

BUILDING
COMMON GROUND



EgcoBox[®] M

North America
(ESR-5212)

Egcoibox M - North America

Design Imperial in kip / kip-ft per Egcoibox4

concrete 2,900 psi / 20.0 MPa.....	5
<i>MM - design table.....</i>	<i>5</i>
<i>VM - design table.....</i>	<i>9</i>
<i>MM± - design table.....</i>	<i>12</i>
concrete 3,630 psi / 25.0 MPa.....	15
<i>MM - design table.....</i>	<i>15</i>
<i>VM - design table.....</i>	<i>19</i>
<i>MM± - design table.....</i>	<i>22</i>
concrete 4,000 psi / 27.6 MPa.....	25
<i>MM - design table.....</i>	<i>25</i>
<i>VM - design table.....</i>	<i>29</i>
<i>MM± - design table.....</i>	<i>32</i>
concrete 4,350 psi / 30.0 MPa.....	35
<i>MM - design table.....</i>	<i>35</i>
<i>VM - design table.....</i>	<i>39</i>
<i>MM± - design table.....</i>	<i>42</i>
concrete 5,000 psi / 34.5 MPa.....	45
<i>MM - design table.....</i>	<i>45</i>
<i>VM - design table.....</i>	<i>49</i>
<i>MM± - design table.....</i>	<i>52</i>

Design Imperial in kip / kip-ft per ft55

concrete 2,900 psi / 20.0 MPa.....	56
<i>MM - design table.....</i>	<i>56</i>
<i>VM - design table.....</i>	<i>60</i>
<i>MM± - design table.....</i>	<i>63</i>
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<i>MM - design table.....</i>	<i>66</i>
<i>VM - design table.....</i>	<i>70</i>
<i>MM± - design table.....</i>	<i>73</i>
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<i>MM - design table.....</i>	<i>76</i>
<i>VM - design table.....</i>	<i>80</i>
<i>MM± - design table.....</i>	<i>83</i>
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<i>MM± - design table.....</i>	<i>93</i>
concrete 5,000 psi / 34.5 MPa.....	96
<i>MM - design table.....</i>	<i>96</i>
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<i>MM± - design table.....</i>	<i>103</i>

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MM± - design table.....	114
concrete 3,630 psi / 25.0 MPa.....	117
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MM± - design table.....	124
concrete 4,000 psi / 27.6 MPa.....	127
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MM± - design table.....	134
concrete 4,350 psi / 30.0 MPa.....	137
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MM± - design table.....	144
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Egcobox[®] M

design Imperial

values in kip / kip-ft

per Egcobox[®] element (unit)

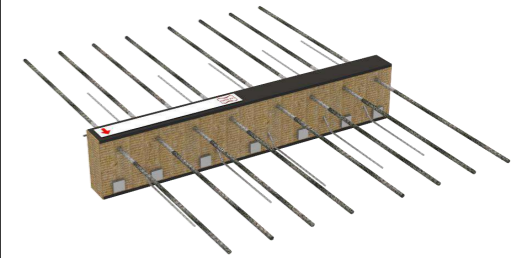
Concrete quality

- 2,900 psi / 20.0 MPa
- 3,630 psi / 25.0 MPa
- 4,000 psi / 27.6 MPa
- 4,350 psi / 30.0 MPa
- 5,000 psi / 34.5 MPa

Design table Egccobox® type MM - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per Egccobox® element

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egccobox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM _n [kip-ft/element]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-4.6	-7.9	-9.9	-11.9	-11.9	-13.9	-15.9	-17.9	-19.9	-21.8	-23.8	-25.8	-27.8	-13.9	
165	178	191	6 1/2"	7"	7 1/2"		-4.9	-8.6	-10.7	-12.9	-12.9	-15.0	-17.2	-19.3	-21.4	-23.6	-25.7	-27.9	-30.0	-15.0	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-5.3	-9.2	-11.5	-13.8	-13.8	-16.1	-18.4	-20.7	-23.0	-25.3	-27.6	-29.9	-32.2	-16.1	
178	191	203	7"	7 1/2"	8"		-5.6	-9.8	-12.3	-14.8	-14.8	-17.2	-19.7	-22.1	-24.6	-27.1	-29.5	-32.0	-34.4	-17.2	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-6.0	-10.5	-13.1	-15.7	-15.7	-18.3	-21.0	-23.6	-26.2	-28.8	-31.4	-34.0	-36.7	-18.3	
191	203	216	7 1/2"	8"	8 1/2"		-6.3	-11.1	-13.9	-16.7	-16.7	-19.4	-22.2	-25.0	-27.8	-30.5	-33.3	-36.1	-38.9	-19.4	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-6.7	-11.7	-14.7	-17.6	-17.6	-20.5	-23.5	-26.4	-29.4	-32.3	-35.2	-38.2	-41.1	-20.5	
203	216	229	8"	8 1/2"	9"		-7.1	-12.4	-15.5	-18.6	-18.6	-21.7	-24.8	-27.8	-30.9	-34.0	-37.1	-40.2	-43.3	-21.7	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-7.4	-13.0	-16.3	-19.5	-19.5	-22.8	-26.0	-29.3	-32.5	-35.8	-39.0	-42.3	-45.5	-22.8	
216	229	241	8 1/2"	9"	9 1/2"		-7.8	-13.6	-17.1	-20.5	-20.5	-23.9	-27.3	-30.7	-34.1	-37.5	-40.9	-44.3	-47.7	-23.9	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-8.1	-14.3	-17.8	-21.4	-21.4	-25.0	-28.5	-32.1	-35.7	-39.3	-42.8	-46.4	-50.0	-25.0	
229	241	254	9"	9 1/2"	10"		-8.5	-14.9	-18.6	-22.4	-22.4	-26.1	-29.8	-33.5	-37.3	-41.0	-44.7	-48.5	-52.2	-26.1	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-8.8	-15.5	-19.4	-23.3	-23.3	-27.2	-31.1	-35.0	-38.9	-42.7	-46.6	-50.5	-54.4	-27.2	
241	254	267	9 1/2"	10"	10 1/2"		-9.2	-16.2	-20.2	-24.3	-24.3	-28.3	-32.3	-36.4	-40.4	-44.5	-48.5	-52.6	-56.6	-28.3	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-9.5	-16.8	-21.0	-25.2	-25.2	-29.4	-33.6	-37.8	-42.0	-46.2	-50.4	-54.6	-58.8	-29.4	
254	267	279	10"	10 1/2"	11"		-9.9	-17.4	-21.8	-26.2	-26.2	-30.5	-34.9	-39.2	-43.6	-48.0	-52.3	-56.7	-61.0	-30.5	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-10.3	-18.1	-22.6	-27.1	-27.1	-31.6	-36.1	-40.7	-45.2	-49.7	-54.2	-58.7	-63.3	-31.6	
267	279	292	10 1/2"	11"	11 1/2"		-10.6	-18.7	-23.4	-28.1	-28.1	-32.7	-37.4	-42.1	-46.8	-51.4	-56.1	-60.8	-65.5	-32.7	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-11.0	-19.3	-24.2	-29.0	-29.0	-33.8	-38.7	-43.5	-48.4	-53.2	-58.0	-62.9	-67.7	-33.8	
279	292	305	11"	11 1/2"	12"		-11.3	-20.0	-25.0	-30.0	-30.0	-35.0	-39.9	-44.9	-49.9	-54.9	-59.9	-64.9	-69.9	-35.0	
286	298		11 1/4"	11 3/4"			-11.7	-20.6	-25.8	-30.9	-30.9	-36.1	-41.2	-46.4	-51.5	-56.7	-61.8	-67.0	-72.1	-36.1	
292	305		11 1/2"	12"			-12.0	-21.2	-26.5	-31.9	-31.9	-37.2	-42.5	-47.8	-53.1	-58.4	-63.7	-69.0	-74.3	-37.2	
298			11 3/4"				-12.4	-21.9	-27.3	-32.8	-32.8	-38.3	-43.7	-49.2	-54.7	-60.2	-65.6	-71.1	-76.6	-38.3	
305			12"				-12.7	-22.5	-28.1	-33.8	-33.8	-39.4	-45.0	-50.6	-56.3	-61.9	-67.5	-73.1	-78.8	-39.4	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV _n [kip/element]														
	C38	C51	C64	1 1/2"	2"	2 1/2"															
VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.0	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	5.3	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	7.9	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	15.8	16.5
V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	10.5	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	21.1	-
V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	20.7
V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+3.0 / -3.0	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+5.9 / -5.9	+3.0 / -3.0
V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+5.9 / -4.4	+11.9 / -8.9	+11.9 / -8.9	+11.9 / -8.9	+11.9 / -8.9	+11.9 / -8.9	+11.9 / -8.9	+11.9 / -8.9	+15.8 / -10.5	+15.8 / -10.5	+15.8 / -10.5	+15.8 / -10.5	+15.8 / -10.5	+15.8 / -10.5	+7.9 / -5.3
V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+12.4 / -12.4	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+24.8 / -24.8	+12.4 / -12.4

Shear force level VS to V4 also possible with lifting shear force (-3 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egccobox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egcoibox® type MM - per Egcoibox® element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox® type MM - per Egcoibox® element

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		Rotation spring stiffness [kip-ft/rad/element]																	
concrete cover top [in]																			
C38	C51	C64	1 1/2"	2"	2 1/2"														
159	171	184	6 3/4"	6 3/4"	7 1/4"	510	703	843	973	1,020	1,153	1,332	1,510	1,687	1,864	2,041	2,217	2,393	1,197
165	178	191	6 1/2"	7"	7 1/2"	592	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	1,395
171	184	197	6 3/4"	7 1/4"	7 3/4"	680	944	1,133	1,308	1,371	1,550	1,790	2,029	2,267	2,505	2,742	2,979	3,216	1,608
178	191	203	7"	7 1/2"	8"	775	1,078	1,295	1,494	1,566	1,770	2,044	2,317	2,589	2,861	3,132	3,403	3,673	1,837
184	197	210	7 1/4"	7 3/4"	8 1/4"	876	1,222	1,466	1,692	1,774	2,005	2,315	2,624	2,933	3,240	3,547	3,854	4,161	2,080
191	203	216	7 1/2"	8"	8 1/2"	982	1,374	1,649	1,903	1,994	2,254	2,603	2,951	3,297	3,643	3,989	4,334	4,678	2,339
197	210	222	7 3/4"	8 1/4"	8 3/4"	1,095	1,534	1,842	2,126	2,228	2,519	2,908	3,297	3,684	4,070	4,456	4,841	5,226	2,613
203	216	229	8"	8 1/2"	9"	1,215	1,704	2,046	2,361	2,475	2,797	3,230	3,661	4,091	4,521	4,949	5,377	5,805	2,902
210	222	235	8 1/4"	8 3/4"	9 1/4"	1,340	1,883	2,260	2,609	2,734	3,091	3,569	4,045	4,520	4,995	5,468	5,941	6,414	3,207
216	229	241	8 1/2"	9"	9 1/2"	1,471	2,071	2,485	2,869	3,006	3,399	3,925	4,449	4,971	5,492	6,013	6,533	7,053	3,526
222	235	248	8 3/4"	9 1/4"	9 3/4"	1,609	2,267	2,721	3,141	3,292	3,721	4,297	4,871	5,443	6,014	6,584	7,153	7,722	3,861
229	241	254	9"	9 1/2"	10"	1,753	2,473	2,968	3,425	3,590	4,058	4,687	5,312	5,936	6,559	7,180	7,801	8,422	4,211
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,903	2,687	3,225	3,722	3,901	4,410	5,093	5,773	6,451	7,127	7,803	8,478	9,152	4,576
241	254	267	9 1/2"	10"	10 1/2"	2,059	2,910	3,493	4,032	4,226	4,777	5,516	6,252	6,987	7,719	8,451	9,182	9,913	4,956
248	260	273	9 3/4"	10 1/4"	10 3/4"	2,221	3,143	3,772	4,353	4,563	5,158	5,956	6,751	7,544	8,335	9,125	9,915	10,703	5,352
254	267	279	10"	10 1/2"	11"	2,389	3,384	4,061	4,687	4,913	5,554	6,413	7,269	8,123	8,975	9,825	10,675	11,525	5,762
260	273	286	10 1/4"	10 3/4"	11 1/4"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
267	279	292	10 1/2"	11"	11 1/2"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
273	286	298	10 3/4"	11 1/4"	11 3/4"	2,745	3,893	4,672	5,392	5,652	6,389	7,378	8,363	9,345	10,325	11,303	12,281	13,258	6,629
279	292	305	11"	11 1/2"	12"	2,931	4,160	4,994	5,763	6,041	6,828	7,886	8,938	9,988	11,035	12,081	13,126	14,170	7,085
286	298		11 1/4"	11 3/4"		3,124	4,437	5,326	6,147	6,442	7,283	8,410	9,533	10,652	11,769	12,885	13,999	15,113	7,556
292	305		11 1/2"	12"		3,323	4,723	5,669	6,543	6,857	7,751	8,951	10,146	11,338	12,527	13,714	14,900	16,086	8,043
298			11 3/4"			3,529	5,017	6,022	6,951	7,285	8,235	9,510	10,779	12,045	13,308	14,569	15,830	17,089	8,545
305			12"			3,740	5,321	6,387	7,371	7,725	8,733	10,085	11,431	12,773	14,113	15,451	16,787	18,123	9,061

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egcoibox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 2,900$ psi / 20.0 MPa (Imperial); - per Egccobox® element

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egccobox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [in ²]	0.37	0.74	0.93	1.11	1.11	1.30	1.48	1.67	1.86	2.04	2.23	2.41	2.60	1.30
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [in ²]	0.49	0.93	1.16	1.39	1.39	1.62	1.86	2.09	2.32	2.55	2.78	3.01	3.25	1.62
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [in ²]	0.05	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
shear force level V1 $\geq a_g$ [in ²]	0.08	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
shear force level V2 $\geq a_g$ [in ²]	0.12	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.25
shear force level V3 $\geq a_g$ [in ²]	0.16	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	-
shear force level V4 $\geq a_g$ [in ²]	-	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.32
shear force level VS \pm $\geq a_g$ [in ²]	-	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
shear force level V1 \pm $\geq a_g$ [in ²]	-	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
shear force level V2 \pm $\geq a_g$ [in ²]	-	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.24	0.25
shear force level V3 \pm $\geq a_g$ [in ²]	-	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	-
shear force level V4 \pm $\geq a_g$ [in ²]	-	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.32
shear force level V6 \pm $\geq a_g$ [in ²]	0.04	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.04
shear force level V7 \pm $\geq a_g$ [in ²]	0.09	0.18	0.18	0.18	0.18	0.18	0.18	0.24	0.24	0.24	0.24	0.24	0.24	0.12
shear force level V8 \pm $\geq a_g$ [in ²]	0.19	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.19

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

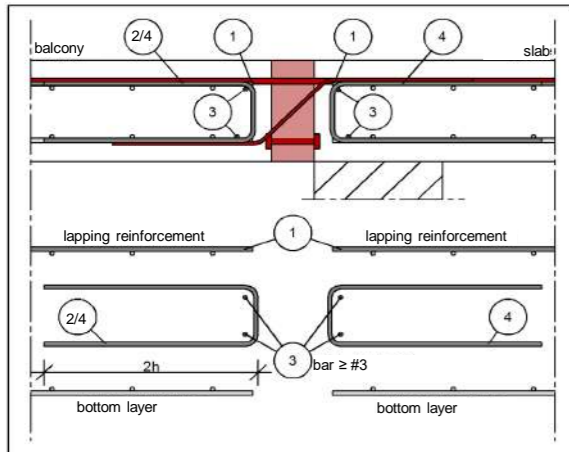
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

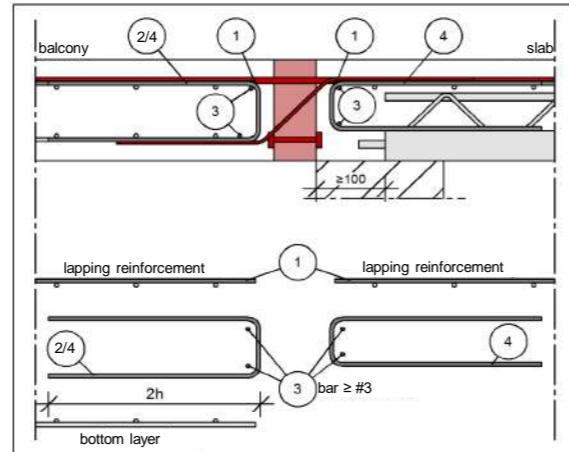
The specifications apply to good bonding conditions.

design proposal

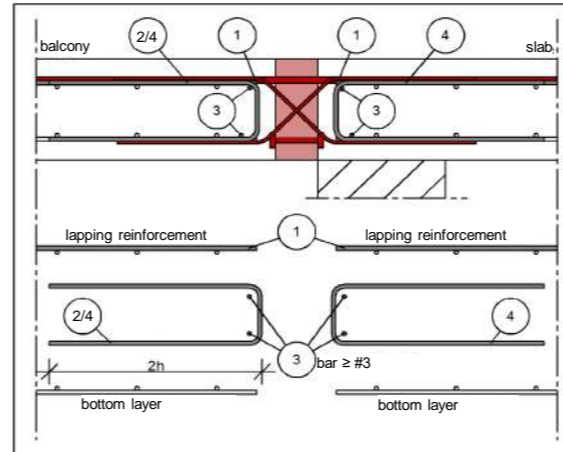
direct support



direct support (semi-prefab slab)



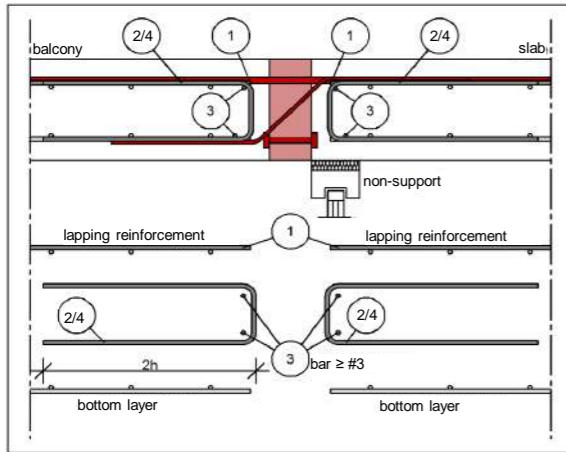
direct support with alternating shear force (V6 \pm , V7 \pm , V8 \pm)



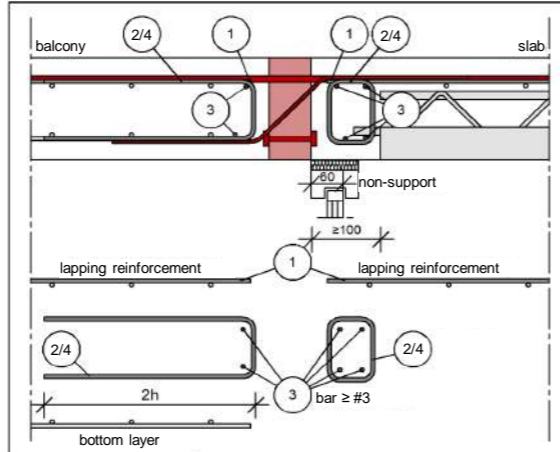
For the Egccobox shear force levels VS \pm to V4 \pm , a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



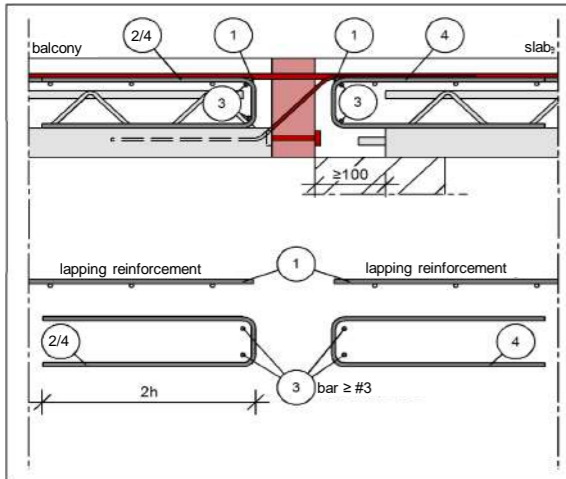
indirect support (semi-prefab slab)



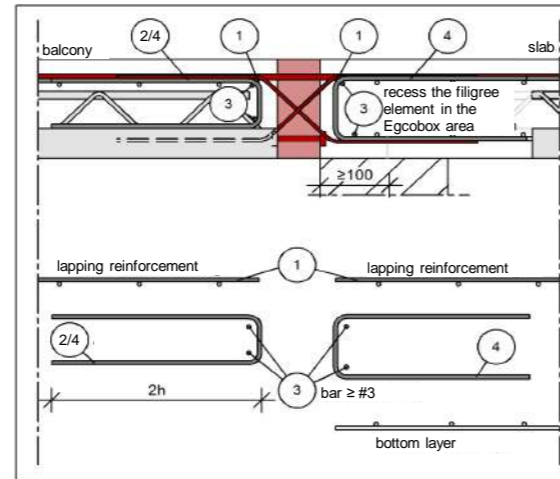
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

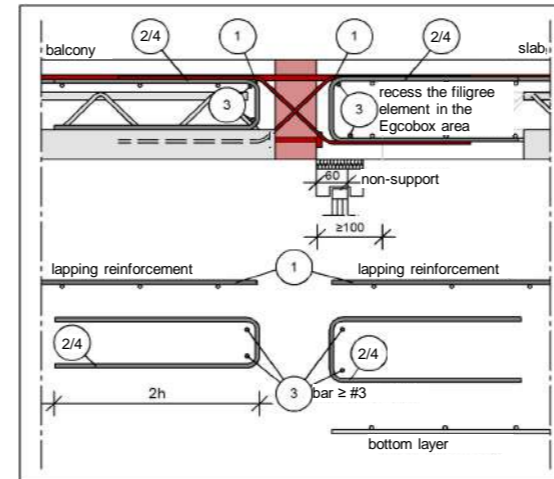
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



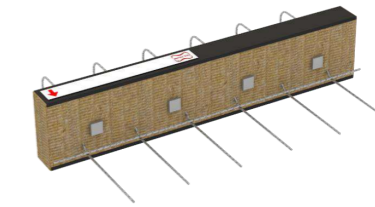
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per Egcoibox® element

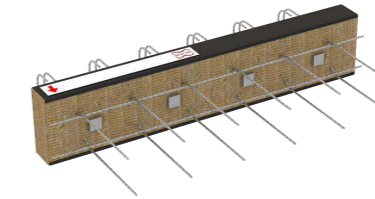
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399			
length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/element]									
C38	C51	C64	1 1/2"	2"	2 1/2"										
height of connection [mm]			height of connection [in]												
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	5.9	7.4	10.5	13.2	15.8	21.1	26.4	31.6	-	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	5.9	7.4	10.5	13.2	15.8	21.1	26.4	31.6	41.3	49.6

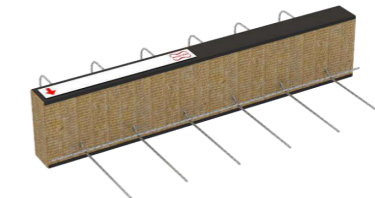
Reinforcement												
shear force bars [qty ø mm]			4 ø 6	5 ø 6	4 ø 8	5 ø 8	6 ø 8	8 ø 8	10 ø 8	12 ø 8	10 ø 10	12 ø 10
minimum wall / beam width [in]			7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"
compression bearings [qty ø mm]			4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	6 ø 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per Egcoibox® element

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K			
length of element [ft in]			7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/element]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	3.0	5.3	7.9	10.5	13.2	-	18.5	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	3.0	5.3	7.9	10.5	13.2	16.5	18.5	24.8

Reinforcement										
shear force bars [qty ø mm]			2 ø 6	2 ø 8	3 ø 8	4 ø 8	5 ø 8	4 ø 10	7 ø 8	6 ø 10
minimum wall / beam width [in]			7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"
compression bearings [qty ø mm]			1 ø 12	1 ø 12	1 ø 12	2 ø 12	2 ø 12	2 ø 12	3 ø 12	3 ø 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"

All Egcoibox types can also be produced in the following variants:

VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K

VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 2,900$ psi / 20.0 MPa (Imperial); - per Egccobox® element

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [in ²]	0.09	0.11	0.16	0.20	0.24	0.32	0.40	0.48	0.63	0.76
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [in ²]	0.05	0.08	0.12	0.16	0.20	0.25	0.28	0.38
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

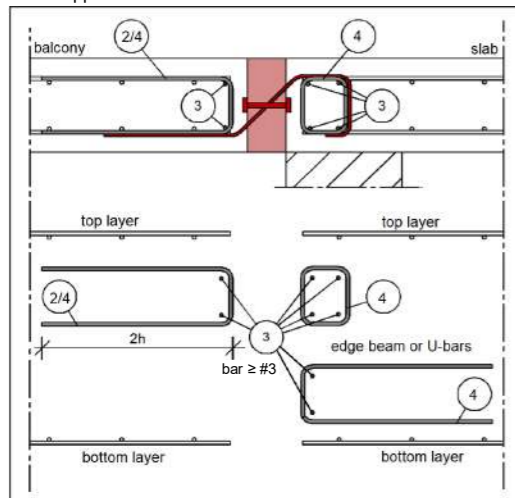
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

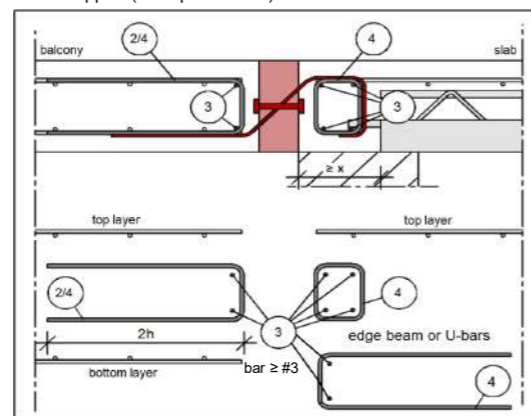
The specifications apply to good bonding conditions.

design proposal

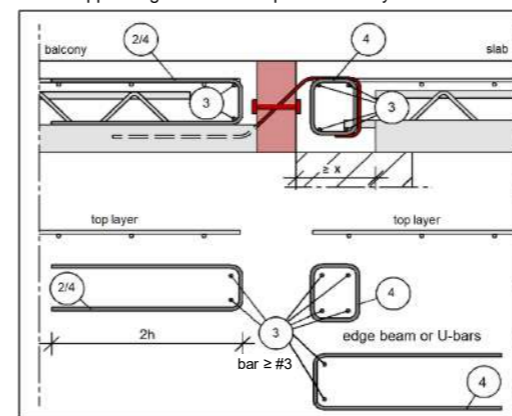
direct support



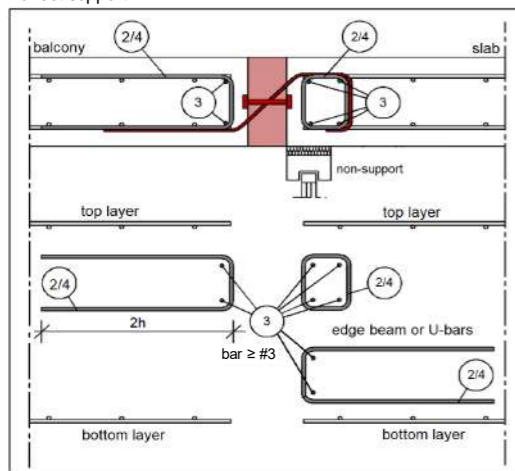
direct support (semi-prefab slab)



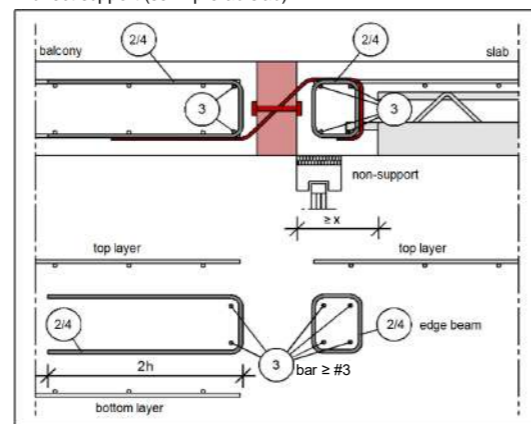
direct support: Egccobox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egccobox in semi-prefab balcony:

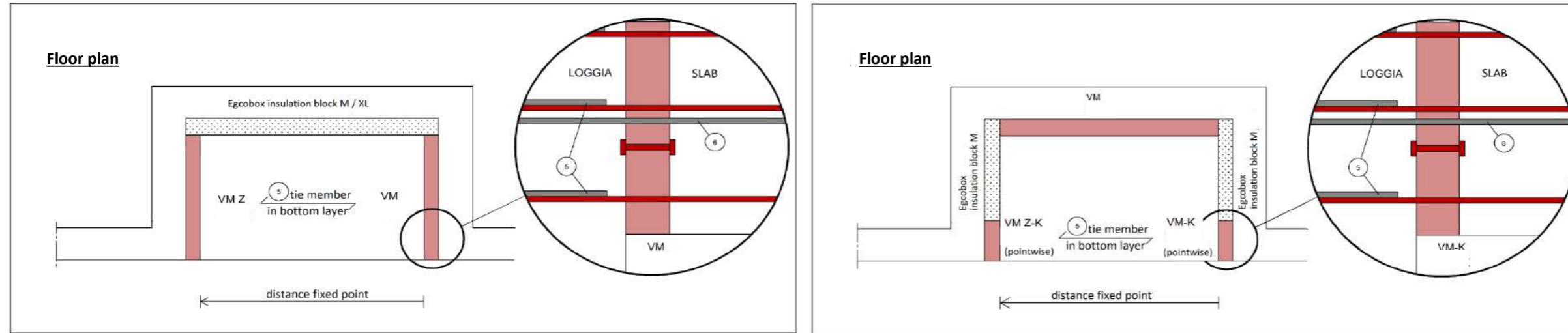
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

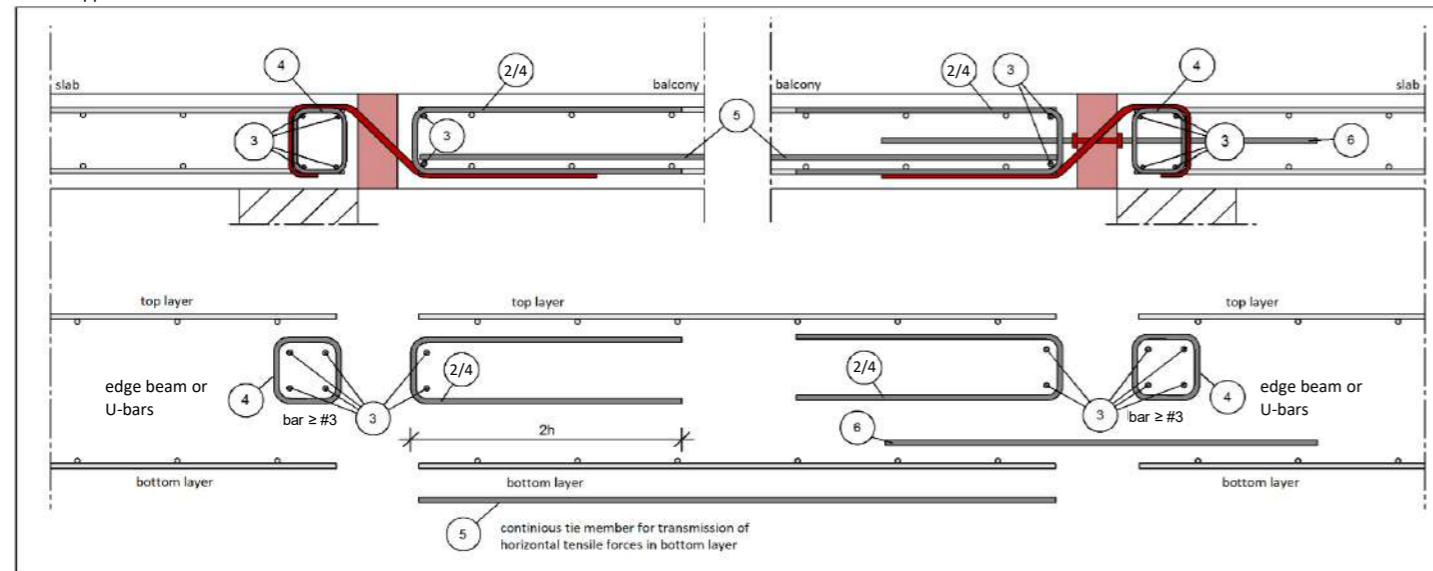
The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

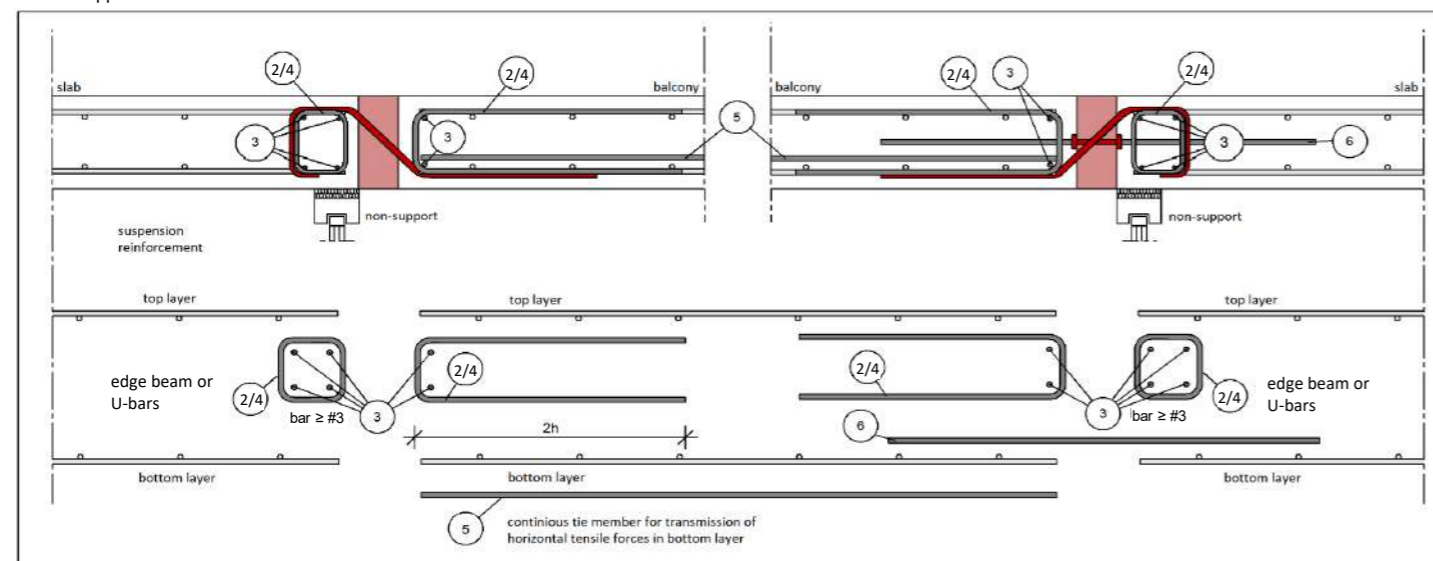


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per Egccobox® element

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM_n [kip-ft/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±8.3	±10.4	±12.5	±14.5	±16.6	±18.7	±20.8	±20.8	±23.7	±26.7	±29.7	±17.8	±20.8	±23.7	±36.7	
	178	203	229	7"	8"	9"	±8.9	±11.2	±13.4	±15.6	±17.9	±20.1	±22.3	±22.4	±25.6	±28.8	±32.0	±19.2	±22.4	±25.6	±39.7	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±9.6	±12.0	±14.4	±16.7	±19.1	±21.5	±23.9	±24.0	±27.5	±30.9	±34.3	±20.6	±24.0	±27.5	±42.6	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±10.2	±12.8	±15.3	±17.9	±20.4	±23.0	±25.5	±25.7	±29.3	±33.0	±36.6	±22.0	±25.7	±29.3	±45.5	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±10.8	±13.5	±16.3	±19.0	±21.7	±24.4	±27.1	±27.3	±31.2	±35.1	±39.0	±23.4	±27.3	±31.2	±48.5	
	203	229	254	8"	9"	10"	±11.5	±14.3	±17.2	±20.1	±22.9	±25.8	±28.7	±28.9	±33.0	±37.2	±41.3	±24.8	±28.9	±33.0	±51.4	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±12.1	±15.1	±18.2	±21.2	±24.2	±27.2	±30.3	±30.5	±34.9	±39.2	±43.6	±26.2	±30.5	±34.9	±54.4	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±12.7	±15.9	±19.1	±22.3	±25.5	±28.7	±31.8	±32.1	±36.7	±41.3	±45.9	±27.6	±32.1	±36.7	±57.3	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±13.4	±16.7	±20.1	±23.4	±26.7	±30.1	±33.4	±33.8	±38.6	±43.4	±48.2	±28.9	±33.8	±38.6	±60.2	
	229	254	279	9"	10"	11"	±14.0	±17.5	±21.0	±24.5	±28.0	±31.5	±35.0	±35.4	±40.5	±45.5	±50.6	±30.3	±35.4	±40.5	±63.2	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±14.6	±18.3	±22.0	±25.6	±29.3	±32.9	±36.6	±37.0	±42.3	±47.6	±52.9	±31.7	±37.0	±42.3	±66.1	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±15.3	±19.1	±22.9	±26.7	±30.5	±34.4	±38.2	±38.6	±44.2	±49.7	±55.2	±33.1	±38.6	±44.2	±69.1	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±15.9	±19.9	±23.9	±27.8	±31.8	±35.8	±39.8	±40.3	±46.0	±51.8	±57.5	±34.5	±40.3	±46.0	±72.0	
	254	279	305	10"	11"	12"	±16.5	±20.7	±24.8	±28.9	±33.1	±37.2	±41.3	±41.9	±47.9	±53.9	±59.8	±35.9	±41.9	±47.9	±75.0	
	260	286		10 1/4"	11 1/4"		±17.2	±21.5	±25.7	±30.0	±34.3	±38.6	±42.9	±43.5	±49.7	±56.0	±62.2	±37.3	±43.5	±49.7	±77.9	
	267	292		10 1/2"	11 1/2"		±17.8	±22.2	±26.7	±31.1	±35.6	±40.0	±44.5	±45.1	±51.6	±58.0	±64.5	±38.7	±45.1	±51.6	±80.8	
	273	298		10 3/4"	11 3/4"		±18.4	±23.0	±27.6	±32.3	±36.9	±41.5	±46.1	±46.8	±53.4	±60.1	±66.8	±40.1	±46.8	±53.4	±83.8	
	279	305		11"	12"		±19.1	±23.8	±28.6	±33.4	±38.1	±42.9	±47.7	±48.4	±55.3	±62.2	±69.1	±41.5	±48.4	±55.3	±86.7	
	286			11 1/4"			±19.7	±24.6	±29.5	±34.5	±39.4	±44.3	±49.2	±50.0	±57.2	±64.3	±71.4	±42.9	±50.0	±57.2	±89.7	
	292			11 1/2"			±20.3	±25.4	±30.5	±35.6	±40.7	±45.7	±50.8	±51.6	±59.0	±66.4	±73.8	±44.3	±51.6	±59.0	±92.6	
298			11 3/4"			±21.0	±26.2	±31.4	±36.7	±41.9	±47.2	±52.4	±53.3	±60.9	±68.5	±76.1	±45.7	±53.3	±60.9	±95.5		
305			12"			±21.6	±27.0	±32.4	±37.8	±43.2	±48.6	±54.0	±54.9	±62.7	±70.6	±78.4	±47.0	±54.9	±62.7	±98.5		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV_n [kip/element]																
	C38	C51	C64	1 1/2"	2"	2 1/2"																	
VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	±7.7	
V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7	±13.7
V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6	±20.6
V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±27.4	±27.4	±27.4	±27.4	±27.4	±27.4	±27.4	±27.4	±27.4	±27.4	±27.4	-	-	-	-	-	-
V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±32.2	±32.2	±32.2	±32.2	±32.2	±32.2	±32.2	±32.2	±32.2	-	-	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±42.9	±42.9	±42.9	±42.9	±42.9	±42.9	±42.9	-	-	-	-	-	-

concrete cover for top and bottom reinforcement Egccobox®
other heights on request



Reinforcement Egccobox® type MM± - per Egccobox® element

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egccobox® type MM± - per Egccobox® element

Egccobox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"				
concrete cover [mm]		concrete cover [in]			Rotation spring stiffness [kip-ft/rad/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	461	576	692	807	922	1,037	1,153	1,107	1,265	1,423	1,581	949	1,107	1,265	1,433
178	203	229	7"	8"	9"	534	667	801	934	1,068	1,201	1,335	1,286	1,470	1,654	1,837	1,102	1,286	1,470	1,672
184	210	235	7 1/4"	8 1/4"	9 1/4"	612	765	918	1,071	1,224	1,377	1,530	1,479	1,690	1,901	2,113	1,268	1,479	1,690	1,928
191	216	241	7 1/2"	8 1/2"	9 1/2"	696	869	1,043	1,217	1,391	1,565	1,739	1,685	1,926	2,166	2,407	1,444	1,685	1,926	2,203
197	222	248	7 3/4"	8 3/4"	9 3/4"	784	980	1,177	1,373	1,569	1,765	1,961	1,905	2,177	2,449	2,721	1,633	1,905	2,177	2,496
203	229	254	8"	9"	10"	879	1,098	1,318	1,538	1,757	1,977	2,196	2,138	2,443	2,749	3,054	1,832	2,138	2,443	2,808
210	235	260	8 1/4"	9 1/4"	10 1/4"	978	1,223	1,467	1,712	1,956	2,201	2,445	2,384	2,725	3,066	3,406	2,044	2,384	2,725	3,138
216	241	267	8 1/2"	9 1/2"	10 1/2"	1,083	1,354	1,624	1,895	2,166	2,437	2,707	2,644	3,022	3,400	3,778	2,267	2,644	3,022	3,486
222	248	273	8 3/4"	9 3/4"	10 3/4"	1,193	1,491	1,790	2,088	2,386	2,685	2,983	2,918	3,335	3,752	4,168	2,501	2,918	3,335	3,852
229	254	279	9"	10"	11"	1,309	1,636	1,963	2,290	2,617	2,945	3,272	3,205	3,663	4,121	4,578	2,747	3,205	3,663	4,237
235	260	286	9 1/4"	10 1/4"	11 1/4"	1,430	1,787	2,144	2,502	2,859	3,217	3,574	3,505	4,006	4,507	5,007	3,004	3,505	4,006	4,640
241	267	292	9 1/2"	10 1/2"	11 1/2"	1,556	1,945	2,334	2,723	3,112	3,501	3,890	3,819	4,365	4,910	5,456	3,273	3,819	4,365	5,062
248	273	298	9 3/4"	10 3/4"	11 3/4"	1,687	2,109	2,531	2,953	3,375	3,797	4,219	4,146	4,739	5,331	5,923	3,554	4,146	4,739	5,501
254	279	305	10"	11"	12"	1,824	2,280	2,736	3,193	3,649	4,105	4,561	4,487	5,128	5,769	6,410	3,846	4,487	5,128	5,959
260	286		10 1/4"	11 1/4"		1,967	2,458	2,950	3,441	3,933	4,425	4,916	4,841	5,533	6,225	6,916	4,150	4,841	5,533	6,436
267	292		10 1/2"	11 1/2"		2,114	2,643	3,171	3,700	4,228	4,757	5,285	5,209	5,953	6,697	7,441	4,465	5,209	5,953	6,930
273	298		10 3/4"	11 3/4"		2,267	2,834	3,401	3,967	4,534	5,101	5,668	5,590	6,389	7,187	7,986	4,792	5,590	6,389	7,443
279	305		11"	12"		2,425	3,032	3,638	4,244	4,851	5,457	6,063	5,985	6,840	7,695	8,550	5,130	5,985	6,840	7,975
286			11 1/4"			2,589	3,236	3,883	4,531	5,178	5,825	6,472	6,393	7,306	8,219	9,132	5,479	6,393	7,306	8,524
292			11 1/2"			2,758	3,447	4,137	4,826	5,516	6,205	6,895	6,814	7,788	8,761	9,735	5,841	6,814	7,788	9,092
298			11 3/4"			2,932	3,665	4,398	5,131	5,864	6,597	7,330	7,249	8,285	9,320	10,356	6,214	7,249	8,285	9,678
305			12"			3,112	3,890	4,668	5,445	6,223	7,001	7,779	7,697	8,797	9,897	10,996	6,598	7,697	8,797	10,283

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egccobox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 2,900 psi / 20.0 MPa (Imerial); - per Egcoibox® element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / element - option 1															
≥ a _s [in²]	0.74	0.93	1.11	1.30	1.48	1.67	1.86	1.89	2.16	2.44	2.71	1.62	1.89	2.16	2.18
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [in²]	0.93	1.16	1.39	1.62	1.86	2.09	2.32	2.27	2.60	2.92	3.25	1.95	2.27	2.60	2.48
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [in²]	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
shear force level V1 ≥ a _s [in²]	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
shear force level V2 ≥ a _s [in²]	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32
shear force level V3 ≥ a _s [in²]	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	-	-	-	-
shear force level V4 ≥ a _s [in²]	-	-	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	-	-	-	-
shear force level V5 ≥ a _s [in²]	-	-	-	-	0.66	0.66	0.66	0.66	0.66	0.66	0.66	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

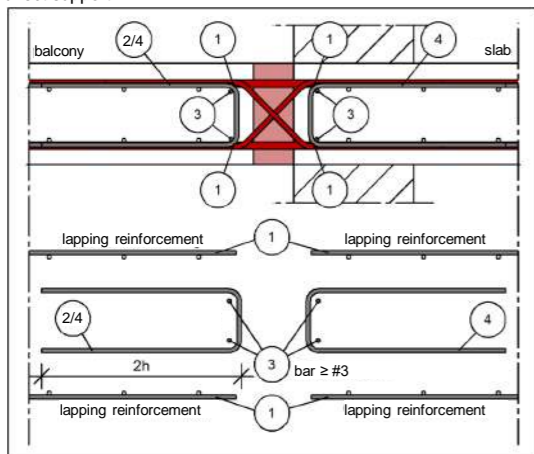
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

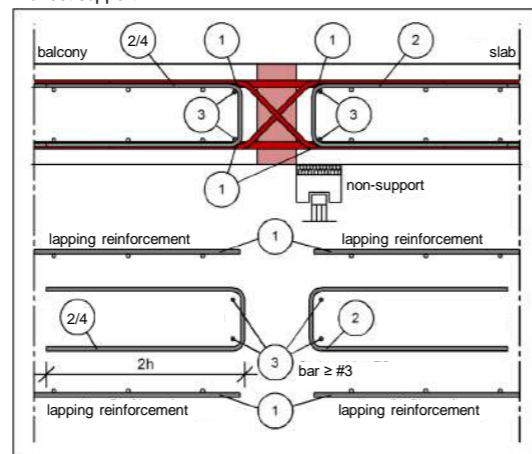
The specifications apply to good bonding conditions.

design proposal

direct support



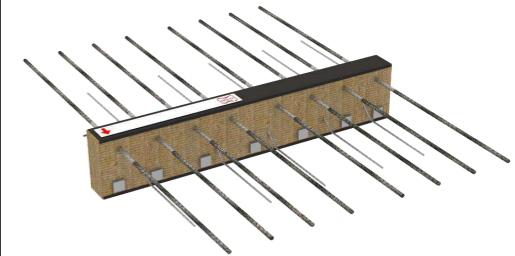
indirect support



Design table Egcoibox® type MM - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per Egcoibox® element

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egcoibox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM _n [kip-ft/element]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-5.1	-8.9	-11.1	-13.3	-13.3	-15.5	-17.8	-20.0	-22.2	-24.4	-26.6	-28.9	-31.1	-15.5	
165	178	191	6 1/2"	7"	7 1/2"		-5.5	-9.6	-12.0	-14.4	-14.4	-16.8	-19.2	-21.6	-24.0	-26.4	-28.8	-31.2	-33.6	-16.8	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-5.9	-10.3	-12.9	-15.4	-15.4	-18.0	-20.6	-23.2	-25.7	-28.3	-30.9	-33.5	-36.0	-18.0	
178	191	203	7"	7 1/2"	8"		-6.3	-11.0	-13.8	-16.5	-16.5	-19.3	-22.0	-24.8	-27.5	-30.3	-33.0	-35.8	-38.5	-19.3	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-6.7	-11.7	-14.6	-17.6	-17.6	-20.5	-23.4	-26.4	-29.3	-32.2	-35.1	-38.1	-41.0	-20.5	
191	203	216	7 1/2"	8"	8 1/2"		-7.1	-12.4	-15.5	-18.6	-18.6	-21.7	-24.8	-27.9	-31.0	-34.2	-37.3	-40.4	-43.5	-21.7	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-7.5	-13.1	-16.4	-19.7	-19.7	-23.0	-26.3	-29.5	-32.8	-36.1	-39.4	-42.7	-45.9	-23.0	
203	216	229	8"	8 1/2"	9"		-7.9	-13.8	-17.3	-20.8	-20.8	-24.2	-27.7	-31.1	-34.6	-38.0	-41.5	-45.0	-48.4	-24.2	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-8.3	-14.5	-18.2	-21.8	-21.8	-25.5	-29.1	-32.7	-36.4	-40.0	-43.6	-47.3	-50.9	-25.5	
216	229	241	8 1/2"	9"	9 1/2"		-8.7	-15.3	-19.1	-22.9	-22.9	-26.7	-30.5	-34.3	-38.1	-41.9	-45.8	-49.6	-53.4	-26.7	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-9.1	-16.0	-19.9	-23.9	-23.9	-27.9	-31.9	-35.9	-39.9	-43.9	-47.9	-51.9	-55.9	-27.9	
229	241	254	9"	9 1/2"	10"		-9.5	-16.7	-20.8	-25.0	-25.0	-29.2	-33.3	-37.5	-41.7	-45.8	-50.0	-54.2	-58.3	-29.2	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-9.9	-17.4	-21.7	-26.1	-26.1	-30.4	-34.8	-39.1	-43.4	-47.8	-52.1	-56.5	-60.8	-30.4	
241	254	267	9 1/2"	10"	10 1/2"		-10.3	-18.1	-22.6	-27.1	-27.1	-31.6	-36.2	-40.7	-45.2	-49.7	-54.3	-58.8	-63.3	-31.6	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-10.7	-18.8	-23.5	-28.2	-28.2	-32.9	-37.6	-42.3	-47.0	-51.7	-56.4	-61.1	-65.8	-32.9	
254	267	279	10"	10 1/2"	11"		-11.1	-19.5	-24.4	-29.2	-29.2	-34.1	-39.0	-43.9	-48.7	-53.6	-58.5	-63.4	-68.2	-34.1	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-11.5	-20.2	-25.3	-30.3	-30.3	-35.4	-40.4	-45.5	-50.5	-55.6	-60.6	-65.7	-70.7	-35.4	
267	279	292	10 1/2"	11"	11 1/2"		-11.9	-20.9	-26.1	-31.4	-31.4	-36.6	-41.8	-47.1	-52.3	-57.5	-62.7	-68.0	-73.2	-36.6	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-12.3	-21.6	-27.0	-32.4	-32.4	-37.8	-43.2	-48.7	-54.1	-59.5	-64.9	-70.3	-75.7	-37.8	
279	292	305	11"	11 1/2"	12"		-12.7	-22.3	-27.9	-33.5	-33.5	-39.1	-44.7	-50.2	-55.8	-61.4	-67.0	-72.6	-78.2	-39.1	
286	298		11 1/4"	11 3/4"			-13.1	-23.0	-28.8	-34.6	-34.6	-40.3	-46.1	-51.8	-57.6	-63.4	-69.1	-74.9	-80.6	-40.3	
292	305		11 1/2"	12"			-13.5	-23.7	-29.7	-35.6	-35.6	-41.6	-47.5	-53.4	-59.4	-65.3	-71.2	-77.2	-83.1	-41.6	
298			11 3/4"				-13.9	-24.5	-30.6	-36.7	-36.7	-42.8	-48.9	-55.0	-61.1	-67.3	-73.4	-79.5	-85.6	-42.8	
305			12"				-14.3	-25.2	-31.5	-37.7	-37.7	-44.0	-50.3	-56.6	-62.9	-69.2	-75.5	-81.8	-88.1	-44.0	



Shear force level		concrete cover top [mm]			concrete cover top [in]			ϕV _n [kip/element]																
		C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.3	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	6.6	
	V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	5.9	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8	11.8
	V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	8.8	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	17.7	18.5
	V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	11.8	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	23.6	-
	V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	23.1
	V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+3.3 / -3.3	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+6.6 / -6.6	+3.3 / -3.3
	V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+6.6 / -5.0	+13.3 / -9.9	+13.3 / -9.9	+13.3 / -9.9	+13.3 / -9.9	+13.3 / -9.9	+13.3 / -9.9	+13.3 / -9.9	+13.3 / -9.9	+17.7 / -11.8	+17.7 / -11.8	+17.7 / -11.8	+17.7 / -11.8	+17.7 / -11.8	+17.7 / -11.8	+17.7 / -11.8	+8.8 / -5.9
	V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+13.9 / -13.9	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+27.7 / -27.7	+13.9 / -13.9

Shear force level VS to V4 also possible with lifting shear force (-3.3 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egcoibox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egcoibox® type MM - per Egcoibox® element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox® type MM - per Egcoibox® element

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		concrete cover top [in]		Rotation spring stiffness [kip-ft/rad/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"														
159	171	184	6 3/4"	6 3/4"	7 1/4"	510	703	843	973	1,020	1,153	1,332	1,510	1,687	1,864	2,041	2,217	2,393	1,197
165	178	191	6 1/2"	7"	7 1/2"	592	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	1,395
171	184	197	6 3/4"	7 1/4"	7 3/4"	680	944	1,133	1,308	1,371	1,550	1,790	2,029	2,267	2,505	2,742	2,979	3,216	1,608
178	191	203	7"	7 1/2"	8"	775	1,078	1,295	1,494	1,566	1,770	2,044	2,317	2,589	2,861	3,132	3,403	3,673	1,837
184	197	210	7 1/4"	7 3/4"	8 1/4"	876	1,222	1,466	1,692	1,774	2,005	2,315	2,624	2,933	3,240	3,547	3,854	4,161	2,080
191	203	216	7 1/2"	8"	8 1/2"	982	1,374	1,649	1,903	1,994	2,254	2,603	2,951	3,297	3,643	3,989	4,334	4,678	2,339
197	210	222	7 3/4"	8 1/4"	8 3/4"	1,095	1,534	1,842	2,126	2,228	2,519	2,908	3,297	3,684	4,070	4,456	4,841	5,226	2,613
203	216	229	8"	8 1/2"	9"	1,215	1,704	2,046	2,361	2,475	2,797	3,230	3,661	4,091	4,521	4,949	5,377	5,805	2,902
210	222	235	8 1/4"	8 3/4"	9 1/4"	1,340	1,883	2,260	2,609	2,734	3,091	3,569	4,045	4,520	4,995	5,468	5,941	6,414	3,207
216	229	241	8 1/2"	9"	9 1/2"	1,471	2,071	2,485	2,869	3,006	3,399	3,925	4,449	4,971	5,492	6,013	6,533	7,053	3,526
222	235	248	8 3/4"	9 1/4"	9 3/4"	1,609	2,267	2,721	3,141	3,292	3,721	4,297	4,871	5,443	6,014	6,584	7,153	7,722	3,861
229	241	254	9"	9 1/2"	10"	1,753	2,473	2,968	3,425	3,590	4,058	4,687	5,312	5,936	6,559	7,180	7,801	8,422	4,211
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,903	2,687	3,225	3,722	3,901	4,410	5,093	5,773	6,451	7,127	7,803	8,478	9,152	4,576
241	254	267	9 1/2"	10"	10 1/2"	2,059	2,910	3,493	4,032	4,226	4,777	5,516	6,252	6,987	7,719	8,451	9,182	9,913	4,956
248	260	273	9 3/4"	10 1/4"	10 3/4"	2,221	3,143	3,772	4,353	4,563	5,158	5,956	6,751	7,544	8,335	9,125	9,915	10,703	5,352
254	267	279	10"	10 1/2"	11"	2,389	3,384	4,061	4,687	4,913	5,554	6,413	7,269	8,123	8,975	9,825	10,675	11,525	5,762
260	273	286	10 1/4"	10 3/4"	11 1/4"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
267	279	292	10 1/2"	11"	11 1/2"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
273	286	298	10 3/4"	11 1/4"	11 3/4"	2,745	3,893	4,672	5,392	5,652	6,389	7,378	8,363	9,345	10,325	11,303	12,281	13,258	6,629
279	292	305	11"	11 1/2"	12"	2,931	4,160	4,994	5,763	6,041	6,828	7,886	8,938	9,988	11,035	12,081	13,126	14,170	7,085
286	298		11 1/4"	11 3/4"		3,124	4,437	5,326	6,147	6,442	7,283	8,410	9,533	10,652	11,769	12,885	13,999	15,113	7,556
292	305		11 1/2"	12"		3,323	4,723	5,669	6,543	6,857	7,751	8,951	10,146	11,338	12,527	13,714	14,900	16,086	8,043
298			11 3/4"			3,529	5,017	6,022	6,951	7,285	8,235	9,510	10,779	12,045	13,308	14,569	15,830	17,089	8,545
305			12"			3,740	5,321	6,387	7,371	7,725	8,733	10,085	11,431	12,773	14,113	15,451	16,787	18,123	9,061

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egcoibox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 3,630$ psi / 25.0 MPa (Imperial); - per Egccobox® element

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egccobox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [in ²]	0.37	0.74	0.93	1.11	1.11	1.30	1.48	1.67	1.86	2.04	2.23	2.41	2.60	1.30
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [in ²]	0.49	0.93	1.16	1.39	1.39	1.62	1.86	2.09	2.32	2.55	2.78	3.01	3.25	1.62
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [in ²]	0.05	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
shear force level V1 $\geq a_g$ [in ²]	0.09	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
shear force level V2 $\geq a_g$ [in ²]	0.14	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.28
shear force level V3 $\geq a_g$ [in ²]	0.18	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	-
shear force level V4 $\geq a_g$ [in ²]	-	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.35
shear force level VS \pm $\geq a_g$ [in ²]	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
shear force level V1 \pm $\geq a_g$ [in ²]	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18
shear force level V2 \pm $\geq a_g$ [in ²]	-	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.28
shear force level V3 \pm $\geq a_g$ [in ²]	-	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	0.36	-
shear force level V4 \pm $\geq a_g$ [in ²]	-	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.35
shear force level V6 \pm $\geq a_g$ [in ²]	0.05	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.05
shear force level V7 \pm $\geq a_g$ [in ²]	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.27	0.27	0.27	0.27	0.27	0.27	0.13
shear force level V8 \pm $\geq a_g$ [in ²]	0.21	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.21

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

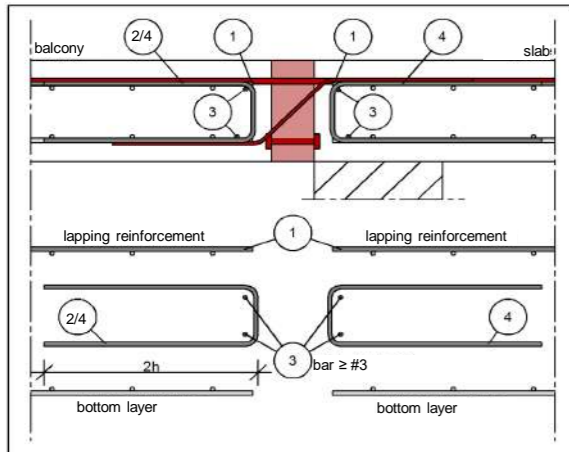
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

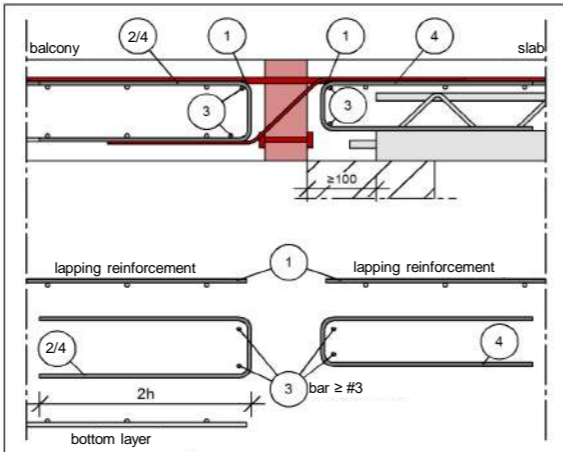
The specifications apply to good bonding conditions.

design proposal

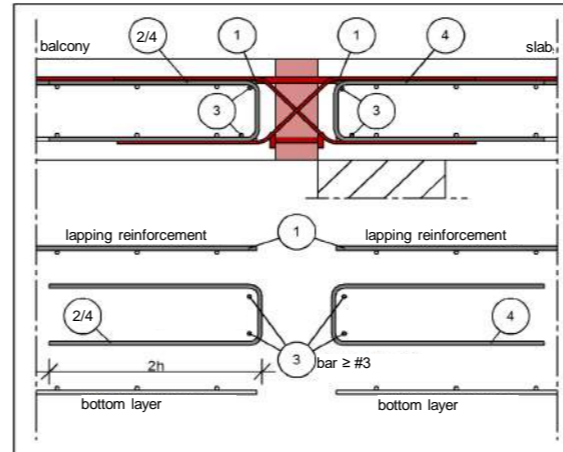
direct support



direct support (semi-prefab slab)



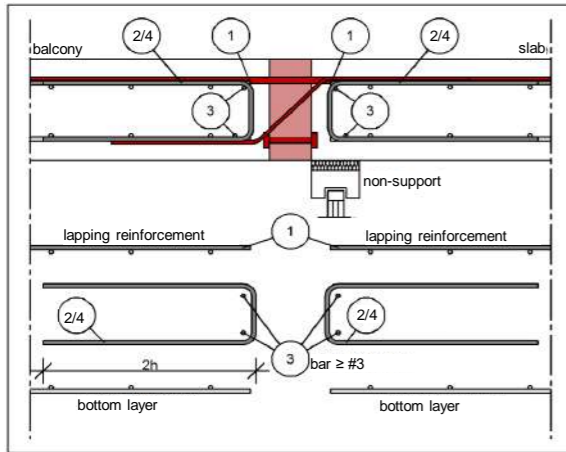
direct support with alternating shear force (V6 \pm , V7 \pm , V8 \pm)



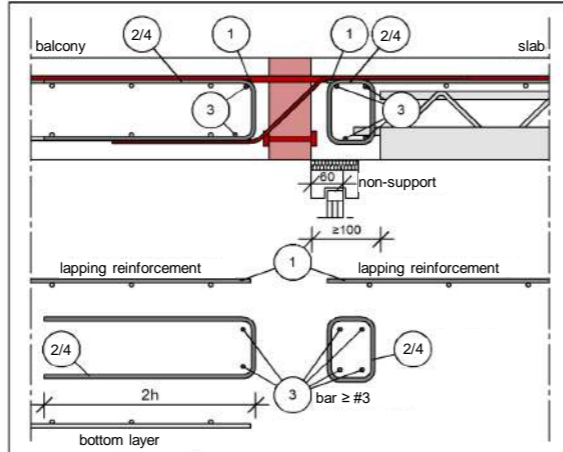
For the Egccobox shear force levels VS \pm to V4 \pm , a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



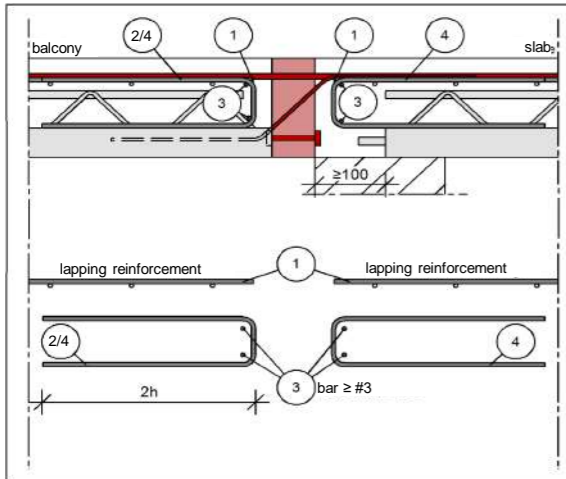
indirect support (semi-prefab slab)



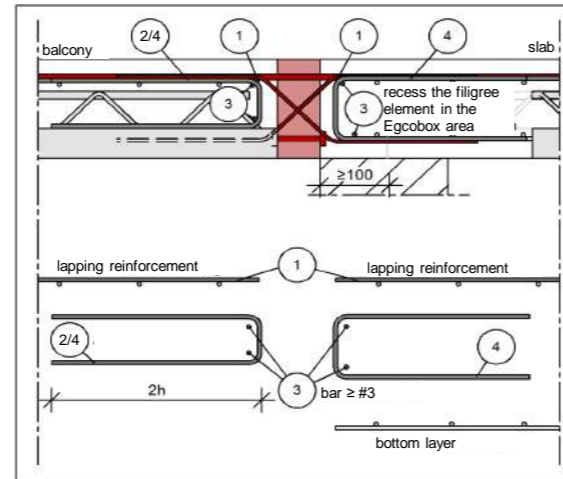
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

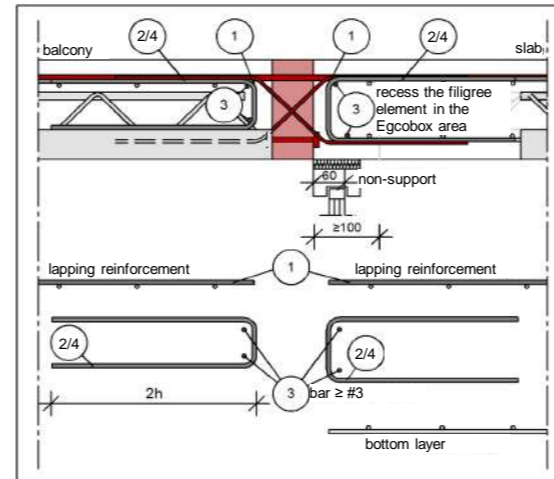
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



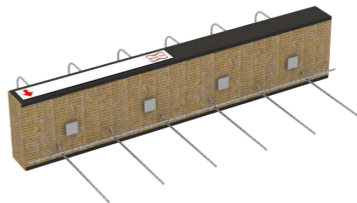
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per Egcoibox® element

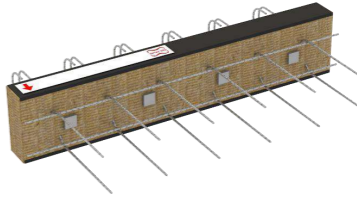
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type						VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399	
length of element [ft in]						3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/element]										
C38	C51	C64	1 1/2"	2"	2 1/2"											
height of connection [mm]			height of connection [in]													
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	6.6	8.3	11.8	14.7	17.7	23.6	29.5	35.4	-	-	
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	6.6	8.3	11.8	14.7	17.7	23.6	29.5	35.4	46.2	55.4	

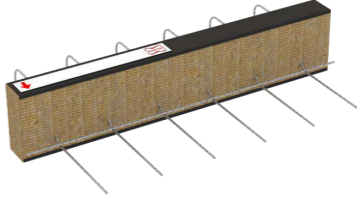
Reinforcement											
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10	
minimum wall / beam width [in]	7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"	
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12	
applicable expansion joint distances [ft in]	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per Egcoibox® element

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type						VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]						7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/element]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	3.3	5.9	8.8	11.8	14.7	-	20.6	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	3.3	5.9	8.8	11.8	14.7	18.5	20.6	27.7

Reinforcement											
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10			
minimum wall / beam width [in]	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"			
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12			
applicable expansion joint distances [ft in]	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"			

All Egcoibox types can also be produced in the following variants:

- VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)
- VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K
- VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

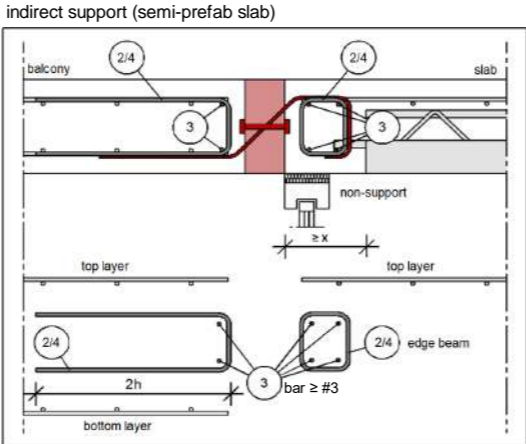
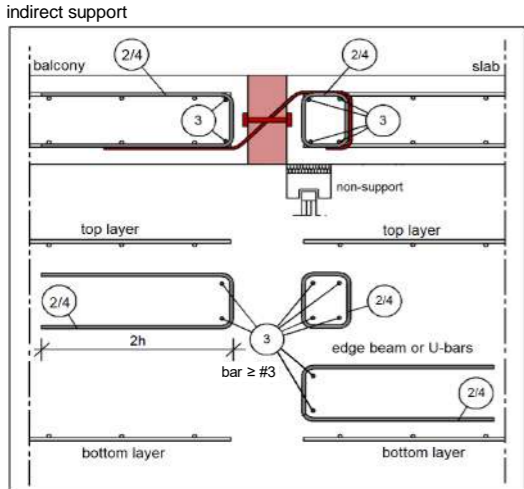
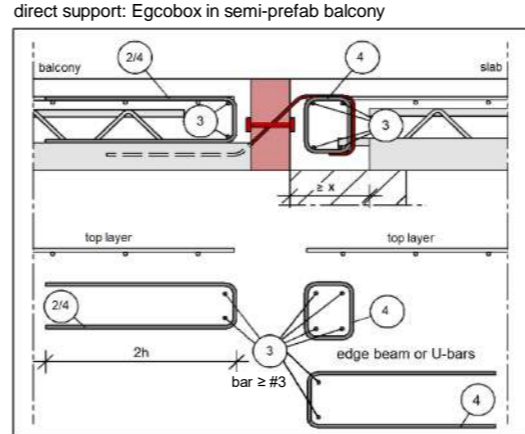
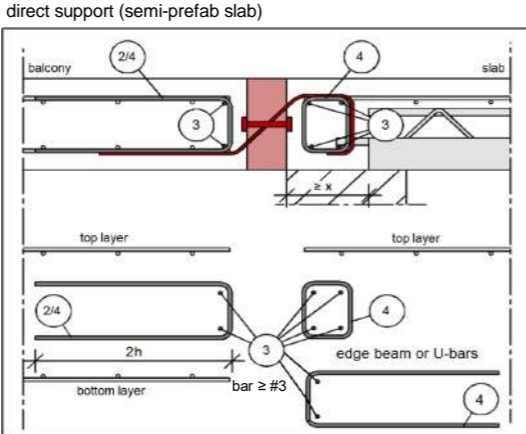
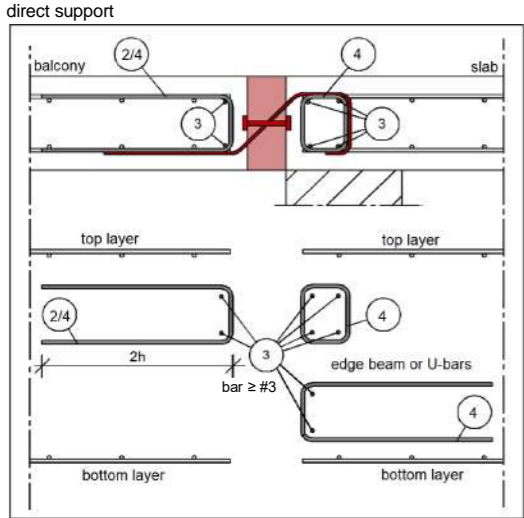
On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 3,630$ psi / 25.0 MPa (Imperial); - per Egccobox® element

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [in ²]	0.10	0.13	0.18	0.23	0.27	0.36	0.45	0.54	0.71	0.85
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [in ²]	0.05	0.09	0.14	0.18	0.23	0.28	0.32	0.42
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement
 On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.
 The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.
 The specifications apply to good bonding conditions.

design proposal

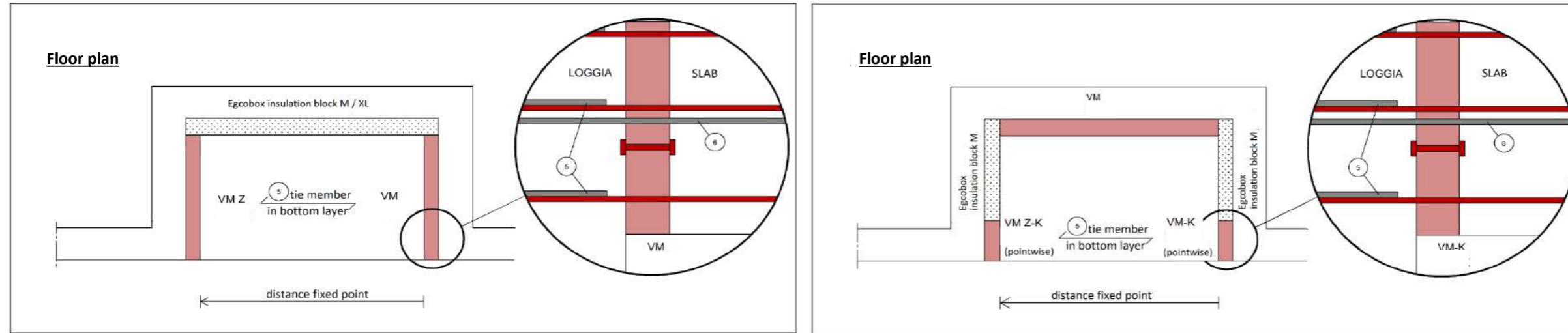


Note Egccobox in semi-prefab balcony:
 It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

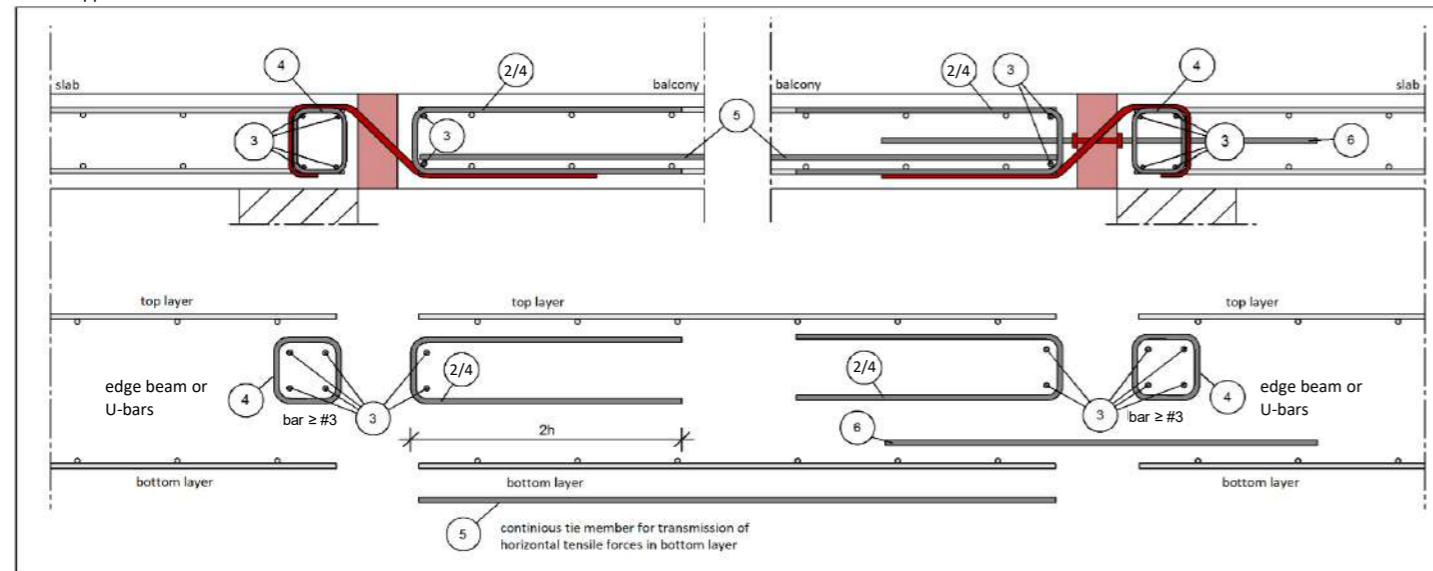
Note indirect support (semi-prefab slab):
 The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

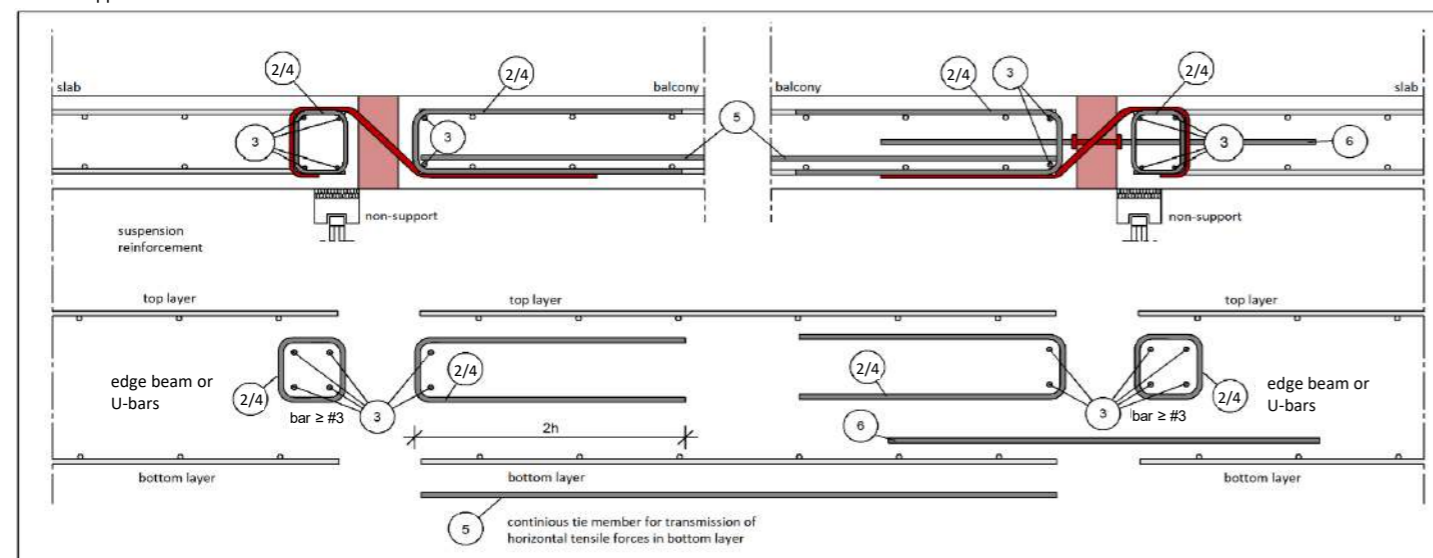


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per Egccobox® element

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM_n [kip-ft/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±9.3	±11.6	±13.9	±16.2	±18.6	±20.9	±23.2	±23.2	±26.6	±29.9	±33.2	±19.9	±23.2	±26.6	±36.7	
	178	203	229	7"	8"	9"	±10.0	±12.5	±15.0	±17.5	±20.0	±22.5	±25.0	±25.1	±28.6	±32.2	±35.8	±21.5	±25.1	±28.6	±39.7	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±10.7	±13.4	±16.0	±18.7	±21.4	±24.1	±26.7	±26.9	±30.7	±34.5	±38.4	±23.0	±26.9	±30.7	±42.6	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±11.4	±14.3	±17.1	±20.0	±22.8	±25.7	±28.5	±28.7	±32.8	±36.9	±41.0	±24.6	±28.7	±32.8	±45.5	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±12.1	±15.1	±18.2	±21.2	±24.2	±27.3	±30.3	±30.5	±34.9	±39.2	±43.6	±26.1	±30.5	±34.9	±48.5	
	203	229	254	8"	9"	10"	±12.8	±16.0	±19.2	±22.4	±25.6	±28.8	±32.1	±32.3	±36.9	±41.5	±46.2	±27.7	±32.3	±36.9	±51.4	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±13.5	±16.9	±20.3	±23.7	±27.1	±30.4	±33.8	±34.1	±39.0	±43.9	±48.8	±29.3	±34.1	±39.0	±54.4	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±14.2	±17.8	±21.4	±24.9	±28.5	±32.0	±35.6	±35.9	±41.1	±46.2	±51.4	±30.8	±35.9	±41.1	±57.3	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±14.9	±18.7	±22.4	±26.2	±29.9	±33.6	±37.4	±37.8	±43.2	±48.5	±53.9	±32.4	±37.8	±43.2	±60.2	
	229	254	279	9"	10"	11"	±15.7	±19.6	±23.5	±27.4	±31.3	±35.2	±39.1	±39.6	±45.2	±50.9	±56.5	±33.9	±39.6	±45.2	±63.2	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±16.4	±20.5	±24.5	±28.6	±32.7	±36.8	±40.9	±41.4	±47.3	±53.2	±59.1	±35.5	±41.4	±47.3	±66.1	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±17.1	±21.3	±25.6	±29.9	±34.1	±38.4	±42.7	±43.2	±49.4	±55.6	±61.7	±37.0	±43.2	±49.4	±69.1	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±17.8	±22.2	±26.7	±31.1	±35.6	±40.0	±44.4	±45.0	±51.5	±57.9	±64.3	±38.6	±45.0	±51.5	±72.0	
	254	279	305	10"	11"	12"	±18.5	±23.1	±27.7	±32.3	±37.0	±41.6	±46.2	±46.8	±53.5	±60.2	±66.9	±40.1	±46.8	±53.5	±75.0	
	260	286		10 1/4"	11 1/4"		±19.2	±24.0	±28.8	±33.6	±38.4	±43.2	±48.0	±48.7	±55.6	±62.6	±69.5	±41.7	±48.7	±55.6	±77.9	
	267	292		10 1/2"	11 1/2"		±19.9	±24.9	±29.9	±34.8	±39.8	±44.8	±49.8	±50.5	±57.7	±64.9	±72.1	±43.3	±50.5	±57.7	±80.8	
	273	298		10 3/4"	11 3/4"		±20.6	±25.8	±30.9	±36.1	±41.2	±46.4	±51.5	±52.3	±59.8	±67.2	±74.7	±44.8	±52.3	±59.8	±83.8	
	279	305		11"	12"		±21.3	±26.6	±32.0	±37.3	±42.6	±48.0	±53.3	±54.1	±61.8	±69.6	±77.3	±46.4	±54.1	±61.8	±86.7	
	286			11 1/4"			±22.0	±27.5	±33.0	±38.5	±44.0	±49.6	±55.1	±55.9	±63.9	±71.9	±79.9	±47.9	±55.9	±63.9	±89.7	
	292			11 1/2"			±22.7	±28.4	±34.1	±39.8	±45.5	±51.1	±56.8	±57.7	±66.0	±74.2	±82.5	±49.5	±57.7	±66.0	±92.6	
298			11 3/4"			±23.4	±29.3	±35.2	±41.0	±46.9	±52.7	±58.6	±59.6	±68.1	±76.6	±85.1	±51.0	±59.6	±68.1	±95.5		
305			12"			±24.1	±30.2	±36.2	±42.3	±48.3	±54.3	±60.4	±61.4	±70.1	±78.9	±87.7	±52.6	±61.4	±70.1	±98.5		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV_n [kip/element]															
	C38	C51	C64	1 1/2"	2"	2 1/2"																
height of connection [mm / in]	VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7	±8.7
	V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3	±15.3
	V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0	±23.0
	V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±30.7	±30.7	±30.7	±30.7	±30.7	±30.7	±30.7	±30.7	±30.7	±30.7	±30.7	-	-	-	-
	V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±47.9	±47.9	±47.9	±47.9	±47.9	±47.9	±47.9	-	-	-	-	

concrete cover for top and bottom reinforcement Egccobox®
other heights on request



Reinforcement Egccobox® type MM± - per Egccobox® element

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egccobox® type MM± - per Egccobox® element

Egccobox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"				
concrete cover [mm]		concrete cover [in]			Rotation spring stiffness [kip-ft/rad/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	461	576	692	807	922	1,037	1,153	1,107	1,265	1,423	1,581	949	1,107	1,265	1,433
178	203	229	7"	8"	9"	534	667	801	934	1,068	1,201	1,335	1,286	1,470	1,654	1,837	1,102	1,286	1,470	1,672
184	210	235	7 1/4"	8 1/4"	9 1/4"	612	765	918	1,071	1,224	1,377	1,530	1,479	1,690	1,901	2,113	1,268	1,479	1,690	1,928
191	216	241	7 1/2"	8 1/2"	9 1/2"	696	869	1,043	1,217	1,391	1,565	1,739	1,685	1,926	2,166	2,407	1,444	1,685	1,926	2,203
197	222	248	7 3/4"	8 3/4"	9 3/4"	784	980	1,177	1,373	1,569	1,765	1,961	1,905	2,177	2,449	2,721	1,633	1,905	2,177	2,496
203	229	254	8"	9"	10"	879	1,098	1,318	1,538	1,757	1,977	2,196	2,138	2,443	2,749	3,054	1,832	2,138	2,443	2,808
210	235	260	8 1/4"	9 1/4"	10 1/4"	978	1,223	1,467	1,712	1,956	2,201	2,445	2,384	2,725	3,066	3,406	2,044	2,384	2,725	3,138
216	241	267	8 1/2"	9 1/2"	10 1/2"	1,083	1,354	1,624	1,895	2,166	2,437	2,707	2,644	3,022	3,400	3,778	2,267	2,644	3,022	3,486
222	248	273	8 3/4"	9 3/4"	10 3/4"	1,193	1,491	1,790	2,088	2,386	2,685	2,983	2,918	3,335	3,752	4,168	2,501	2,918	3,335	3,852
229	254	279	9"	10"	11"	1,309	1,636	1,963	2,290	2,617	2,945	3,272	3,205	3,663	4,121	4,578	2,747	3,205	3,663	4,237
235	260	286	9 1/4"	10 1/4"	11 1/4"	1,430	1,787	2,144	2,502	2,859	3,217	3,574	3,505	4,006	4,507	5,007	3,004	3,505	4,006	4,640
241	267	292	9 1/2"	10 1/2"	11 1/2"	1,556	1,945	2,334	2,723	3,112	3,501	3,890	3,819	4,365	4,910	5,456	3,273	3,819	4,365	5,062
248	273	298	9 3/4"	10 3/4"	11 3/4"	1,687	2,109	2,531	2,953	3,375	3,797	4,219	4,146	4,739	5,331	5,923	3,554	4,146	4,739	5,501
254	279	305	10"	11"	12"	1,824	2,280	2,736	3,193	3,649	4,105	4,561	4,487	5,128	5,769	6,410	3,846	4,487	5,128	5,959
260	286		10 1/4"	11 1/4"		1,967	2,458	2,950	3,441	3,933	4,425	4,916	4,841	5,533	6,225	6,916	4,150	4,841	5,533	6,436
267	292		10 1/2"	11 1/2"		2,114	2,643	3,171	3,700	4,228	4,757	5,285	5,209	5,953	6,697	7,441	4,465	5,209	5,953	6,930
273	298		10 3/4"	11 3/4"		2,267	2,834	3,401	3,967	4,534	5,101	5,668	5,590	6,389	7,187	7,986	4,792	5,590	6,389	7,443
279	305		11"	12"		2,425	3,032	3,638	4,244	4,851	5,457	6,063	5,985	6,840	7,695	8,550	5,130	5,985	6,840	7,975
286			11 1/4"			2,589	3,236	3,883	4,531	5,178	5,825	6,472	6,393	7,306	8,219	9,132	5,479	6,393	7,306	8,524
292			11 1/2"			2,758	3,447	4,137	4,826	5,516	6,205	6,895	6,814	7,788	8,761	9,735	5,841	6,814	7,788	9,092
298			11 3/4"			2,932	3,665	4,398	5,131	5,864	6,597	7,330	7,249	8,285	9,320	10,356	6,214	7,249	8,285	9,678
305			12"			3,112	3,890	4,668	5,445	6,223	7,001	7,779	7,697	8,797	9,897	10,996	6,598	7,697	8,797	10,283

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egccobox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 3,630 psi / 25.0 MPa (Imerial); - per Egcoibox® element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / element - option 1															
≥ a _s [in²]	0.74	0.93	1.11	1.30	1.48	1.67	1.86	1.89	2.16	2.44	2.71	1.62	1.89	2.16	2.18
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [in²]	0.93	1.16	1.39	1.62	1.86	2.09	2.32	2.27	2.60	2.92	3.25	1.95	2.27	2.60	2.22
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [in²]	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13
shear force level V1 ≥ a _s [in²]	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23	0.23
shear force level V2 ≥ a _s [in²]	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35
shear force level V3 ≥ a _s [in²]	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	-	-	-	-
shear force level V4 ≥ a _s [in²]	-	-	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-	-	-	-
shear force level V5 ≥ a _s [in²]	-	-	-	-	0.73	0.73	0.73	0.73	0.73	0.73	0.73	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

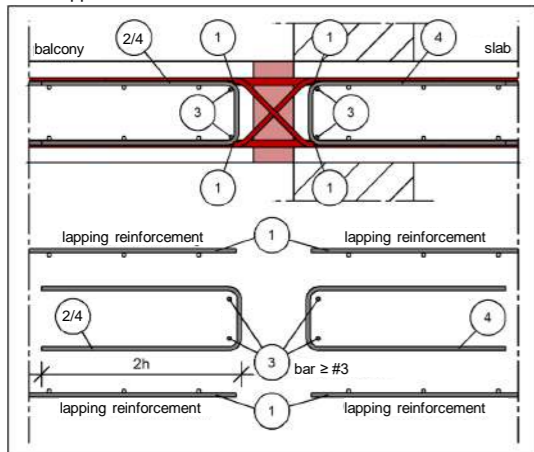
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

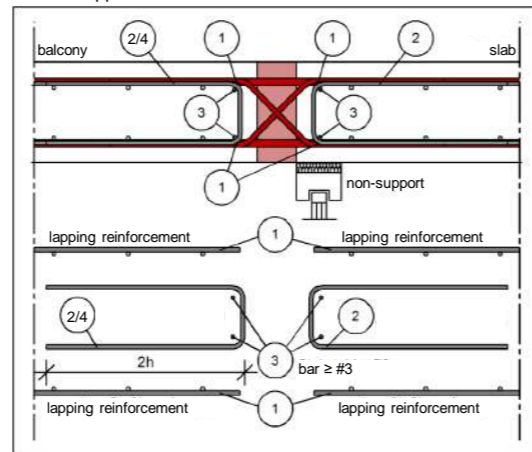
The specifications apply to good bonding conditions.

design proposal

direct support



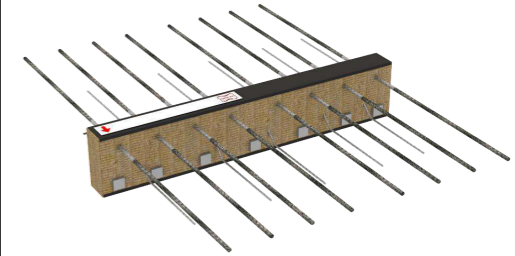
indirect support



Design table Egccobox® type MM - concrete strength ≥ 4,000 psi / 27.6 MPa (Imperial); - per Egccobox® element

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egccobox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM _n [kip-ft/element]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-5.4	-9.3	-11.7	-14.0	-14.0	-16.3	-18.7	-21.0	-23.3	-25.6	-28.0	-30.3	-32.6	-16.3	
165	178	191	6 1/2"	7"	7 1/2"		-5.8	-10.1	-12.6	-15.1	-15.1	-17.6	-20.1	-22.7	-25.2	-27.7	-30.2	-32.7	-35.2	-17.6	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-6.2	-10.8	-13.5	-16.2	-16.2	-18.9	-21.6	-24.3	-27.0	-29.7	-32.4	-35.1	-37.8	-18.9	
178	191	203	7"	7 1/2"	8"		-6.6	-11.6	-14.4	-17.3	-17.3	-20.2	-23.1	-26.0	-28.9	-31.8	-34.7	-37.6	-40.5	-20.2	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-7.0	-12.3	-15.4	-18.5	-18.5	-21.5	-24.6	-27.7	-30.8	-33.8	-36.9	-40.0	-43.1	-21.5	
191	203	216	7 1/2"	8"	8 1/2"		-7.5	-13.0	-16.3	-19.6	-19.6	-22.8	-26.1	-29.4	-32.6	-35.9	-39.1	-42.4	-45.7	-22.8	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-7.9	-13.8	-17.2	-20.7	-20.7	-24.1	-27.6	-31.0	-34.5	-37.9	-41.4	-44.8	-48.3	-24.1	
203	216	229	8"	8 1/2"	9"		-8.3	-14.5	-18.2	-21.8	-21.8	-25.4	-29.1	-32.7	-36.3	-40.0	-43.6	-47.2	-50.9	-25.4	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-8.7	-15.3	-19.1	-22.9	-22.9	-26.7	-30.6	-34.4	-38.2	-42.0	-45.8	-49.6	-53.5	-26.7	
216	229	241	8 1/2"	9"	9 1/2"		-9.1	-16.0	-20.0	-24.0	-24.0	-28.0	-32.0	-36.0	-40.0	-44.1	-48.1	-52.1	-56.1	-28.0	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-9.5	-16.8	-21.0	-25.1	-25.1	-29.3	-33.5	-37.7	-41.9	-46.1	-50.3	-54.5	-58.7	-29.3	
229	241	254	9"	9 1/2"	10"		-10.0	-17.5	-21.9	-26.3	-26.3	-30.6	-35.0	-39.4	-43.8	-48.1	-52.5	-56.9	-61.3	-30.6	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-10.4	-18.2	-22.8	-27.4	-27.4	-31.9	-36.5	-41.1	-45.6	-50.2	-54.7	-59.3	-63.9	-31.9	
241	254	267	9 1/2"	10"	10 1/2"		-10.8	-19.0	-23.7	-28.5	-28.5	-33.2	-38.0	-42.7	-47.5	-52.2	-57.0	-61.7	-66.5	-33.2	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-11.2	-19.7	-24.7	-29.6	-29.6	-34.5	-39.5	-44.4	-49.3	-54.3	-59.2	-64.1	-69.1	-34.5	
254	267	279	10"	10 1/2"	11"		-11.6	-20.5	-25.6	-30.7	-30.7	-35.8	-41.0	-46.1	-51.2	-56.3	-61.4	-66.6	-71.7	-35.8	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-12.0	-21.2	-26.5	-31.8	-31.8	-37.1	-42.4	-47.8	-53.1	-58.4	-63.7	-69.0	-74.3	-37.1	
267	279	292	10 1/2"	11"	11 1/2"		-12.5	-22.0	-27.5	-33.0	-33.0	-38.4	-43.9	-49.4	-54.9	-60.4	-65.9	-71.4	-76.9	-38.4	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-12.9	-22.7	-28.4	-34.1	-34.1	-39.7	-45.4	-51.1	-56.8	-62.5	-68.1	-73.8	-79.5	-39.7	
279	292	305	11"	11 1/2"	12"		-13.3	-23.5	-29.3	-35.2	-35.2	-41.0	-46.9	-52.8	-58.6	-64.5	-70.4	-76.2	-82.1	-41.0	
286	298		11 1/4"	11 3/4"			-13.7	-24.2	-30.2	-36.3	-36.3	-42.3	-48.4	-54.4	-60.5	-66.5	-72.6	-78.6	-84.7	-42.3	
292	305		11 1/2"	12"			-14.1	-24.9	-31.2	-37.4	-37.4	-43.6	-49.9	-56.1	-62.4	-68.6	-74.8	-81.1	-87.3	-43.6	
298			11 3/4"				-14.6	-25.7	-32.1	-38.5	-38.5	-44.9	-51.4	-57.8	-64.2	-70.6	-77.1	-83.5	-89.9	-44.9	
305			12"				-15.0	-26.4	-33.0	-39.6	-39.6	-46.3	-52.9	-59.5	-66.1	-72.7	-79.3	-85.9	-92.5	-46.3	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV _n [kip/element]																
	C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.5	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		
	V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	6.2	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	12.4	
	V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	9.3	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	18.6	19.4	
	V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	12.4	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	24.8	-
	V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	24.2
	V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+3.5 / -3.5	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+7.0 / -7.0	+3.5 / -3.5	
	V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+7.0 / -5.2	+13.9 / -10.4	+13.9 / -10.4	+13.9 / -10.4	+13.9 / -10.4	+13.9 / -10.4	+13.9 / -10.4	+13.9 / -10.4	+18.6 / -12.4	+18.6 / -12.4	+18.6 / -12.4	+18.6 / -12.4	+18.6 / -12.4	+18.6 / -12.4	+9.3 / -6.2	
	V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+14.5 / -14.5	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+29.1 / -29.1	+14.5 / -14.5	

Shear force level VS to V4 also possible with lifting shear force (-3.5 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egccobox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egcoibox® type MM - per Egcoibox® element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox® type MM - per Egcoibox® element

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		concrete cover top [in]		Rotation spring stiffness [kip-ft/rad/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"														
159	171	184	6 3/4"	6 3/4"	7 1/4"	510	703	843	973	1,020	1,153	1,332	1,510	1,687	1,864	2,041	2,217	2,393	1,197
165	178	191	6 1/2"	7"	7 1/2"	592	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	1,395
171	184	197	6 3/4"	7 1/4"	7 3/4"	680	944	1,133	1,308	1,371	1,550	1,790	2,029	2,267	2,505	2,742	2,979	3,216	1,608
178	191	203	7"	7 1/2"	8"	775	1,078	1,295	1,494	1,566	1,770	2,044	2,317	2,589	2,861	3,132	3,403	3,673	1,837
184	197	210	7 1/4"	7 3/4"	8 1/4"	876	1,222	1,466	1,692	1,774	2,005	2,315	2,624	2,933	3,240	3,547	3,854	4,161	2,080
191	203	216	7 1/2"	8"	8 1/2"	982	1,374	1,649	1,903	1,994	2,254	2,603	2,951	3,297	3,643	3,989	4,334	4,678	2,339
197	210	222	7 3/4"	8 1/4"	8 3/4"	1,095	1,534	1,842	2,126	2,228	2,519	2,908	3,297	3,684	4,070	4,456	4,841	5,226	2,613
203	216	229	8"	8 1/2"	9"	1,215	1,704	2,046	2,361	2,475	2,797	3,230	3,661	4,091	4,521	4,949	5,377	5,805	2,902
210	222	235	8 1/4"	8 3/4"	9 1/4"	1,340	1,883	2,260	2,609	2,734	3,091	3,569	4,045	4,520	4,995	5,468	5,941	6,414	3,207
216	229	241	8 1/2"	9"	9 1/2"	1,471	2,071	2,485	2,869	3,006	3,399	3,925	4,449	4,971	5,492	6,013	6,533	7,053	3,526
222	235	248	8 3/4"	9 1/4"	9 3/4"	1,609	2,267	2,721	3,141	3,292	3,721	4,297	4,871	5,443	6,014	6,584	7,153	7,722	3,861
229	241	254	9"	9 1/2"	10"	1,753	2,473	2,968	3,425	3,590	4,058	4,687	5,312	5,936	6,559	7,180	7,801	8,422	4,211
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,903	2,687	3,225	3,722	3,901	4,410	5,093	5,773	6,451	7,127	7,803	8,478	9,152	4,576
241	254	267	9 1/2"	10"	10 1/2"	2,059	2,910	3,493	4,032	4,226	4,777	5,516	6,252	6,987	7,719	8,451	9,182	9,913	4,956
248	260	273	9 3/4"	10 1/4"	10 3/4"	2,221	3,143	3,772	4,353	4,563	5,158	5,956	6,751	7,544	8,335	9,125	9,915	10,703	5,352
254	267	279	10"	10 1/2"	11"	2,389	3,384	4,061	4,687	4,913	5,554	6,413	7,269	8,123	8,975	9,825	10,675	11,525	5,762
260	273	286	10 1/4"	10 3/4"	11 1/4"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
267	279	292	10 1/2"	11"	11 1/2"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
273	286	298	10 3/4"	11 1/4"	11 3/4"	2,745	3,893	4,672	5,392	5,652	6,389	7,378	8,363	9,345	10,325	11,303	12,281	13,258	6,629
279	292	305	11"	11 1/2"	12"	2,931	4,160	4,994	5,763	6,041	6,828	7,886	8,938	9,988	11,035	12,081	13,126	14,170	7,085
286	298		11 1/4"	11 3/4"		3,124	4,437	5,326	6,147	6,442	7,283	8,410	9,533	10,652	11,769	12,885	13,999	15,113	7,556
292	305		11 1/2"	12"		3,323	4,723	5,669	6,543	6,857	7,751	8,951	10,146	11,338	12,527	13,714	14,900	16,086	8,043
298			11 3/4"			3,529	5,017	6,022	6,951	7,285	8,235	9,510	10,779	12,045	13,308	14,569	15,830	17,089	8,545
305			12"			3,740	5,321	6,387	7,371	7,725	8,733	10,085	11,431	12,773	14,113	15,451	16,787	18,123	9,061

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egcoibox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 4,000$ psi / 27.6 MPa (Imperial); - per Egccobox® element

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egccobox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [in ²]	0.37	0.74	0.93	1.11	1.11	1.30	1.48	1.67	1.86	2.04	2.23	2.41	2.60	1.30
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [in ²]	0.49	0.93	1.16	1.39	1.39	1.62	1.86	2.09	2.32	2.55	2.78	3.01	3.25	1.62
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [in ²]	0.05	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
shear force level V1 $\geq a_g$ [in ²]	0.09	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
shear force level V2 $\geq a_g$ [in ²]	0.14	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.30
shear force level V3 $\geq a_g$ [in ²]	0.19	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	-
shear force level V4 $\geq a_g$ [in ²]	-	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.37
shear force level VS± $\geq a_g$ [in ²]	-	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
shear force level V1± $\geq a_g$ [in ²]	-	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19
shear force level V2± $\geq a_g$ [in ²]	-	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.30
shear force level V3± $\geq a_g$ [in ²]	-	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	0.38	-
shear force level V4± $\geq a_g$ [in ²]	-	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.59	0.37
shear force level V6± $\geq a_g$ [in ²]	0.05	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.05
shear force level V7± $\geq a_g$ [in ²]	0.11	0.21	0.21	0.21	0.21	0.21	0.21	0.28	0.28	0.28	0.28	0.28	0.28	0.14
shear force level V8± $\geq a_g$ [in ²]	0.22	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.44	0.22

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

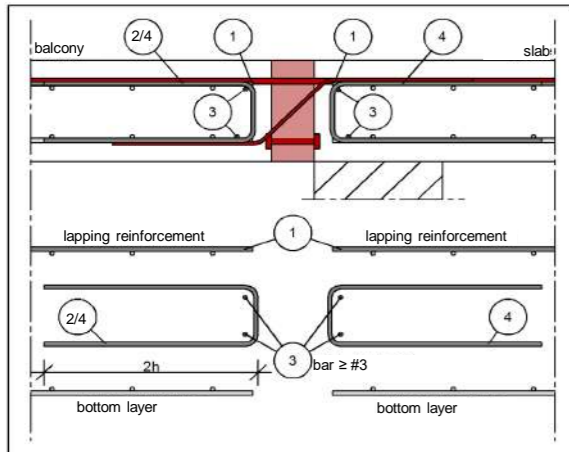
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

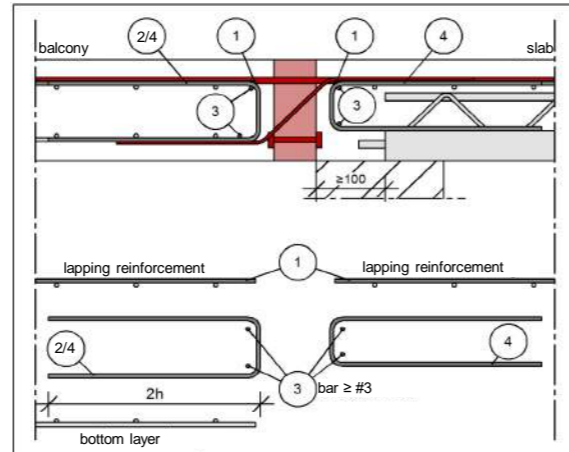
The specifications apply to good bonding conditions.

design proposal

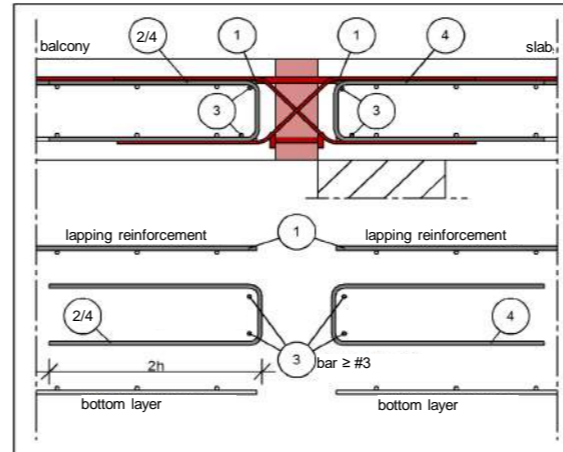
direct support



direct support (semi-prefab slab)



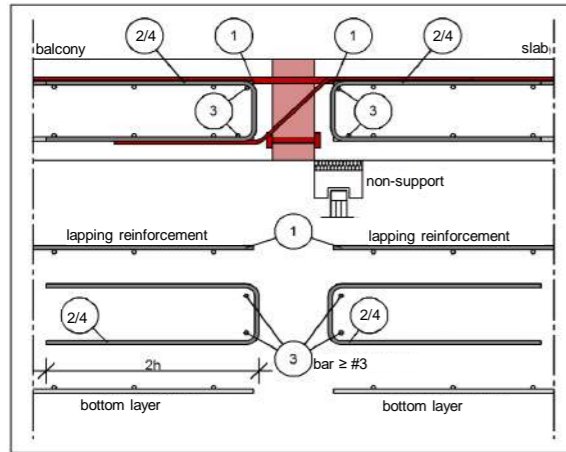
direct support with alternating shear force (V6±, V7±, V8±)



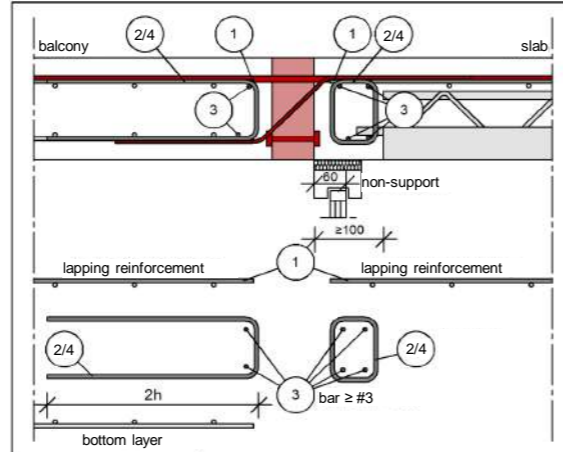
For the Egccobox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



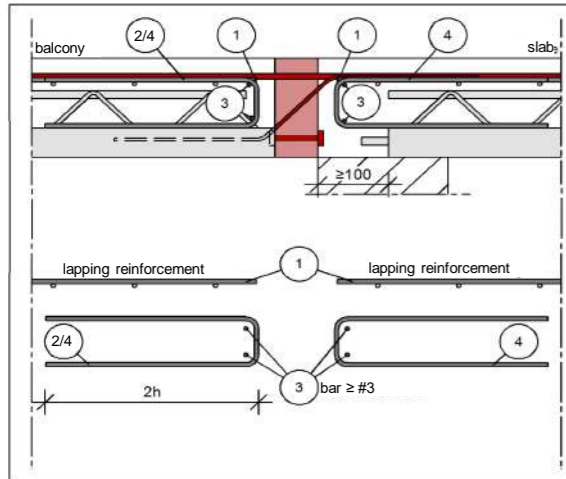
indirect support (semi-prefab slab)



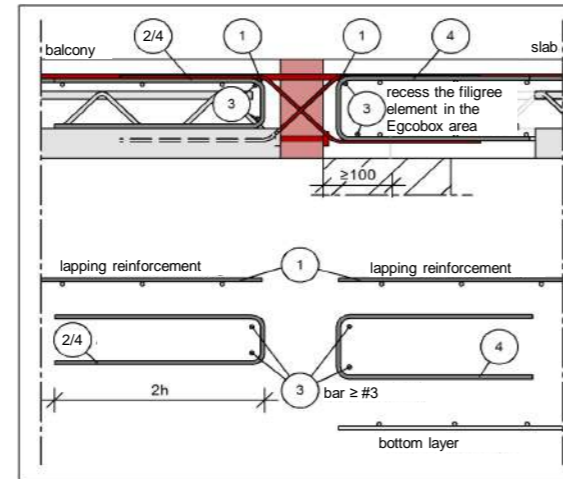
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

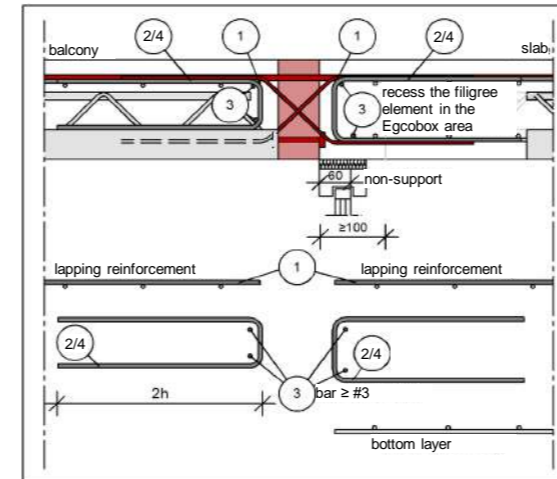
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



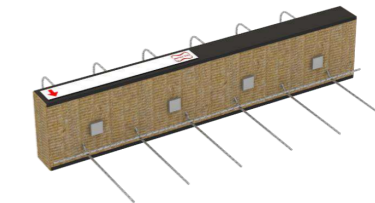
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 4,000 psi / 27.6 MPa (Imperial); - per Egcoibox® element

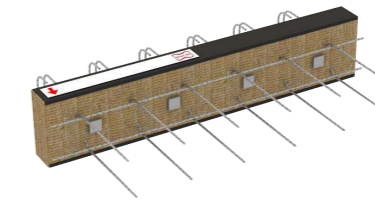
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399			
length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"			
concrete cover top [mm]			rowspan="3" style="text-align: center;"> ϕV_n [kip/element]												
concrete cover top [in]															
C38	C51	C64	1 1/2"	2"	2 1/2"										
height of connection [mm]			rowspan="3" style="text-align: center;"> ϕV_n [kip/element]												
height of connection [in]															
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	7.0	8.7	12.4	15.5	18.6	24.8	31.0	37.2	-	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	7.0	8.7	12.4	15.5	18.6	24.8	31.0	37.2	48.5	58.2

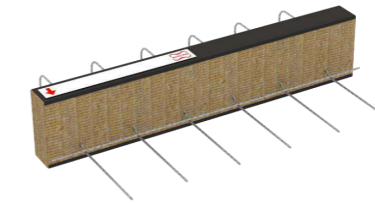
Reinforcement												
shear force bars [qty ϕ mm]			4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10
minimum wall / beam width [in]			7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"
compression bearings [qty ϕ mm]			4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 4,000 psi / 27.6 MPa (Imperial); - per Egcoibox® element

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K			
length of element [ft in]			7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"			
concrete cover top [mm]			ϕV_n [kip/element]										
concrete cover top [in]													
C38	C51	C64									1 1/2"	2"	2 1/2"
height of connection [mm]			ϕV_n [kip/element]										
height of connection [in]													
159-305	171-305	184-305									6 1/4"-12"	6 3/4"-12"	7 1/4"-12"
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	3.5	6.2	9.3	12.4	15.5	19.4	21.7	29.1

Reinforcement										
shear force bars [qty ϕ mm]			2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10
minimum wall / beam width [in]			7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"
compression bearings [qty ϕ mm]			1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"

All Egcoibox types can also be produced in the following variants:

VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K

VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 4,000$ psi / 27.6 MPa (Imperial); - per Egccobox® element

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [in ²]	0.11	0.13	0.19	0.24	0.28	0.38	0.47	0.57	0.74	0.89
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [in ²]	0.05	0.09	0.14	0.19	0.24	0.30	0.33	0.45
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

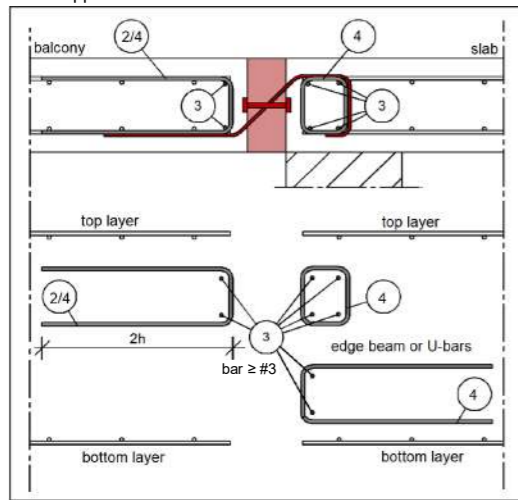
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

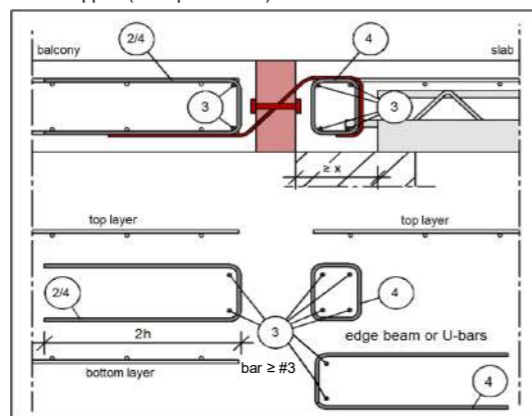
The specifications apply to good bonding conditions.

design proposal

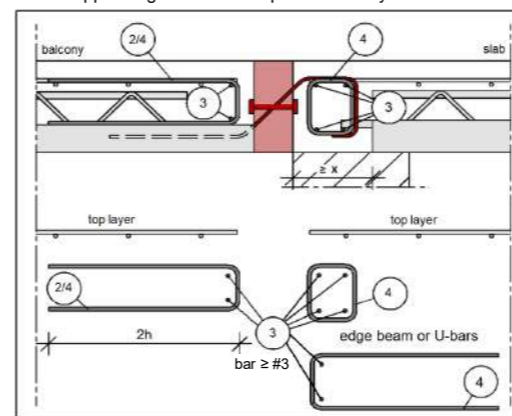
direct support



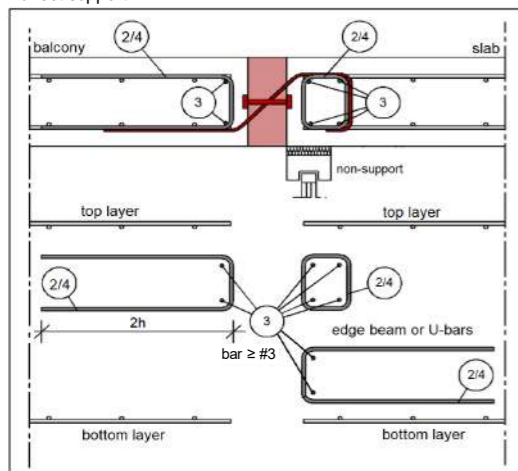
direct support (semi-prefab slab)



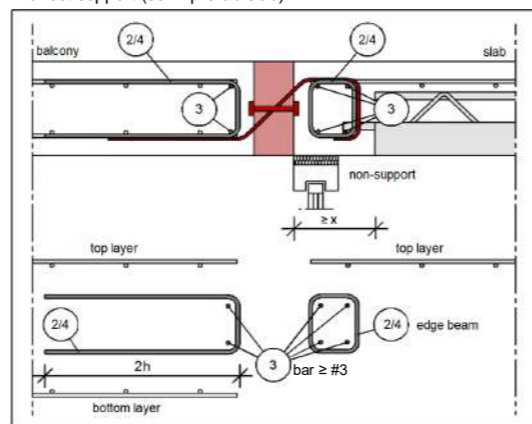
direct support: Egccobox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egccobox in semi-prefab balcony:

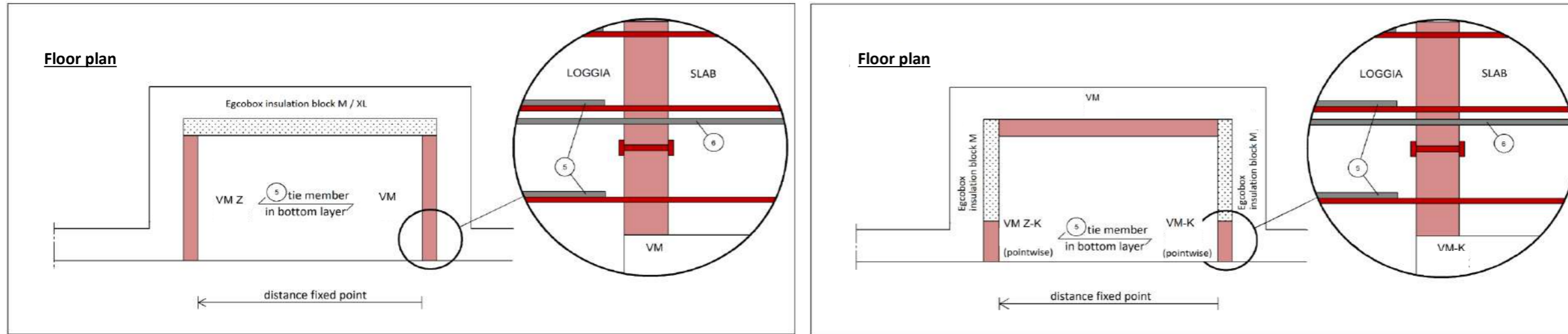
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

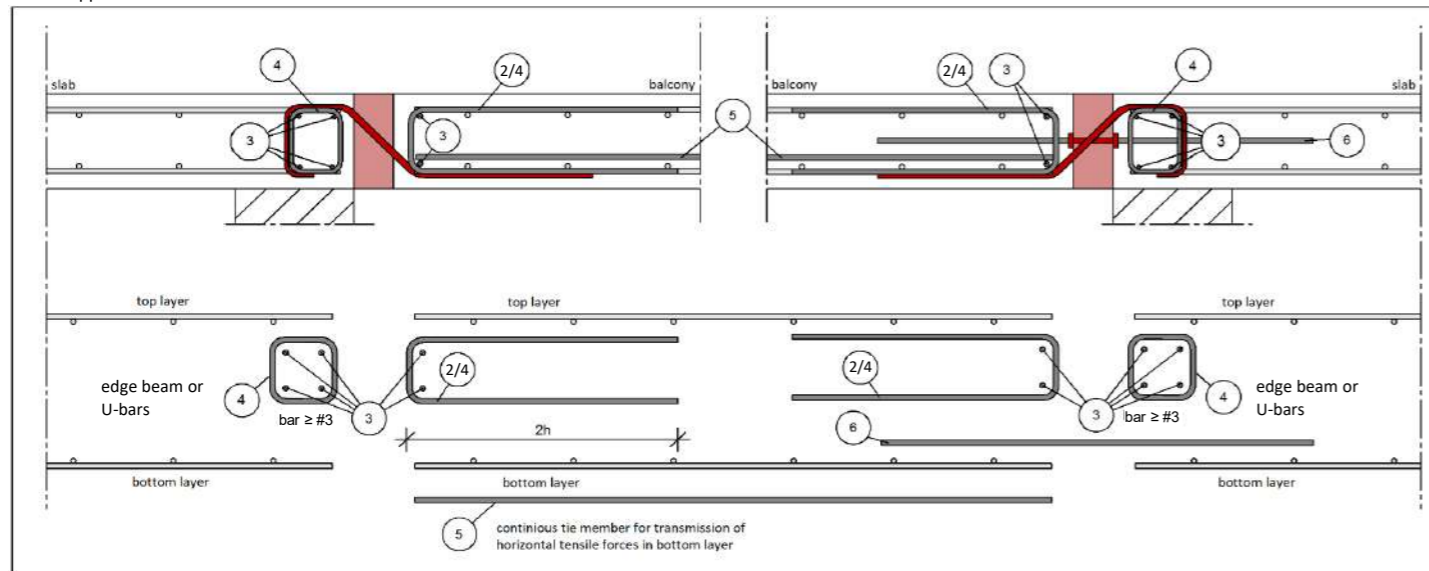
The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

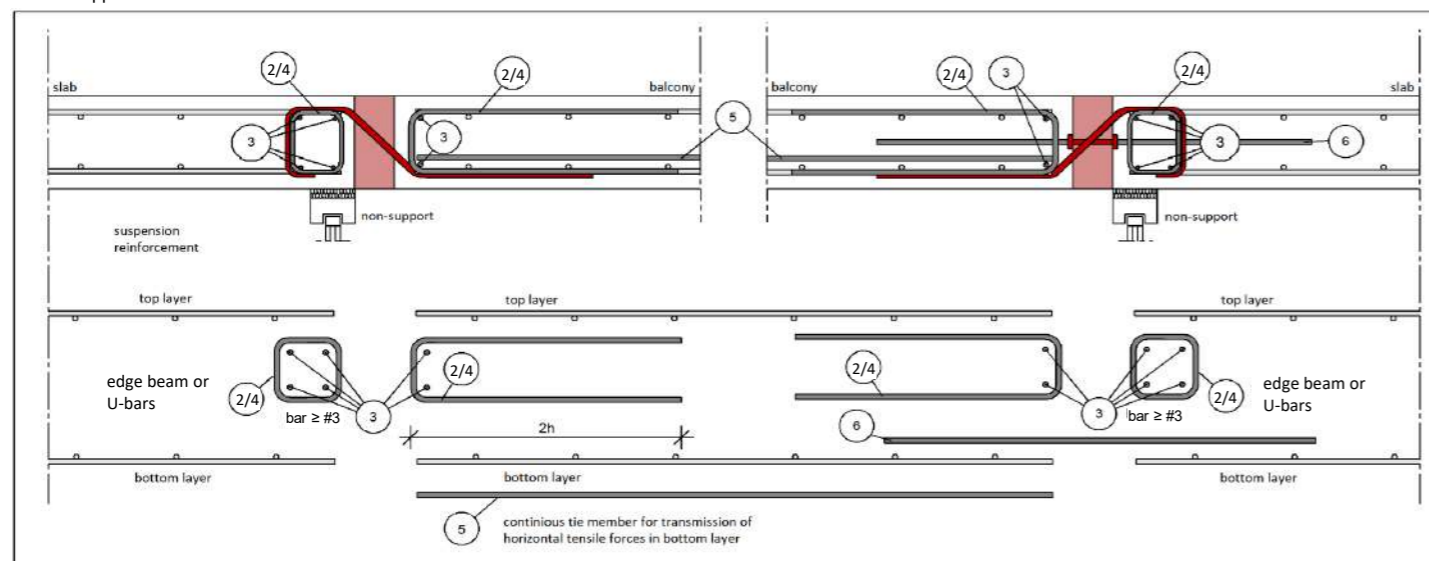


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Reinforcement Egccobox® type MM± - per Egccobox® element

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egccobox® type MM± - per Egccobox® element

Egccobox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"				
concrete cover [mm]		concrete cover [in]			Rotation spring stiffness [kip-ft/rad/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	461	576	692	807	922	1,037	1,153	1,107	1,265	1,423	1,581	949	1,107	1,265	1,433
178	203	229	7"	8"	9"	534	667	801	934	1,068	1,201	1,335	1,286	1,470	1,654	1,837	1,102	1,286	1,470	1,672
184	210	235	7 1/4"	8 1/4"	9 1/4"	612	765	918	1,071	1,224	1,377	1,530	1,479	1,690	1,901	2,113	1,268	1,479	1,690	1,928
191	216	241	7 1/2"	8 1/2"	9 1/2"	696	869	1,043	1,217	1,391	1,565	1,739	1,685	1,926	2,166	2,407	1,444	1,685	1,926	2,203
197	222	248	7 3/4"	8 3/4"	9 3/4"	784	980	1,177	1,373	1,569	1,765	1,961	1,905	2,177	2,449	2,721	1,633	1,905	2,177	2,496
203	229	254	8"	9"	10"	879	1,098	1,318	1,538	1,757	1,977	2,196	2,138	2,443	2,749	3,054	1,832	2,138	2,443	2,808
210	235	260	8 1/4"	9 1/4"	10 1/4"	978	1,223	1,467	1,712	1,956	2,201	2,445	2,384	2,725	3,066	3,406	2,044	2,384	2,725	3,138
216	241	267	8 1/2"	9 1/2"	10 1/2"	1,083	1,354	1,624	1,895	2,166	2,437	2,707	2,644	3,022	3,400	3,778	2,267	2,644	3,022	3,486
222	248	273	8 3/4"	9 3/4"	10 3/4"	1,193	1,491	1,790	2,088	2,386	2,685	2,983	2,918	3,335	3,752	4,168	2,501	2,918	3,335	3,852
229	254	279	9"	10"	11"	1,309	1,636	1,963	2,290	2,617	2,945	3,272	3,205	3,663	4,121	4,578	2,747	3,205	3,663	4,237
235	260	286	9 1/4"	10 1/4"	11 1/4"	1,430	1,787	2,144	2,502	2,859	3,217	3,574	3,505	4,006	4,507	5,007	3,004	3,505	4,006	4,640
241	267	292	9 1/2"	10 1/2"	11 1/2"	1,556	1,945	2,334	2,723	3,112	3,501	3,890	3,819	4,365	4,910	5,456	3,273	3,819	4,365	5,062
248	273	298	9 3/4"	10 3/4"	11 3/4"	1,687	2,109	2,531	2,953	3,375	3,797	4,219	4,146	4,739	5,331	5,923	3,554	4,146	4,739	5,501
254	279	305	10"	11"	12"	1,824	2,280	2,736	3,193	3,649	4,105	4,561	4,487	5,128	5,769	6,410	3,846	4,487	5,128	5,959
260	286		10 1/4"	11 1/4"		1,967	2,458	2,950	3,441	3,933	4,425	4,916	4,841	5,533	6,225	6,916	4,150	4,841	5,533	6,436
267	292		10 1/2"	11 1/2"		2,114	2,643	3,171	3,700	4,228	4,757	5,285	5,209	5,953	6,697	7,441	4,465	5,209	5,953	6,930
273	298		10 3/4"	11 3/4"		2,267	2,834	3,401	3,967	4,534	5,101	5,668	5,590	6,389	7,187	7,986	4,792	5,590	6,389	7,443
279	305		11"	12"		2,425	3,032	3,638	4,244	4,851	5,457	6,063	5,985	6,840	7,695	8,550	5,130	5,985	6,840	7,975
286			11 1/4"			2,589	3,236	3,883	4,531	5,178	5,825	6,472	6,393	7,306	8,219	9,132	5,479	6,393	7,306	8,524
292			11 1/2"			2,758	3,447	4,137	4,826	5,516	6,205	6,895	6,814	7,788	8,761	9,735	5,841	6,814	7,788	9,092
298			11 3/4"			2,932	3,665	4,398	5,131	5,864	6,597	7,330	7,249	8,285	9,320	10,356	6,214	7,249	8,285	9,678
305			12"			3,112	3,890	4,668	5,445	6,223	7,001	7,779	7,697	8,797	9,897	10,996	6,598	7,697	8,797	10,283

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egccobox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 4,000 psi / 27.6 MPa (Imerial); - per Egcoibox® element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l _p [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / element - option 1															
≥ a _s [in²]	0.74	0.93	1.11	1.30	1.48	1.67	1.86	1.89	2.16	2.44	2.71	1.62	1.89	2.16	2.18
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [in²]	0.93	1.16	1.39	1.62	1.86	2.09	2.32	2.27	2.60	2.92	3.25	1.95	2.27	2.60	2.18
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [in²]	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14
shear force level V1 ≥ a _s [in²]	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
shear force level V2 ≥ a _s [in²]	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37	0.37
shear force level V3 ≥ a _s [in²]	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49	-	-	-	-
shear force level V4 ≥ a _s [in²]	-	-	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	0.58	-	-	-	-
shear force level V5 ≥ a _s [in²]	-	-	-	-	0.77	0.77	0.77	0.77	0.77	0.77	0.77	-	-	-	-

item ③+④ - structural reinforcement

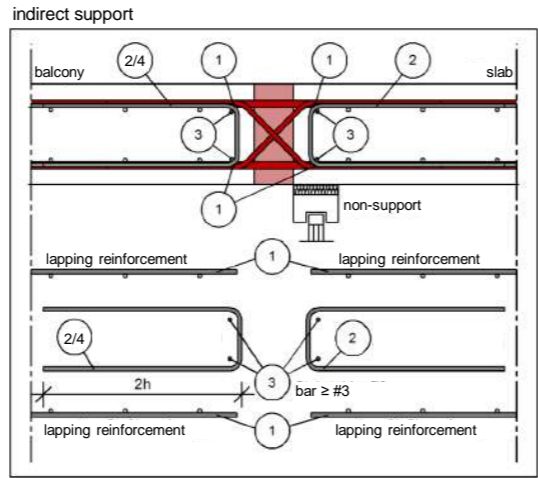
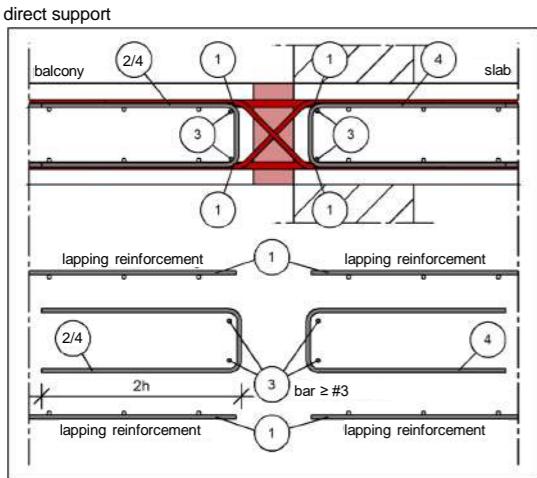
On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

The specifications apply to good bonding conditions.

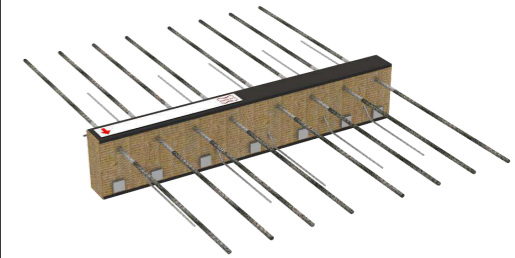
design proposal



Design table Egcoibox® type MM - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per Egcoibox® element

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egcoibox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM _n [kip-ft/element]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-5.6	-9.7	-12.2	-14.6	-14.6	-17.0	-19.5	-21.9	-24.3	-26.7	-29.2	-31.6	-34.0	-17.0	
165	178	191	6 1/2"	7"	7 1/2"		-6.0	-10.5	-13.1	-15.8	-15.8	-18.4	-21.0	-23.6	-26.3	-28.9	-31.5	-34.1	-36.8	-18.4	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-6.5	-11.3	-14.1	-16.9	-16.9	-19.7	-22.6	-25.4	-28.2	-31.0	-33.8	-36.7	-39.5	-19.7	
178	191	203	7"	7 1/2"	8"		-6.9	-12.1	-15.1	-18.1	-18.1	-21.1	-24.1	-27.1	-30.1	-33.1	-36.2	-39.2	-42.2	-21.1	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-7.3	-12.8	-16.0	-19.2	-19.2	-22.4	-25.7	-28.9	-32.1	-35.3	-38.5	-41.7	-44.9	-22.4	
191	203	216	7 1/2"	8"	8 1/2"		-7.8	-13.6	-17.0	-20.4	-20.4	-23.8	-27.2	-30.6	-34.0	-37.4	-40.8	-44.2	-47.6	-23.8	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-8.2	-14.4	-18.0	-21.6	-21.6	-25.2	-28.8	-32.4	-35.9	-39.5	-43.1	-46.7	-50.3	-25.2	
203	216	229	8"	8 1/2"	9"		-8.6	-15.2	-18.9	-22.7	-22.7	-26.5	-30.3	-34.1	-37.9	-41.7	-45.5	-49.3	-53.0	-26.5	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-9.1	-15.9	-19.9	-23.9	-23.9	-27.9	-31.9	-35.8	-39.8	-43.8	-47.8	-51.8	-55.8	-27.9	
216	229	241	8 1/2"	9"	9 1/2"		-9.5	-16.7	-20.9	-25.1	-25.1	-29.2	-33.4	-37.6	-41.8	-45.9	-50.1	-54.3	-58.5	-29.2	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-10.0	-17.5	-21.9	-26.2	-26.2	-30.6	-35.0	-39.3	-43.7	-48.1	-52.4	-56.8	-61.2	-30.6	
229	241	254	9"	9 1/2"	10"		-10.4	-18.3	-22.8	-27.4	-27.4	-31.9	-36.5	-41.1	-45.6	-50.2	-54.8	-59.3	-63.9	-31.9	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-10.8	-19.0	-23.8	-28.5	-28.5	-33.3	-38.1	-42.8	-47.6	-52.3	-57.1	-61.9	-66.6	-33.3	
241	254	267	9 1/2"	10"	10 1/2"		-11.3	-19.8	-24.8	-29.7	-29.7	-34.7	-39.6	-44.6	-49.5	-54.5	-59.4	-64.4	-69.3	-34.7	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-11.7	-20.6	-25.7	-30.9	-30.9	-36.0	-41.2	-46.3	-51.5	-56.6	-61.7	-66.9	-72.0	-36.0	
254	267	279	10"	10 1/2"	11"		-12.1	-21.4	-26.7	-32.0	-32.0	-37.4	-42.7	-48.1	-53.4	-58.7	-64.1	-69.4	-74.8	-37.4	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-12.6	-22.1	-27.7	-33.2	-33.2	-38.7	-44.3	-49.8	-55.3	-60.9	-66.4	-71.9	-77.5	-38.7	
267	279	292	10 1/2"	11"	11 1/2"		-13.0	-22.9	-28.6	-34.4	-34.4	-40.1	-45.8	-51.5	-57.3	-63.0	-68.7	-74.5	-80.2	-40.1	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-13.4	-23.7	-29.6	-35.5	-35.5	-41.4	-47.4	-53.3	-59.2	-65.1	-71.1	-77.0	-82.9	-41.4	
279	292	305	11"	11 1/2"	12"		-13.9	-24.5	-30.6	-36.7	-36.7	-42.8	-48.9	-55.0	-61.1	-67.3	-73.4	-79.5	-85.6	-42.8	
286	298		11 1/4"	11 3/4"			-14.3	-25.2	-31.5	-37.9	-37.9	-44.2	-50.5	-56.8	-63.1	-69.4	-75.7	-82.0	-88.3	-44.2	
292	305		11 1/2"	12"			-14.7	-26.0	-32.5	-39.0	-39.0	-45.5	-52.0	-58.5	-65.0	-71.5	-78.0	-84.5	-91.0	-45.5	
298			11 3/4"				-15.2	-26.8	-33.5	-40.2	-40.2	-46.9	-53.6	-60.3	-67.0	-73.7	-80.4	-87.1	-93.8	-46.9	
305			12"				-15.6	-27.6	-34.5	-41.3	-41.3	-48.2	-55.1	-62.0	-68.9	-75.8	-82.7	-89.6	-96.5	-48.2	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV _n [kip/element]																
	C38	C51	C64	1 1/2"	2"	2 1/2"																	
VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.6	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	6.5	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9	12.9
V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	9.7	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	19.4	20.2
V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	12.9	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	25.8	-
V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	40.5	25.3
V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+3.6 / -3.6	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+7.3 / -7.3	+3.6 / -3.6
V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+7.3 / -5.4	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+14.5 / -10.9	+9.7 / -6.5
V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+15.2 / -15.2	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+30.3 / -30.3	+15.2 / -15.2

Shear force level VS to V4 also possible with lifting shear force (-3.6 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egcoibox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egcoibox® type MM - per Egcoibox® element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox® type MM - per Egcoibox® element

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		Rotation spring stiffness [kip-ft/rad/element]																	
concrete cover top [in]																			
C38	C51	C64	1 1/2"	2"	2 1/2"														
159	171	184	6 3/4"	6 3/4"	7 1/4"	510	703	843	973	1,020	1,153	1,332	1,510	1,687	1,864	2,041	2,217	2,393	1,197
165	178	191	6 1/2"	7"	7 1/2"	592	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	1,395
171	184	197	6 3/4"	7 1/4"	7 3/4"	680	944	1,133	1,308	1,371	1,550	1,790	2,029	2,267	2,505	2,742	2,979	3,216	1,608
178	191	203	7"	7 1/2"	8"	775	1,078	1,295	1,494	1,566	1,770	2,044	2,317	2,589	2,861	3,132	3,403	3,673	1,837
184	197	210	7 1/4"	7 3/4"	8 1/4"	876	1,222	1,466	1,692	1,774	2,005	2,315	2,624	2,933	3,240	3,547	3,854	4,161	2,080
191	203	216	7 1/2"	8"	8 1/2"	982	1,374	1,649	1,903	1,994	2,254	2,603	2,951	3,297	3,643	3,989	4,334	4,678	2,339
197	210	222	7 3/4"	8 1/4"	8 3/4"	1,095	1,534	1,842	2,126	2,228	2,519	2,908	3,297	3,684	4,070	4,456	4,841	5,226	2,613
203	216	229	8"	8 1/2"	9"	1,215	1,704	2,046	2,361	2,475	2,797	3,230	3,661	4,091	4,521	4,949	5,377	5,805	2,902
210	222	235	8 1/4"	8 3/4"	9 1/4"	1,340	1,883	2,260	2,609	2,734	3,091	3,569	4,045	4,520	4,995	5,468	5,941	6,414	3,207
216	229	241	8 1/2"	9"	9 1/2"	1,471	2,071	2,485	2,869	3,006	3,399	3,925	4,449	4,971	5,492	6,013	6,533	7,053	3,526
222	235	248	8 3/4"	9 1/4"	9 3/4"	1,609	2,267	2,721	3,141	3,292	3,721	4,297	4,871	5,443	6,014	6,584	7,153	7,722	3,861
229	241	254	9"	9 1/2"	10"	1,753	2,473	2,968	3,425	3,590	4,058	4,687	5,312	5,936	6,559	7,180	7,801	8,422	4,211
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,903	2,687	3,225	3,722	3,901	4,410	5,093	5,773	6,451	7,127	7,803	8,478	9,152	4,576
241	254	267	9 1/2"	10"	10 1/2"	2,059	2,910	3,493	4,032	4,226	4,777	5,516	6,252	6,987	7,719	8,451	9,182	9,913	4,956
248	260	273	9 3/4"	10 1/4"	10 3/4"	2,221	3,143	3,772	4,353	4,563	5,158	5,956	6,751	7,544	8,335	9,125	9,915	10,703	5,352
254	267	279	10"	10 1/2"	11"	2,389	3,384	4,061	4,687	4,913	5,554	6,413	7,269	8,123	8,975	9,825	10,675	11,525	5,762
260	273	286	10 1/4"	10 3/4"	11 1/4"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
267	279	292	10 1/2"	11"	11 1/2"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
273	286	298	10 3/4"	11 1/4"	11 3/4"	2,745	3,893	4,672	5,392	5,652	6,389	7,378	8,363	9,345	10,325	11,303	12,281	13,258	6,629
279	292	305	11"	11 1/2"	12"	2,931	4,160	4,994	5,763	6,041	6,828	7,886	8,938	9,988	11,035	12,081	13,126	14,170	7,085
286	298		11 1/4"	11 3/4"		3,124	4,437	5,326	6,147	6,442	7,283	8,410	9,533	10,652	11,769	12,885	13,999	15,113	7,556
292	305		11 1/2"	12"		3,323	4,723	5,669	6,543	6,857	7,751	8,951	10,146	11,338	12,527	13,714	14,900	16,086	8,043
298			11 3/4"			3,529	5,017	6,022	6,951	7,285	8,235	9,510	10,779	12,045	13,308	14,569	15,830	17,089	8,545
305			12"			3,740	5,321	6,387	7,371	7,725	8,733	10,085	11,431	12,773	14,113	15,451	16,787	18,123	9,061

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egcoibox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 4,350$ psi / 30.0 MPa (Imperial); - per Egccobox® element

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egccobox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [in ²]	0.37	0.74	0.93	1.11	1.11	1.30	1.48	1.67	1.86	2.04	2.23	2.41	2.60	1.30
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [in ²]	0.49	0.93	1.16	1.39	1.39	1.62	1.86	2.09	2.32	2.55	2.78	3.01	3.25	1.62
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [in ²]	0.06	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
shear force level V1 $\geq a_g$ [in ²]	0.10	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
shear force level V2 $\geq a_g$ [in ²]	0.15	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	#WERT!
shear force level V3 $\geq a_g$ [in ²]	0.20	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	-
shear force level V4 $\geq a_g$ [in ²]	-	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.39
shear force level VS \pm $\geq a_g$ [in ²]	-	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11
shear force level V1 \pm $\geq a_g$ [in ²]	-	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
shear force level V2 \pm $\geq a_g$ [in ²]	-	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	#WERT!
shear force level V3 \pm $\geq a_g$ [in ²]	-	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	-
shear force level V4 \pm $\geq a_g$ [in ²]	-	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.62	0.39
shear force level V6 \pm $\geq a_g$ [in ²]	0.06	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.06
shear force level V7 \pm $\geq a_g$ [in ²]	0.11	0.22	0.22	0.22	0.22	0.22	0.22	0.30	0.30	0.30	0.30	0.30	0.30	0.15
shear force level V8 \pm $\geq a_g$ [in ²]	0.23	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.47	0.23

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

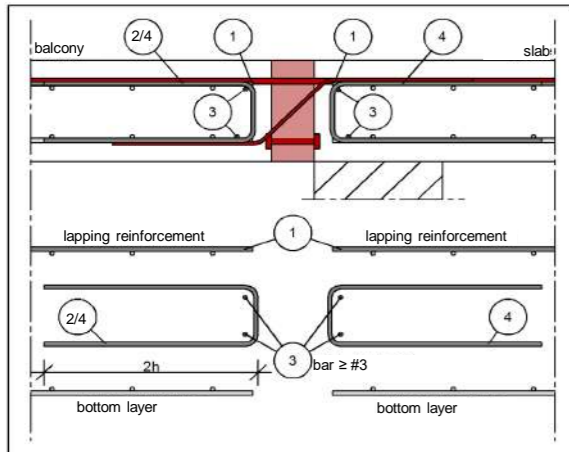
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

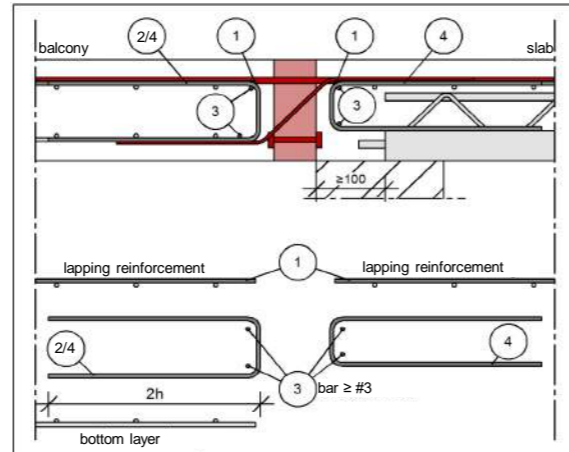
The specifications apply to good bonding conditions.

design proposal

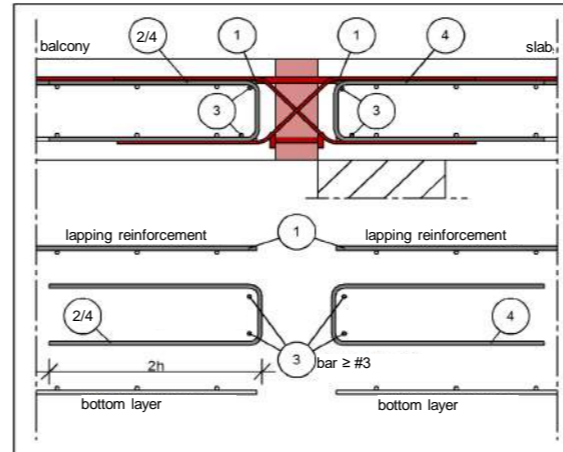
direct support



direct support (semi-prefab slab)



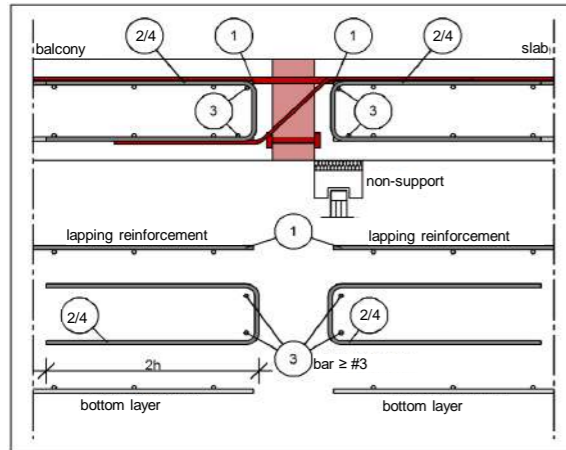
direct support with alternating shear force (V6 \pm , V7 \pm , V8 \pm)



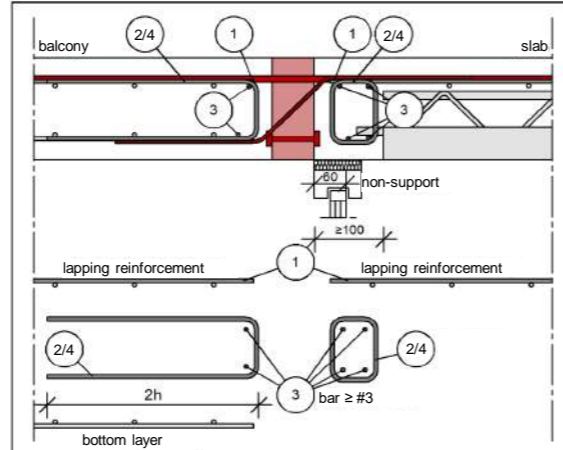
For the Egccobox shear force levels VS \pm to V4 \pm , a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



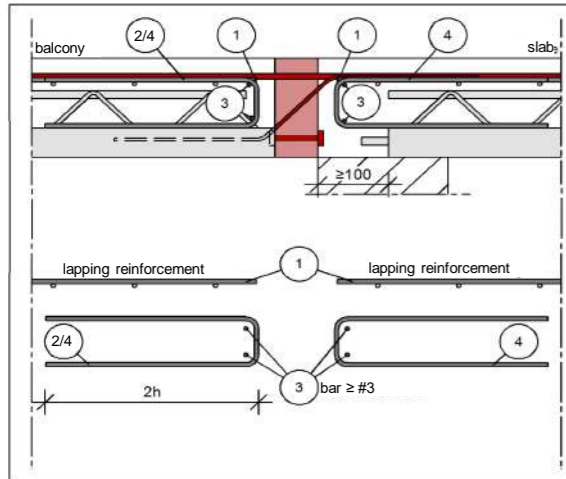
indirect support (semi-prefab slab)



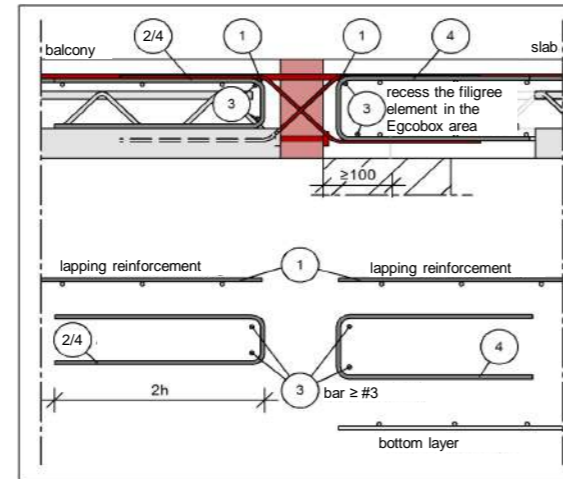
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

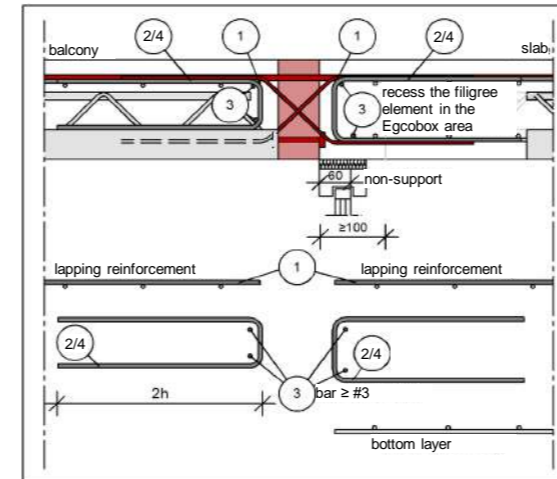
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



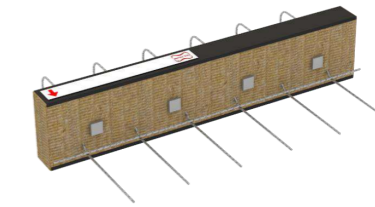
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egccobox® type VM - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per Egccobox® element

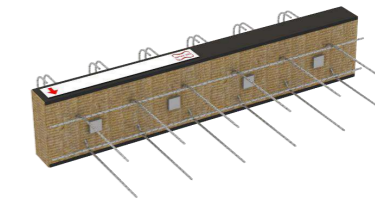
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egccobox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399			
length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/element]									
C38	C51	C64	1 1/2"	2"	2 1/2"										
height of connection [mm]			height of connection [in]												
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	7.3	9.1	12.9	16.1	19.4	25.8	32.3	38.7	-	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	7.3	9.1	12.9	16.1	19.4	25.8	32.3	38.7	50.6	60.7

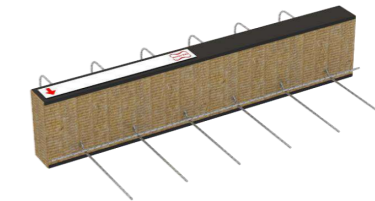
Reinforcement												
shear force bars [qty ϕ mm]			4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10
minimum wall / beam width [in]			7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"
compression bearings [qty ϕ mm]			4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egccobox® type VM-K - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per Egccobox® element

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egccobox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K			
length of element [ft in]			7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/element]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	3.6	6.5	9.7	12.9	16.1	-	22.6	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	3.6	6.5	9.7	12.9	16.1	20.2	22.6	30.3

Reinforcement										
shear force bars [qty ϕ mm]			2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10
minimum wall / beam width [in]			7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"
compression bearings [qty ϕ mm]			1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"

All Egccobox types can also be produced in the following variants:

VM_± / VM-K_± - Egccobox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egccobox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egccobox® VM / VM-K

VM Z_± / VM Z_-K± - Egccobox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egccobox® VM± / VM-K±

Egccobox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egcoibox® type VM / VM-K - concrete strength $\geq 4,350$ psi / 30.0 MPa (Imperial); - per Egcoibox® element

Egcoibox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [in ²]	0.11	0.14	0.20	0.25	0.30	0.40	0.49	0.59	0.77	0.93
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egcoibox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [in ²]	0.06	0.10	0.15	0.20	0.25	0.31	0.35	0.46
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

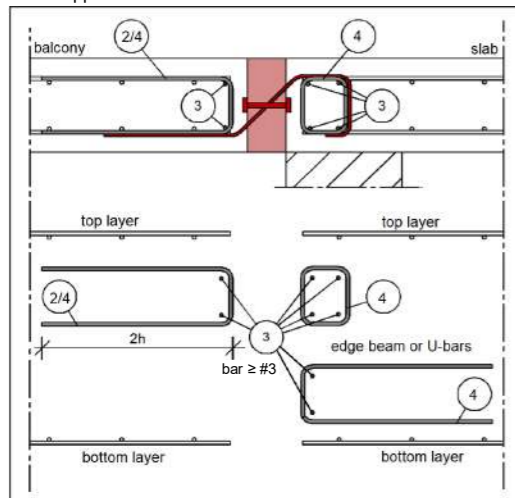
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

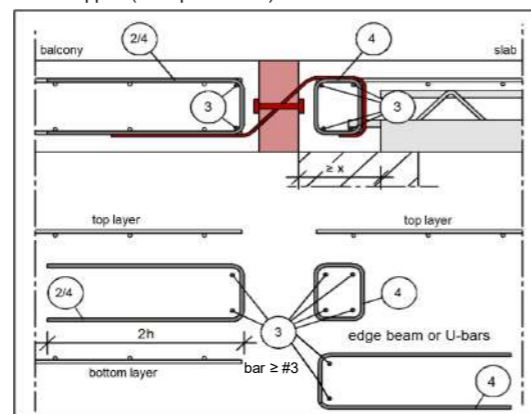
The specifications apply to good bonding conditions.

design proposal

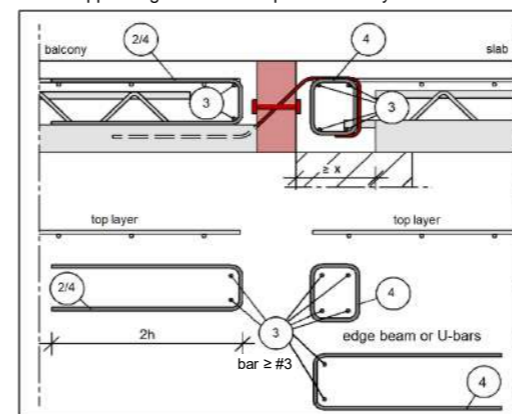
direct support



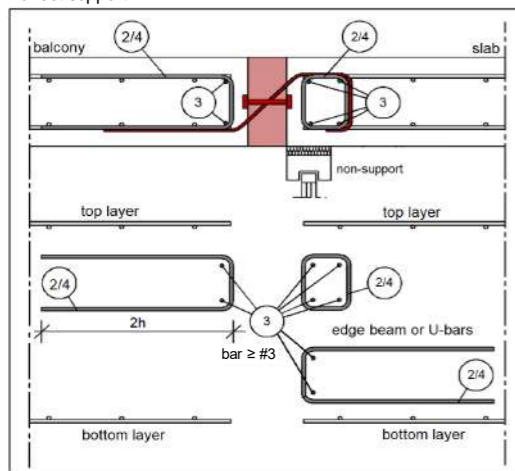
direct support (semi-prefab slab)



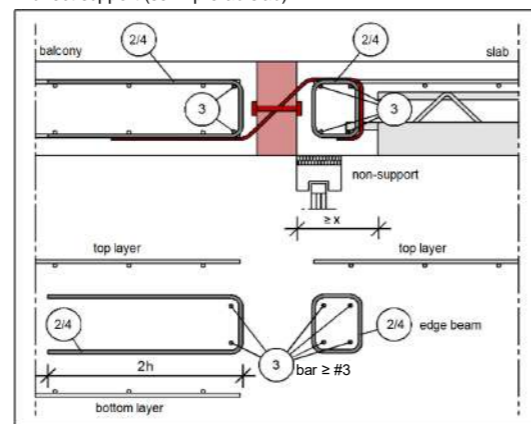
direct support: Egcoibox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egcoibox in semi-prefab balcony:

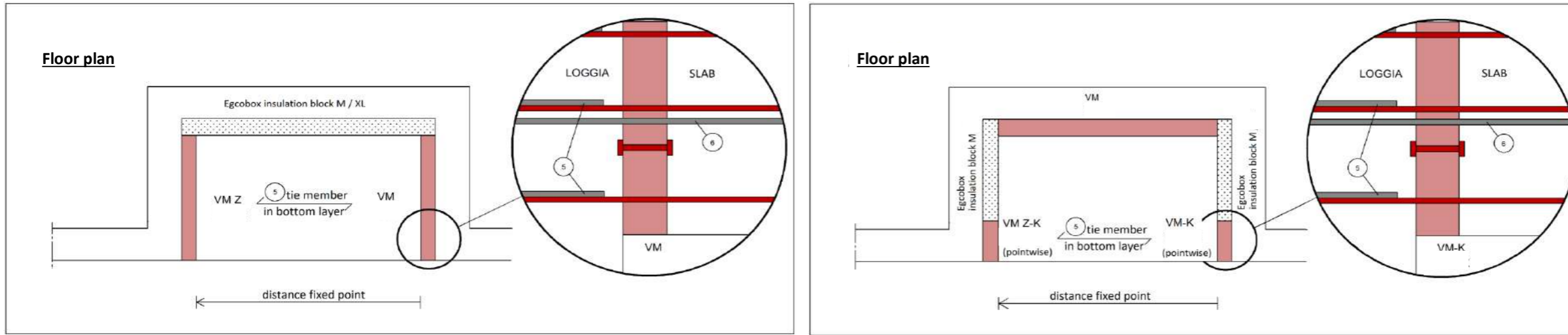
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

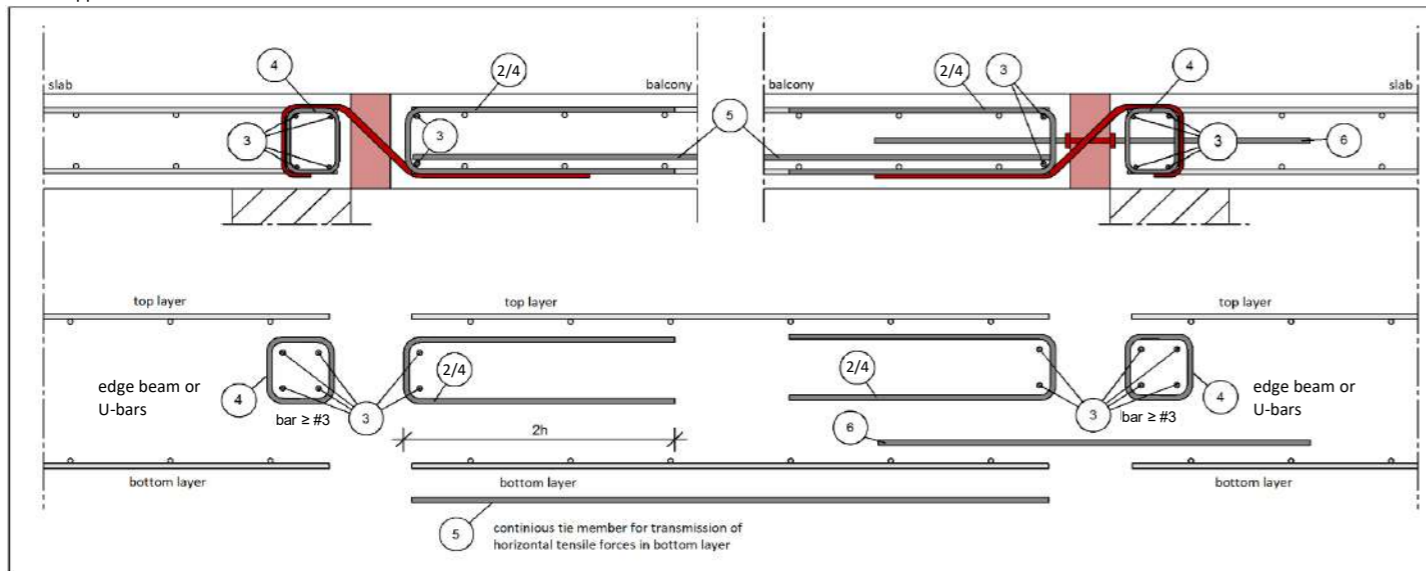
The information on the minimum required connection reinforcement of the Egcoibox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egcoibox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

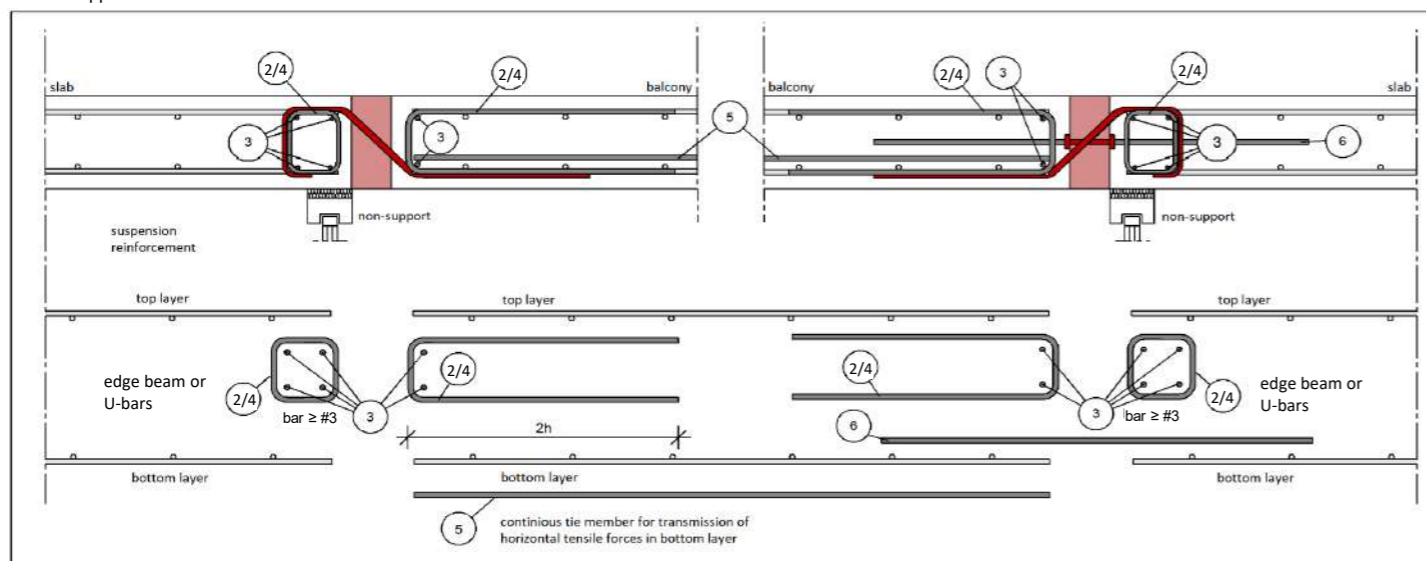


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per Egccobox® element

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM_n [kip-ft/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±10.2	±12.7	±15.2	±17.8	±20.3	±22.9	±25.4	±25.4	±29.1	±32.7	±36.4	±21.8	±25.4	±29.1	±36.7	
	178	203	229	7"	8"	9"	±10.9	±13.7	±16.4	±19.1	±21.9	±24.6	±27.4	±27.4	±31.4	±35.3	±39.2	±23.5	±27.4	±31.4	±39.7	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±11.7	±14.6	±17.6	±20.5	±23.4	±26.4	±29.3	±29.4	±33.6	±37.8	±42.0	±25.2	±29.4	±33.6	±42.6	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±12.5	±15.6	±18.7	±21.9	±25.0	±28.1	±31.2	±31.4	±35.9	±40.4	±44.9	±26.9	±31.4	±35.9	±45.5	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±13.3	±16.6	±19.9	±23.2	±26.5	±29.9	±33.2	±33.4	±38.2	±42.9	±47.7	±28.6	±33.4	±38.2	±48.5	
	203	229	254	8"	9"	10"	±14.0	±17.6	±21.1	±24.6	±28.1	±31.6	±35.1	±35.4	±40.4	±45.5	±50.6	±30.3	±35.4	±40.4	±51.4	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±14.8	±18.5	±22.2	±25.9	±29.6	±33.3	±37.0	±37.4	±42.7	±48.1	±53.4	±32.0	±37.4	±42.7	±54.4	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±15.6	±19.5	±23.4	±27.3	±31.2	±35.1	±39.0	±39.4	±45.0	±50.6	±56.2	±33.7	±39.4	±45.0	±57.3	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±16.4	±20.5	±24.6	±28.6	±32.7	±36.8	±40.9	±41.4	±47.3	±53.2	±59.1	±35.5	±41.4	±47.3	±60.2	
	229	254	279	9"	10"	11"	±17.1	±21.4	±25.7	±30.0	±34.3	±38.6	±42.9	±43.3	±49.5	±55.7	±61.9	±37.2	±43.3	±49.5	±63.2	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±17.9	±22.4	±26.9	±31.4	±35.8	±40.3	±44.8	±45.3	±51.8	±58.3	±64.8	±38.9	±45.3	±51.8	±66.1	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±18.7	±23.4	±28.0	±32.7	±37.4	±42.1	±46.7	±47.3	±54.1	±60.8	±67.6	±40.6	±47.3	±54.1	±69.1	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±19.5	±24.3	±29.2	±34.1	±38.9	±43.8	±48.7	±49.3	±56.4	±63.4	±70.4	±42.3	±49.3	±56.4	±72.0	
	254	279	305	10"	11"	12"	±20.2	±25.3	±30.4	±35.4	±40.5	±45.6	±50.6	±51.3	±58.6	±66.0	±73.3	±44.0	±51.3	±58.6	±75.0	
	260	286		10 1/4"	11 1/4"		±21.0	±26.3	±31.5	±36.8	±42.0	±47.3	±52.6	±53.3	±60.9	±68.5	±76.1	±45.7	±53.3	±60.9	±77.9	
	267	292		10 1/2"	11 1/2"		±21.8	±27.2	±32.7	±38.1	±43.6	±49.0	±54.5	±55.3	±63.2	±71.1	±79.0	±47.4	±55.3	±63.2	±80.8	
	273	298		10 3/4"	11 3/4"		±22.6	±28.2	±33.9	±39.5	±45.1	±50.8	±56.4	±57.3	±65.5	±73.6	±81.8	±49.1	±57.3	±65.5	±83.8	
	279	305		11"	12"		±23.3	±29.2	±35.0	±40.9	±46.7	±52.5	±58.4	±59.3	±67.7	±76.2	±84.7	±50.8	±59.3	±67.7	±86.7	
	286			11 1/4"			±24.1	±30.2	±36.2	±42.2	±48.2	±54.3	±60.3	±61.2	±70.0	±78.7	±87.5	±52.5	±61.2	±70.0	±89.7	
	292			11 1/2"			±24.9	±31.1	±37.3	±43.6	±49.8	±56.0	±62.2	±63.2	±72.3	±81.3	±90.3	±54.2	±63.2	±72.3	±92.6	
298			11 3/4"			±25.7	±32.1	±38.5	±44.9	±51.3	±57.8	±64.2	±65.2	±74.5	±83.9	±93.2	±55.9	±65.2	±74.5	±95.5		
305			12"			±26.4	±33.1	±39.7	±46.3	±52.9	±59.5	±66.1	±67.2	±76.8	±86.4	±96.0	±57.6	±67.2	±76.8	±98.5		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV_n [kip/element]																
	C38	C51	C64	1 1/2"	2"	2 1/2"	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5		
VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	±9.5	
V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8	±16.8
V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2	±25.2
V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±33.6	±33.6	±33.6	±33.6	±33.6	±33.6	±33.6	±33.6	±33.6	±33.6	±33.6	-	-	-	-	-	-
V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±39.4	±39.4	±39.4	±39.4	±39.4	±39.4	±39.4	±39.4	±39.4	-	-	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±52.5	±52.5	±52.5	±52.5	±52.5	±52.5	±52.5	-	-	-	-	-	-

concrete cover for top and bottom reinforcement Egccobox®
other heights on request



Reinforcement Egccobox® type MM± - per Egccobox® element

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egccobox® type MM± - per Egccobox® element

	Egccobox type			MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±		
	length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"		
	concrete cover [mm]			concrete cover [in]			Rotation spring stiffness [kip-ft/rad/element]													
height of connection [mm / in]	C38	C51	C64	1 1/2"	2"	2 1/2"														
	171	197	222	6 3/4"	7 3/4"	8 3/4"	461	576	692	807	922	1,037	1,153	1,107	1,265	1,423	1,581	949	1,107	1,265
178	203	229	7"	8"	9"	534	667	801	934	1,068	1,201	1,335	1,286	1,470	1,654	1,837	1,102	1,286	1,470	1,672
184	210	235	7 1/4"	8 1/4"	9 1/4"	612	765	918	1,071	1,224	1,377	1,530	1,479	1,690	1,901	2,113	1,268	1,479	1,690	1,928
191	216	241	7 1/2"	8 1/2"	9 1/2"	696	869	1,043	1,217	1,391	1,565	1,739	1,685	1,926	2,166	2,407	1,444	1,685	1,926	2,203
197	222	248	7 3/4"	8 3/4"	9 3/4"	784	980	1,177	1,373	1,569	1,765	1,961	1,905	2,177	2,449	2,721	1,633	1,905	2,177	2,496
203	229	254	8"	9"	10"	879	1,098	1,318	1,538	1,757	1,977	2,196	2,138	2,443	2,749	3,054	1,832	2,138	2,443	2,808
210	235	260	8 1/4"	9 1/4"	10 1/4"	978	1,223	1,467	1,712	1,956	2,201	2,445	2,384	2,725	3,066	3,406	2,044	2,384	2,725	3,138
216	241	267	8 1/2"	9 1/2"	10 1/2"	1,083	1,354	1,624	1,895	2,166	2,437	2,707	2,644	3,022	3,400	3,778	2,267	2,644	3,022	3,486
222	248	273	8 3/4"	9 3/4"	10 3/4"	1,193	1,491	1,790	2,088	2,386	2,685	2,983	2,918	3,335	3,752	4,168	2,501	2,918	3,335	3,852
229	254	279	9"	10"	11"	1,309	1,636	1,963	2,290	2,617	2,945	3,272	3,205	3,663	4,121	4,578	2,747	3,205	3,663	4,237
235	260	286	9 1/4"	10 1/4"	11 1/4"	1,430	1,787	2,144	2,502	2,859	3,217	3,574	3,505	4,006	4,507	5,007	3,004	3,505	4,006	4,640
241	267	292	9 1/2"	10 1/2"	11 1/2"	1,556	1,945	2,334	2,723	3,112	3,501	3,890	3,819	4,365	4,910	5,456	3,273	3,819	4,365	5,062
248	273	298	9 3/4"	10 3/4"	11 3/4"	1,687	2,109	2,531	2,953	3,375	3,797	4,219	4,146	4,739	5,331	5,923	3,554	4,146	4,739	5,501
254	279	305	10"	11"	12"	1,824	2,280	2,736	3,193	3,649	4,105	4,561	4,487	5,128	5,769	6,410	3,846	4,487	5,128	5,959
260	286		10 1/4"	11 1/4"		1,967	2,458	2,950	3,441	3,933	4,425	4,916	4,841	5,533	6,225	6,916	4,150	4,841	5,533	6,436
267	292		10 1/2"	11 1/2"		2,114	2,643	3,171	3,700	4,228	4,757	5,285	5,209	5,953	6,697	7,441	4,465	5,209	5,953	6,930
273	298		10 3/4"	11 3/4"		2,267	2,834	3,401	3,967	4,534	5,101	5,668	5,590	6,389	7,187	7,986	4,792	5,590	6,389	7,443
279	305		11"	12"		2,425	3,032	3,638	4,244	4,851	5,457	6,063	5,985	6,840	7,695	8,550	5,130	5,985	6,840	7,975
286			11 1/4"			2,589	3,236	3,883	4,531	5,178	5,825	6,472	6,393	7,306	8,219	9,132	5,479	6,393	7,306	8,524
292			11 1/2"			2,758	3,447	4,137	4,826	5,516	6,205	6,895	6,814	7,788	8,761	9,735	5,841	6,814	7,788	9,092
298			11 3/4"			2,932	3,665	4,398	5,131	5,864	6,597	7,330	7,249	8,285	9,320	10,356	6,214	7,249	8,285	9,678
305			12"			3,112	3,890	4,668	5,445	6,223	7,001	7,779	7,697	8,797	9,897	10,996	6,598	7,697	8,797	10,283

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egccobox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 4,350 psi / 30.0 MPa (Imerial); - per Egcoibox® element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / element - option 1															
≥ a _g [in²]	0.74	0.93	1.11	1.30	1.48	1.67	1.86	1.89	2.16	2.44	2.71	1.62	1.89	2.16	2.18
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _g [in²]	0.93	1.16	1.39	1.62	1.86	2.09	2.32	2.27	2.60	2.92	3.25	1.95	2.27	2.60	2.18
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _g [in²]	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
shear force level V1 ≥ a _g [in²]	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26
shear force level V2 ≥ a _g [in²]	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39	0.39
shear force level V3 ≥ a _g [in²]	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	0.51	-	-	-	-
shear force level V4 ≥ a _g [in²]	-	-	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	-	-	-	-
shear force level V5 ≥ a _g [in²]	-	-	-	-	0.80	0.80	0.80	0.80	0.80	0.80	0.80	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

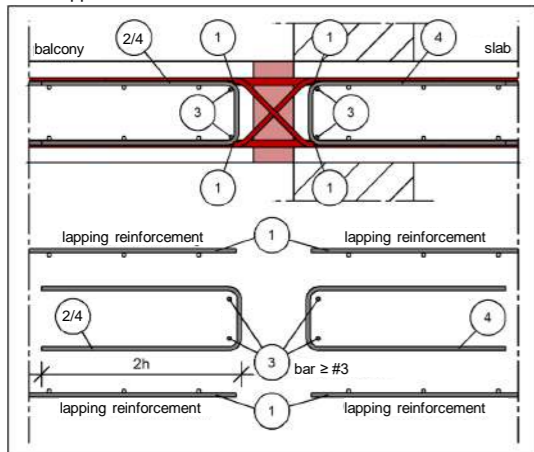
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

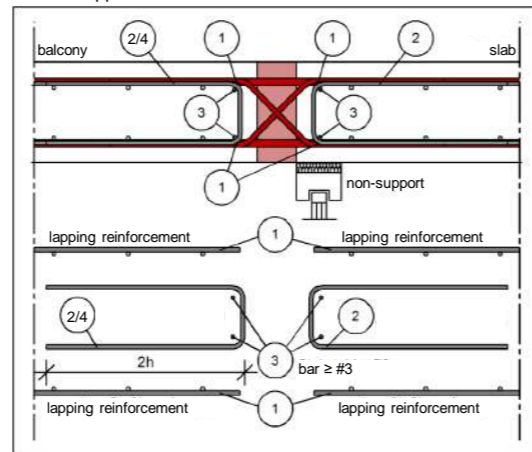
The specifications apply to good bonding conditions.

design proposal

direct support



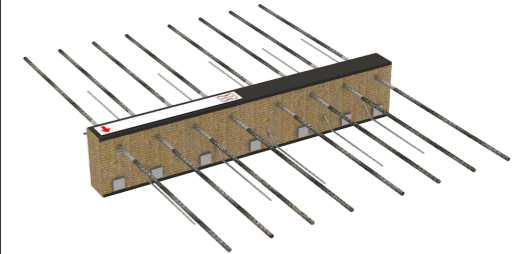
indirect support



Design table Egcoibox® type MM - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per Egcoibox® element

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egcoibox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM _n [kip-ft/element]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-6.0	-10.4	-13.0	-15.1	-15.6	-18.2	-20.9	-23.5	-26.1	-28.7	-31.3	-33.9	-36.5	-18.2	
165	178	191	6 1/2"	7"	7 1/2"		-6.5	-11.3	-14.1	-16.3	-16.9	-19.7	-22.5	-25.3	-28.1	-31.0	-33.8	-36.6	-39.4	-19.7	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-6.9	-12.1	-15.1	-17.5	-18.1	-21.2	-24.2	-27.2	-30.2	-33.2	-36.3	-39.3	-42.3	-21.2	
178	191	203	7"	7 1/2"	8"		-7.4	-12.9	-16.2	-18.7	-19.4	-22.6	-25.8	-29.1	-32.3	-35.5	-38.8	-42.0	-45.2	-22.6	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-7.9	-13.8	-17.2	-19.9	-20.6	-24.1	-27.5	-30.9	-34.4	-37.8	-41.3	-44.7	-48.1	-24.1	
191	203	216	7 1/2"	8"	8 1/2"		-8.3	-14.6	-18.2	-21.1	-21.9	-25.5	-29.2	-32.8	-36.5	-40.1	-43.8	-47.4	-51.0	-25.5	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-8.8	-15.4	-19.3	-22.3	-23.1	-27.0	-30.8	-34.7	-38.5	-42.4	-46.2	-50.1	-54.0	-27.0	
203	216	229	8"	8 1/2"	9"		-9.3	-16.2	-20.3	-23.5	-24.4	-28.4	-32.5	-36.6	-40.6	-44.7	-48.7	-52.8	-56.9	-28.4	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-9.7	-17.1	-21.3	-24.7	-25.6	-29.9	-34.2	-38.4	-42.7	-47.0	-51.2	-55.5	-59.8	-29.9	
216	229	241	8 1/2"	9"	9 1/2"		-10.2	-17.9	-22.4	-25.9	-26.9	-31.3	-35.8	-40.3	-44.8	-49.3	-53.7	-58.2	-62.7	-31.3	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-10.7	-18.7	-23.4	-27.1	-28.1	-32.8	-37.5	-42.2	-46.9	-51.5	-56.2	-60.9	-65.6	-32.8	
229	241	254	9"	9 1/2"	10"		-11.1	-19.6	-24.5	-28.3	-29.4	-34.3	-39.1	-44.0	-48.9	-53.8	-58.7	-63.6	-68.5	-34.3	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-11.6	-20.4	-25.5	-29.5	-30.6	-35.7	-40.8	-45.9	-51.0	-56.1	-61.2	-66.3	-71.4	-35.7	
241	254	267	9 1/2"	10"	10 1/2"		-12.1	-21.2	-26.5	-30.7	-31.9	-37.2	-42.5	-47.8	-53.1	-58.4	-63.7	-69.0	-74.3	-37.2	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-12.5	-22.1	-27.6	-31.9	-33.1	-38.6	-44.1	-49.6	-55.2	-60.7	-66.2	-71.7	-77.2	-38.6	
254	267	279	10"	10 1/2"	11"		-13.0	-22.9	-28.6	-33.1	-34.3	-40.1	-45.8	-51.5	-57.2	-63.0	-68.7	-74.4	-80.1	-40.1	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-13.5	-23.7	-29.7	-34.3	-35.6	-41.5	-47.5	-53.4	-59.3	-65.3	-71.2	-77.1	-83.1	-41.5	
267	279	292	10 1/2"	11"	11 1/2"		-13.9	-24.6	-30.7	-35.5	-36.8	-43.0	-49.1	-55.3	-61.4	-67.5	-73.7	-79.8	-86.0	-43.0	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-14.4	-25.4	-31.7	-36.7	-38.1	-44.4	-50.8	-57.1	-63.5	-69.8	-76.2	-82.5	-88.9	-44.4	
279	292	305	11"	11 1/2"	12"		-14.9	-26.2	-32.8	-37.9	-39.3	-45.9	-52.4	-59.0	-65.6	-72.1	-78.7	-85.2	-91.8	-45.9	
286	298		11 1/4"	11 3/4"			-15.3	-27.1	-33.8	-39.1	-40.6	-47.3	-54.1	-60.9	-67.6	-74.4	-81.2	-87.9	-94.7	-47.3	
292	305		11 1/2"	12"			-15.8	-27.9	-34.9	-40.3	-41.8	-48.8	-55.8	-62.7	-69.7	-76.7	-83.7	-90.6	-97.6	-48.8	
298			11 3/4"				-16.3	-28.7	-35.9	-41.5	-43.1	-50.3	-57.4	-64.6	-71.8	-79.0	-86.2	-93.3	-100.5	-50.3	
305			12"				-16.7	-29.5	-36.9	-42.7	-44.3	-51.7	-59.1	-66.5	-73.9	-81.3	-88.6	-96.0	-103.4	-51.7	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV _n [kip/element]															
	C38	C51	C64	1 1/2"	2"	2 1/2"																
VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.9	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8	7.8
V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	6.9	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8	13.8
V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	10.4	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	20.8	21.7
V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	13.8	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	27.7	-
V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	43.4	27.1
V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+3.9/-3.9	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+7.8/-7.8	+3.9/-3.9
V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+7.8/-5.8	+15.6/-11.7	+15.6/-11.7	+15.6/-11.7	+15.6/-11.7	+15.6/-11.7	+15.6/-11.7	+15.6/-11.7	+15.6/-11.7	+20.8/-13.8	+20.8/-13.8	+20.8/-13.8	+20.8/-13.8	+20.8/-13.8	+20.8/-13.8	+10.4/-6.9
V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+16.3/-16.3	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+32.5/-32.5	+16.3/-16.3

Shear force level VS to V4 also possible with lifting shear force (-3.9 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egcoibox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egcoibox® type MM - per Egcoibox® element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox® type MM - per Egcoibox® element

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		concrete cover top [in]		Rotation spring stiffness [kip-ft/rad/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"														
159	171	184	6 3/4"	6 3/4"	7 1/4"	510	703	843	973	1,020	1,153	1,332	1,510	1,687	1,864	2,041	2,217	2,393	1,197
165	178	191	6 1/2"	7"	7 1/2"	592	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	1,395
171	184	197	6 3/4"	7 1/4"	7 3/4"	680	944	1,133	1,308	1,371	1,550	1,790	2,029	2,267	2,505	2,742	2,979	3,216	1,608
178	191	203	7"	7 1/2"	8"	775	1,078	1,295	1,494	1,566	1,770	2,044	2,317	2,589	2,861	3,132	3,403	3,673	1,837
184	197	210	7 1/4"	7 3/4"	8 1/4"	876	1,222	1,466	1,692	1,774	2,005	2,315	2,624	2,933	3,240	3,547	3,854	4,161	2,080
191	203	216	7 1/2"	8"	8 1/2"	982	1,374	1,649	1,903	1,994	2,254	2,603	2,951	3,297	3,643	3,989	4,334	4,678	2,339
197	210	222	7 3/4"	8 1/4"	8 3/4"	1,095	1,534	1,842	2,126	2,228	2,519	2,908	3,297	3,684	4,070	4,456	4,841	5,226	2,613
203	216	229	8"	8 1/2"	9"	1,215	1,704	2,046	2,361	2,475	2,797	3,230	3,661	4,091	4,521	4,949	5,377	5,805	2,902
210	222	235	8 1/4"	8 3/4"	9 1/4"	1,340	1,883	2,260	2,609	2,734	3,091	3,569	4,045	4,520	4,995	5,468	5,941	6,414	3,207
216	229	241	8 1/2"	9"	9 1/2"	1,471	2,071	2,485	2,869	3,006	3,399	3,925	4,449	4,971	5,492	6,013	6,533	7,053	3,526
222	235	248	8 3/4"	9 1/4"	9 3/4"	1,609	2,267	2,721	3,141	3,292	3,721	4,297	4,871	5,443	6,014	6,584	7,153	7,722	3,861
229	241	254	9"	9 1/2"	10"	1,753	2,473	2,968	3,425	3,590	4,058	4,687	5,312	5,936	6,559	7,180	7,801	8,422	4,211
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,903	2,687	3,225	3,722	3,901	4,410	5,093	5,773	6,451	7,127	7,803	8,478	9,152	4,576
241	254	267	9 1/2"	10"	10 1/2"	2,059	2,910	3,493	4,032	4,226	4,777	5,516	6,252	6,987	7,719	8,451	9,182	9,913	4,956
248	260	273	9 3/4"	10 1/4"	10 3/4"	2,221	3,143	3,772	4,353	4,563	5,158	5,956	6,751	7,544	8,335	9,125	9,915	10,703	5,352
254	267	279	10"	10 1/2"	11"	2,389	3,384	4,061	4,687	4,913	5,554	6,413	7,269	8,123	8,975	9,825	10,675	11,525	5,762
260	273	286	10 1/4"	10 3/4"	11 1/4"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
267	279	292	10 1/2"	11"	11 1/2"	2,564	3,634	4,361	5,034	5,276	5,964	6,887	7,806	8,723	9,638	10,551	11,464	12,376	6,188
273	286	298	10 3/4"	11 1/4"	11 3/4"	2,745	3,893	4,672	5,392	5,652	6,389	7,378	8,363	9,345	10,325	11,303	12,281	13,258	6,629
279	292	305	11"	11 1/2"	12"	2,931	4,160	4,994	5,763	6,041	6,828	7,886	8,938	9,988	11,035	12,081	13,126	14,170	7,085
286	298		11 1/4"	11 3/4"		3,124	4,437	5,326	6,147	6,442	7,283	8,410	9,533	10,652	11,769	12,885	13,999	15,113	7,556
292	305		11 1/2"	12"		3,323	4,723	5,669	6,543	6,857	7,751	8,951	10,146	11,338	12,527	13,714	14,900	16,086	8,043
298			11 3/4"			3,529	5,017	6,022	6,951	7,285	8,235	9,510	10,779	12,045	13,308	14,569	15,830	17,089	8,545
305			12"			3,740	5,321	6,387	7,371	7,725	8,733	10,085	11,431	12,773	14,113	15,451	16,787	18,123	9,061

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egcoibox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 5,000$ psi / 34.5 MPa (Imperial); - per Egccobox® element

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egccobox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [in ²]	0.37	0.74	0.93	1.11	1.11	1.30	1.48	1.67	1.86	2.04	2.23	2.41	2.60	1.30
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [in ²]	0.49	0.93	1.16	1.39	1.39	1.62	1.86	2.09	2.32	2.55	2.78	3.01	3.25	1.62
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [in ²]	0.06	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
shear force level V1 $\geq a_g$ [in ²]	0.11	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
shear force level V2 $\geq a_g$ [in ²]	0.16	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.33
shear force level V3 $\geq a_g$ [in ²]	0.21	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	-
shear force level V4 $\geq a_g$ [in ²]	-	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.42
shear force level VS \pm $\geq a_g$ [in ²]	-	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12
shear force level V1 \pm $\geq a_g$ [in ²]	-	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21	0.21
shear force level V2 \pm $\geq a_g$ [in ²]	-	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.32	0.33
shear force level V3 \pm $\geq a_g$ [in ²]	-	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	0.42	-
shear force level V4 \pm $\geq a_g$ [in ²]	-	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.66	0.42
shear force level V6 \pm $\geq a_g$ [in ²]	0.06	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.06
shear force level V7 \pm $\geq a_g$ [in ²]	0.12	0.24	0.24	0.24	0.24	0.24	0.24	0.32	0.32	0.32	0.32	0.32	0.32	0.16
shear force level V8 \pm $\geq a_g$ [in ²]	0.25	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.25

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

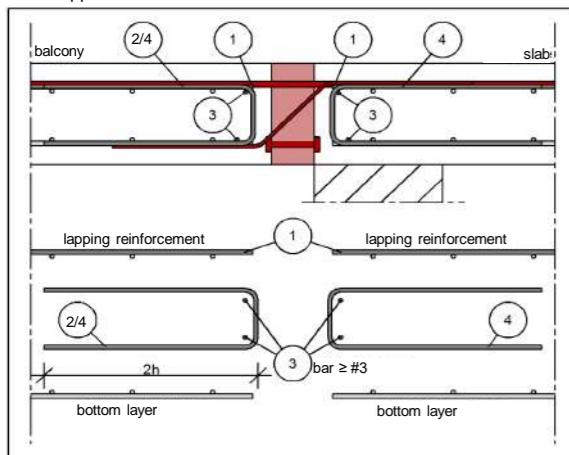
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

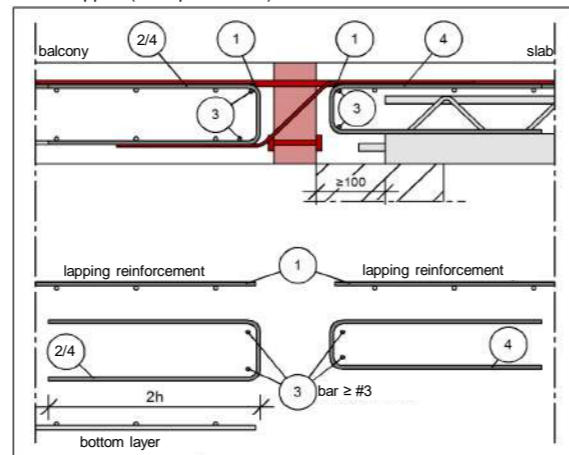
The specifications apply to good bonding conditions.

design proposal

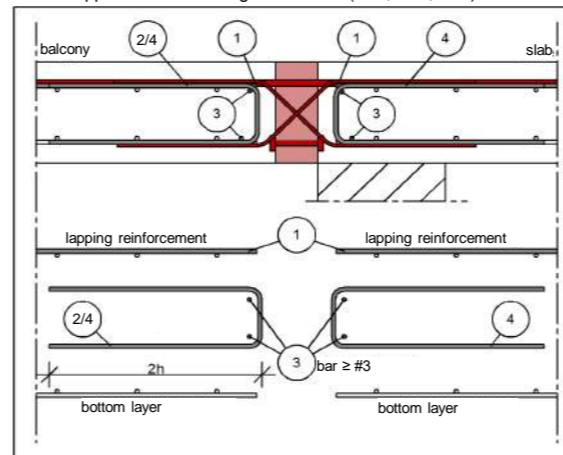
direct support



direct support (semi-prefab slab)



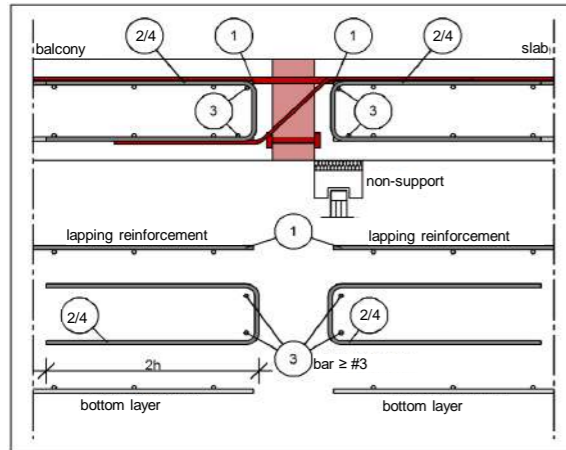
direct support with alternating shear force (V6 \pm , V7 \pm , V8 \pm)



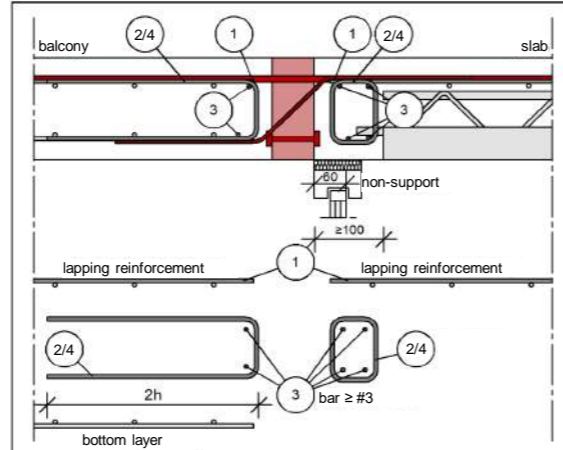
For the Egccobox shear force levels VS \pm to V4 \pm , a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



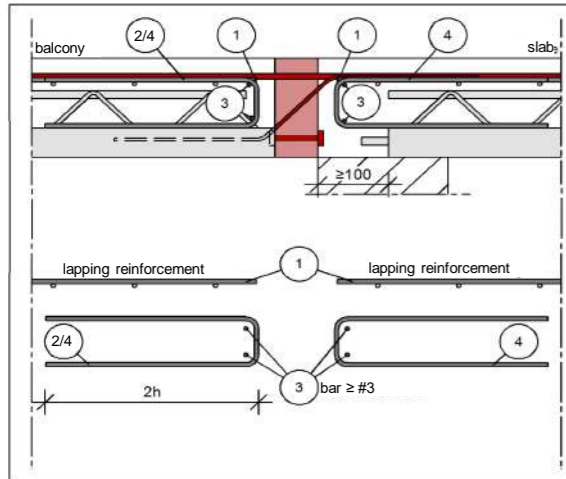
indirect support (semi-prefab slab)



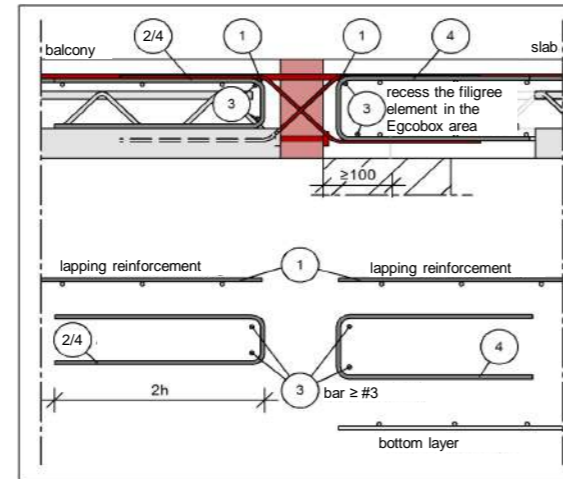
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

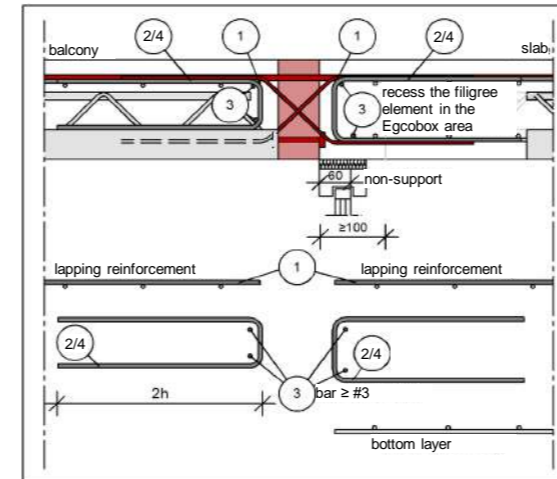
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



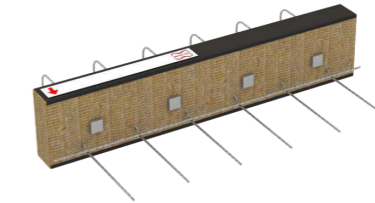
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per Egcoibox® element

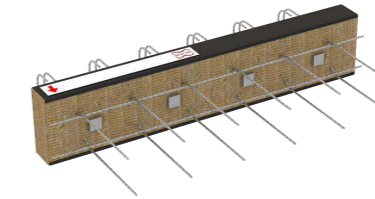
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399			
length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"			
concrete cover top [mm]			rowspan="3" style="text-align: center;"> ϕV_n [kip/element]												
concrete cover top [in]															
C38	C51	C64	1 1/2"	2"	2 1/2"										
height of connection [mm]			rowspan="3" style="text-align: center;"> ϕV_n [kip/element]												
height of connection [in]															
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	7.8	9.7	13.8	17.3	20.8	27.7	34.6	41.5	-	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	7.8	9.7	13.8	17.3	20.8	27.7	34.6	41.5	54.2	65.1

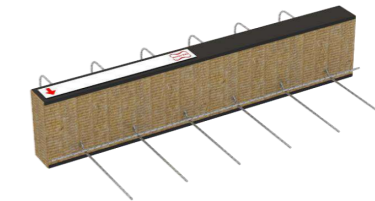
Reinforcement												
shear force bars [qty ø mm]			4 ø 6	5 ø 6	4 ø 8	5 ø 8	6 ø 8	8 ø 8	10 ø 8	12 ø 8	10 ø 10	12 ø 10
minimum wall / beam width [in]			7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"
compression bearings [qty ø mm]			4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	6 ø 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per Egcoibox® element

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K			
length of element [ft in]			7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"			
concrete cover top [mm]			ϕV_n [kip/element]										
concrete cover top [in]													
C38	C51	C64									1 1/2"	2"	2 1/2"
height of connection [mm]			ϕV_n [kip/element]										
height of connection [in]													
159-305	171-305	184-305									6 1/4"-12"	6 3/4"-12"	7 1/4"-12"
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	3.9	6.9	10.4	13.8	17.3	21.7	24.2	32.5

Reinforcement										
shear force bars [qty ø mm]			2 ø 6	2 ø 8	3 ø 8	4 ø 8	5 ø 8	4 ø 10	7 ø 8	6 ø 10
minimum wall / beam width [in]			7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"
compression bearings [qty ø mm]			1 ø 12	1 ø 12	1 ø 12	2 ø 12	2 ø 12	2 ø 12	3 ø 12	3 ø 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"

All Egcoibox types can also be produced in the following variants:

VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K

VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egcoibox® type VM / VM-K - concrete strength $\geq 5,000$ psi / 34.5 MPa (Imperial); - per Egcoibox® element

Egcoibox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [in ²]	0.12	0.15	0.21	0.27	0.32	0.42	0.53	0.64	0.83	1.00
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egcoibox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [in ²]	0.06	0.11	0.16	0.21	0.27	0.33	0.37	0.50
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

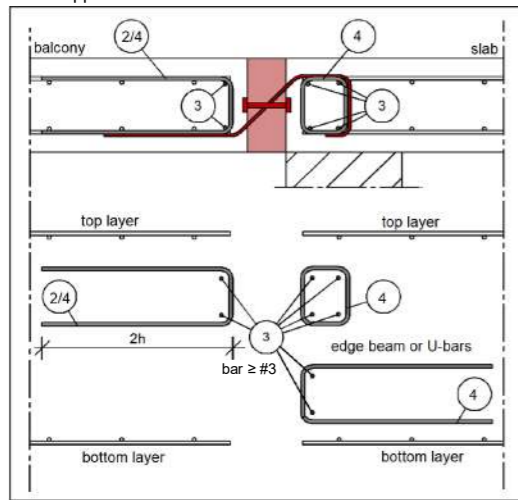
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

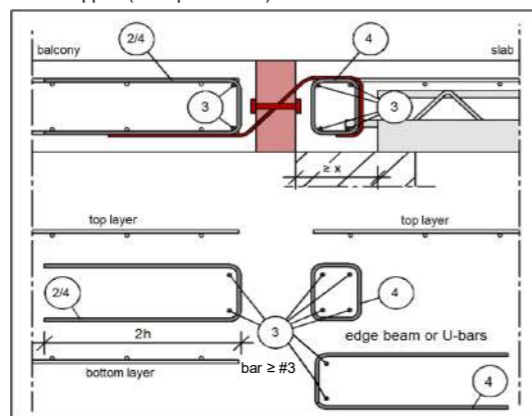
The specifications apply to good bonding conditions.

design proposal

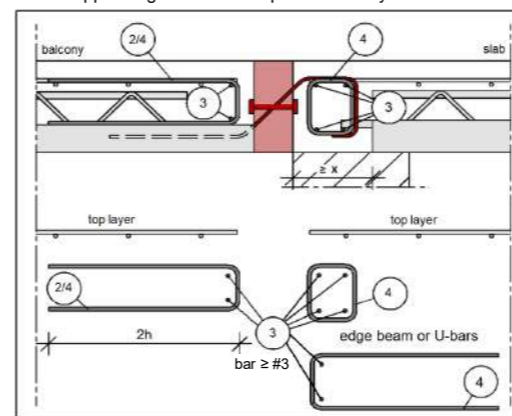
direct support



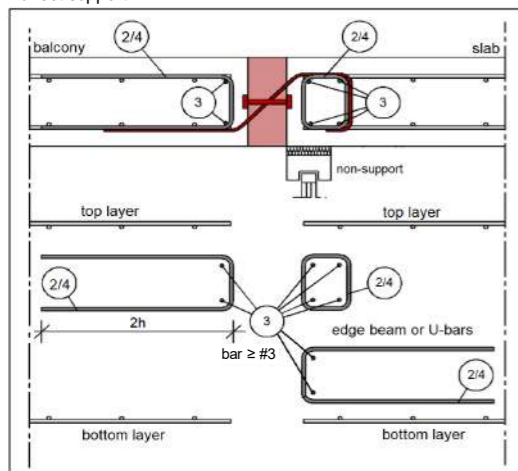
direct support (semi-prefab slab)



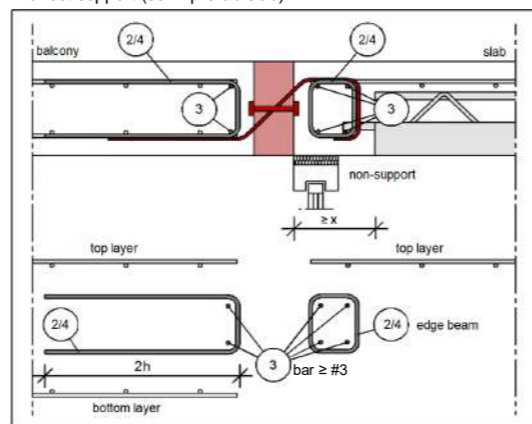
direct support: Egcoibox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egcoibox in semi-prefab balcony:

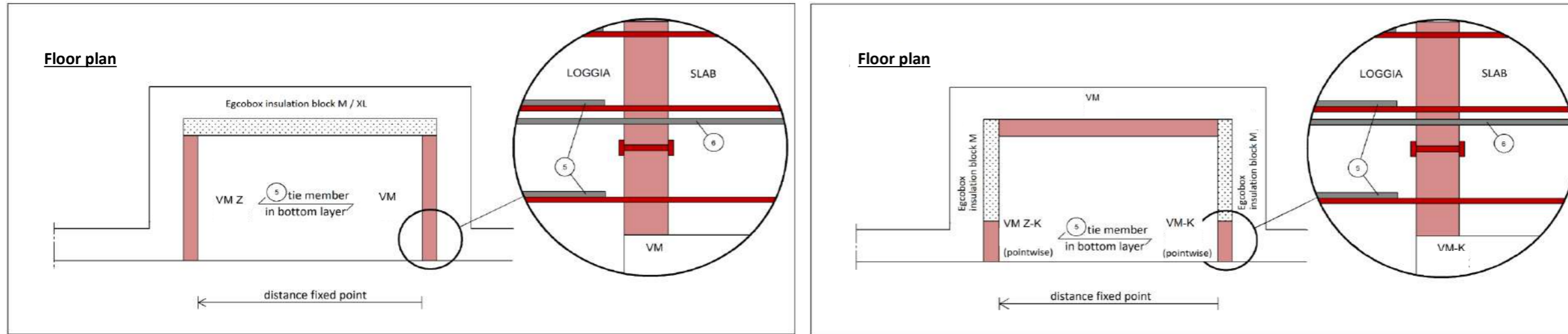
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

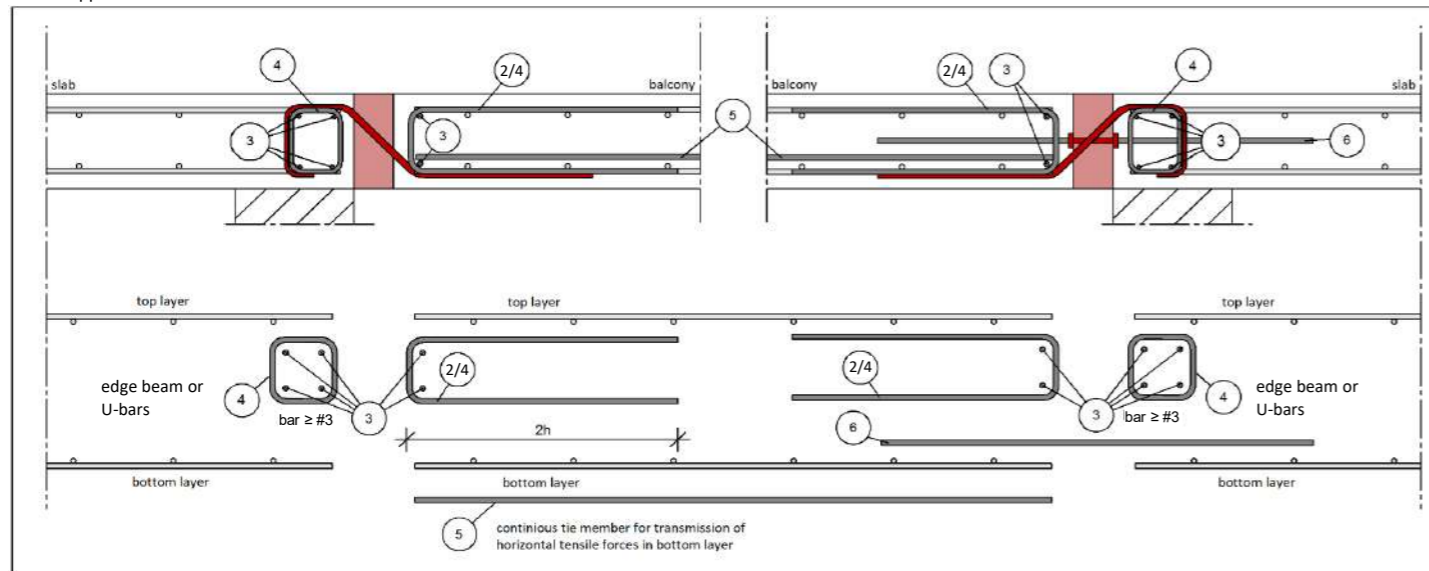
The information on the minimum required connection reinforcement of the Egcoibox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egcoibox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal Egco[®] VM Z_ / VM Z_-K



direct support

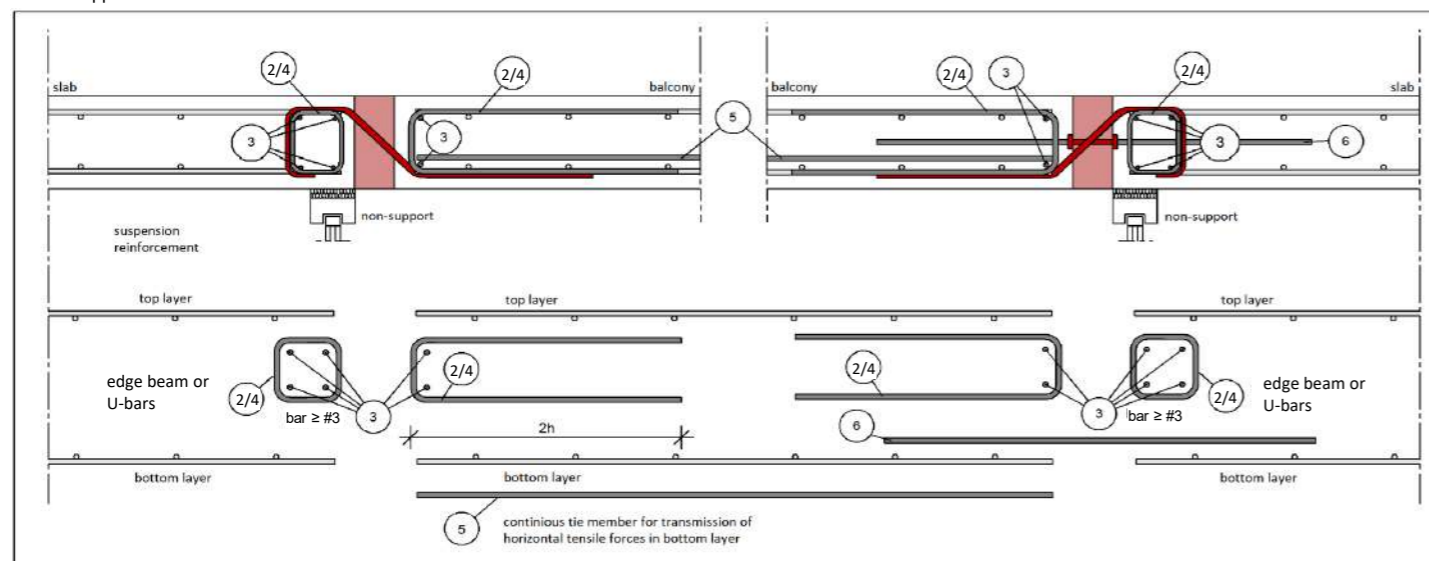


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the Egco[®].

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the Egco VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per Egccobox® element

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM_n [kip-ft/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±10.4	±13.0	±15.7	±18.3	±20.9	±23.5	±26.1	±26.9	±30.7	±34.6	±38.4	±23.0	±26.9	±30.7	±36.7	
	178	203	229	7"	8"	9"	±11.2	±14.0	±16.8	±19.7	±22.5	±25.3	±28.1	±29.0	±33.1	±37.3	±41.4	±24.8	±29.0	±33.1	±39.7	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±12.0	±15.0	±18.0	±21.0	±24.1	±27.1	±30.1	±31.1	±35.5	±40.0	±44.4	±26.6	±31.1	±35.5	±42.6	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±12.8	±16.0	±19.2	±22.4	±25.6	±28.9	±32.1	±33.2	±37.9	±42.7	±47.4	±28.5	±33.2	±37.9	±45.5	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±13.6	±17.0	±20.4	±23.8	±27.2	±30.6	±34.1	±35.3	±40.3	±45.4	±50.4	±30.3	±35.3	±40.3	±48.5	
	203	229	254	8"	9"	10"	±14.4	±18.0	±21.6	±25.2	±28.8	±32.4	±36.0	±37.4	±42.7	±48.1	±53.4	±32.1	±37.4	±42.7	±51.4	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±15.2	±19.0	±22.8	±26.6	±30.4	±34.2	±38.0	±39.5	±45.1	±50.8	±56.4	±33.9	±39.5	±45.1	±54.4	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±16.0	±20.0	±24.0	±28.0	±32.0	±36.0	±40.0	±41.6	±47.5	±53.5	±59.4	±35.7	±41.6	±47.5	±57.3	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±16.8	±21.0	±25.2	±29.4	±33.6	±37.8	±42.0	±43.7	±49.9	±56.2	±62.4	±37.5	±43.7	±49.9	±60.2	
	229	254	279	9"	10"	11"	±17.6	±22.0	±26.4	±30.8	±35.2	±39.6	±44.0	±45.8	±52.3	±58.9	±65.4	±39.3	±45.8	±52.3	±63.2	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±18.4	±23.0	±27.6	±32.2	±36.8	±41.4	±46.0	±47.9	±54.7	±61.6	±68.4	±41.1	±47.9	±54.7	±66.1	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±19.2	±24.0	±28.8	±33.6	±38.4	±43.2	±48.0	±50.0	±57.1	±64.3	±71.4	±42.9	±50.0	±57.1	±69.1	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±20.0	±25.0	±30.0	±35.0	±40.0	±45.0	±50.0	±52.1	±59.5	±67.0	±74.4	±44.7	±52.1	±59.5	±72.0	
	254	279	305	10"	11"	12"	±20.8	±26.0	±31.2	±36.4	±41.6	±46.8	±52.0	±54.2	±62.0	±69.7	±77.4	±46.5	±54.2	±62.0	±75.0	
	260	286		10 1/4"	11 1/4"		±21.6	±27.0	±32.4	±37.8	±43.2	±48.6	±54.0	±56.3	±64.4	±72.4	±80.4	±48.3	±56.3	±64.4	±77.9	
	267	292		10 1/2"	11 1/2"		±22.4	±28.0	±33.6	±39.2	±44.8	±50.3	±55.9	±58.4	±66.8	±75.1	±83.4	±50.1	±58.4	±66.8	±80.8	
	273	298		10 3/4"	11 3/4"		±23.2	±29.0	±34.8	±40.6	±46.3	±52.1	±57.9	±60.5	±69.2	±77.8	±86.4	±51.9	±60.5	±69.2	±83.8	
	279	305		11"	12"		±24.0	±30.0	±36.0	±41.9	±47.9	±53.9	±59.9	±62.6	±71.6	±80.5	±89.4	±53.7	±62.6	±71.6	±86.7	
	286			11 1/4"			±24.8	±31.0	±37.1	±43.3	±49.5	±55.7	±61.9	±64.7	±74.0	±83.2	±92.4	±55.5	±64.7	±74.0	±89.7	
	292			11 1/2"			±25.6	±32.0	±38.3	±44.7	±51.1	±57.5	±63.9	±66.8	±76.4	±85.9	±95.5	±57.3	±66.8	±76.4	±92.6	
298			11 3/4"			±26.4	±32.9	±39.5	±46.1	±52.7	±59.3	±65.9	±68.9	±78.8	±88.6	±98.5	±59.1	±68.9	±78.8	±95.5		
305			12"			±27.2	±33.9	±40.7	±47.5	±54.3	±61.1	±67.9	±71.0	±81.2	±91.3	±101.5	±60.9	±71.0	±81.2	±98.5		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV_n [kip/element]																
	C38	C51	C64	1 1/2"	2"	2 1/2"	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2		
VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	±10.2	
V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0	±18.0
V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0	±27.0
V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	±36.0	-	-	-	-	-
V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±42.2	±42.2	±42.2	±42.2	±42.2	±42.2	±42.2	±42.2	±42.2	±42.2	-	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±56.3	±56.3	±56.3	±56.3	±56.3	±56.3	±56.3	±56.3	-	-	-	-	-

concrete cover for top and bottom reinforcement Egccobox®
other heights on request



Reinforcement Egccobox® type MM± - per Egccobox® element

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egccobox® type MM± - per Egccobox® element

Egccobox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"				
concrete cover [mm]		concrete cover [in]			Rotation spring stiffness [kip-ft/rad/element]															
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	461	576	692	807	922	1,037	1,153	1,107	1,265	1,423	1,581	949	1,107	1,265	1,433
178	203	229	7"	8"	9"	534	667	801	934	1,068	1,201	1,335	1,286	1,470	1,654	1,837	1,102	1,286	1,470	1,672
184	210	235	7 1/4"	8 1/4"	9 1/4"	612	765	918	1,071	1,224	1,377	1,530	1,479	1,690	1,901	2,113	1,268	1,479	1,690	1,928
191	216	241	7 1/2"	8 1/2"	9 1/2"	696	869	1,043	1,217	1,391	1,565	1,739	1,685	1,926	2,166	2,407	1,444	1,685	1,926	2,203
197	222	248	7 3/4"	8 3/4"	9 3/4"	784	980	1,177	1,373	1,569	1,765	1,961	1,905	2,177	2,449	2,721	1,633	1,905	2,177	2,496
203	229	254	8"	9"	10"	879	1,098	1,318	1,538	1,757	1,977	2,196	2,138	2,443	2,749	3,054	1,832	2,138	2,443	2,808
210	235	260	8 1/4"	9 1/4"	10 1/4"	978	1,223	1,467	1,712	1,956	2,201	2,445	2,384	2,725	3,066	3,406	2,044	2,384	2,725	3,138
216	241	267	8 1/2"	9 1/2"	10 1/2"	1,083	1,354	1,624	1,895	2,166	2,437	2,707	2,644	3,022	3,400	3,778	2,267	2,644	3,022	3,486
222	248	273	8 3/4"	9 3/4"	10 3/4"	1,193	1,491	1,790	2,088	2,386	2,685	2,983	2,918	3,335	3,752	4,168	2,501	2,918	3,335	3,852
229	254	279	9"	10"	11"	1,309	1,636	1,963	2,290	2,617	2,945	3,272	3,205	3,663	4,121	4,578	2,747	3,205	3,663	4,237
235	260	286	9 1/4"	10 1/4"	11 1/4"	1,430	1,787	2,144	2,502	2,859	3,217	3,574	3,505	4,006	4,507	5,007	3,004	3,505	4,006	4,640
241	267	292	9 1/2"	10 1/2"	11 1/2"	1,556	1,945	2,334	2,723	3,112	3,501	3,890	3,819	4,365	4,910	5,456	3,273	3,819	4,365	5,062
248	273	298	9 3/4"	10 3/4"	11 3/4"	1,687	2,109	2,531	2,953	3,375	3,797	4,219	4,146	4,739	5,331	5,923	3,554	4,146	4,739	5,501
254	279	305	10"	11"	12"	1,824	2,280	2,736	3,193	3,649	4,105	4,561	4,487	5,128	5,769	6,410	3,846	4,487	5,128	5,959
260	286		10 1/4"	11 1/4"		1,967	2,458	2,950	3,441	3,933	4,425	4,916	4,841	5,533	6,225	6,916	4,150	4,841	5,533	6,436
267	292		10 1/2"	11 1/2"		2,114	2,643	3,171	3,700	4,228	4,757	5,285	5,209	5,953	6,697	7,441	4,465	5,209	5,953	6,930
273	298		10 3/4"	11 3/4"		2,267	2,834	3,401	3,967	4,534	5,101	5,668	5,590	6,389	7,187	7,986	4,792	5,590	6,389	7,443
279	305		11"	12"		2,425	3,032	3,638	4,244	4,851	5,457	6,063	5,985	6,840	7,695	8,550	5,130	5,985	6,840	7,975
286			11 1/4"			2,589	3,236	3,883	4,531	5,178	5,825	6,472	6,393	7,306	8,219	9,132	5,479	6,393	7,306	8,524
292			11 1/2"			2,758	3,447	4,137	4,826	5,516	6,205	6,895	6,814	7,788	8,761	9,735	5,841	6,814	7,788	9,092
298			11 3/4"			2,932	3,665	4,398	5,131	5,864	6,597	7,330	7,249	8,285	9,320	10,356	6,214	7,249	8,285	9,678
305			12"			3,112	3,890	4,668	5,445	6,223	7,001	7,779	7,697	8,797	9,897	10,996	6,598	7,697	8,797	10,283

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/element] \times 1 / \text{rotation spring stiffness [kip-ft/rad/Egccobox® element]} \times \text{cantilever length } l_b [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 5,000 psi / 34.5 MPa (Imerial); - per Egcoibox® element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / element - option 1															
≥ a ₀ [in²]	0.74	0.93	1.11	1.30	1.48	1.67	1.86	1.89	2.16	2.44	2.71	1.62	1.89	2.16	2.18
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a ₀ [in²]	0.93	1.16	1.39	1.62	1.86	2.09	2.32	2.27	2.60	2.92	3.25	1.95	2.27	2.60	2.18
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a ₀ [in²]	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16
shear force level V1 ≥ a ₀ [in²]	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28	0.28
shear force level V2 ≥ a ₀ [in²]	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41	0.41
shear force level V3 ≥ a ₀ [in²]	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	0.55	-	-	-	-
shear force level V4 ≥ a ₀ [in²]	-	-	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	-	-	-	-
shear force level V5 ≥ a ₀ [in²]	-	-	-	-	0.86	0.86	0.86	0.86	0.86	0.86	0.86	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

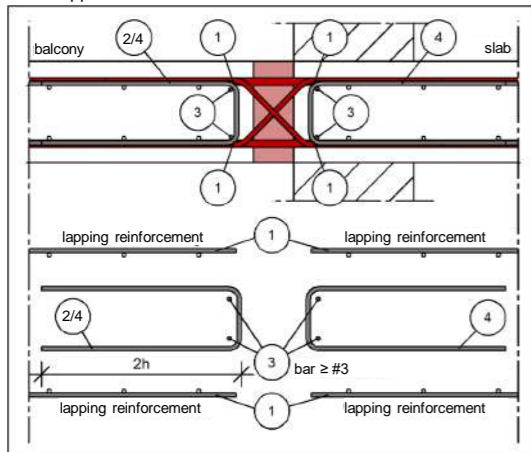
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

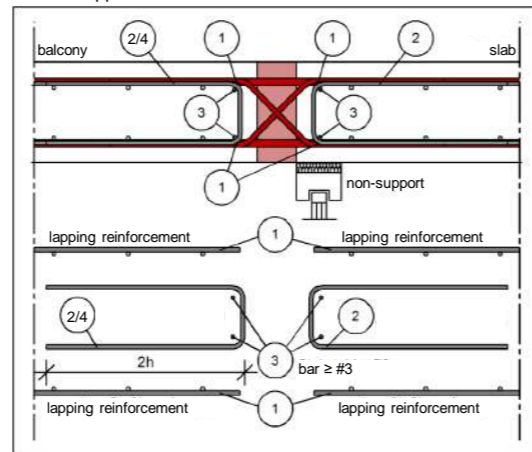
The specifications apply to good bonding conditions.

design proposal

direct support



indirect support



Egcobox[®] M

design Imperial

values in kip / kip-ft

per ft

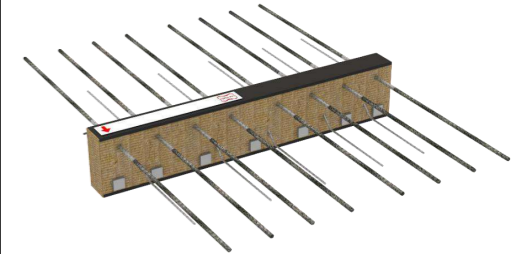
Concrete quality

- 2,900 psi / 20.0 MPa
- 3,630 psi / 25.0 MPa
- 4,000 psi / 27.6 MPa
- 4,350 psi / 30.0 MPa
- 5,000 psi / 34.5 MPa

Design table Egcoibox® type MM - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per ft

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egcoibox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM_n [kip-ft/ft]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
height of connection [mm / in]	159	171	184	6 1/4"	6 3/4"	7 1/4"	-2.79	-2.42	-3.03	-3.63	-3.63	-4.24	-4.84	-5.45	-6.05	-6.66	-7.26	-7.87	-8.47	-8.47	
	165	178	191	6 1/2"	7"	7 1/2"	-3.00	-2.61	-3.27	-3.92	-3.92	-4.57	-5.23	-5.88	-6.53	-7.19	-7.84	-8.50	-9.15	-9.15	
	171	184	197	6 3/4"	7 1/4"	7 3/4"	-3.22	-2.81	-3.51	-4.21	-4.21	-4.91	-5.61	-6.32	-7.02	-7.72	-8.42	-9.12	-9.82	-9.82	
	178	191	203	7"	7 1/2"	8"	-3.44	-3.00	-3.75	-4.50	-4.50	-5.25	-6.00	-6.75	-7.50	-8.25	-9.00	-9.75	-10.50	-10.50	
	184	197	210	7 1/4"	7 3/4"	8 1/4"	-3.65	-3.19	-3.99	-4.79	-4.79	-5.59	-6.39	-7.18	-7.98	-8.78	-9.58	-10.38	-11.18	-11.18	
	191	203	216	7 1/2"	8"	8 1/2"	-3.87	-3.39	-4.23	-5.08	-5.08	-5.93	-6.77	-7.62	-8.46	-9.31	-10.16	-11.00	-11.85	-11.85	
	197	210	222	7 3/4"	8 1/4"	8 3/4"	-4.09	-3.58	-4.47	-5.37	-5.37	-6.26	-7.16	-8.05	-8.95	-9.84	-10.74	-11.63	-12.53	-12.53	
	203	216	229	8"	8 1/2"	9"	-4.30	-3.77	-4.71	-5.66	-5.66	-6.60	-7.54	-8.49	-9.43	-10.37	-11.32	-12.26	-13.20	-13.20	
	210	222	235	8 1/4"	8 3/4"	9 1/4"	-4.52	-3.96	-4.96	-5.95	-5.95	-6.94	-7.93	-8.92	-9.91	-10.90	-11.89	-12.89	-13.88	-13.88	
	216	229	241	8 1/2"	9"	9 1/2"	-4.74	-4.16	-5.20	-6.24	-6.24	-7.28	-8.32	-9.36	-10.39	-11.43	-12.47	-13.51	-14.55	-14.55	
	222	235	248	8 3/4"	9 1/4"	9 3/4"	-4.95	-4.35	-5.44	-6.53	-6.53	-7.61	-8.70	-9.79	-10.88	-11.96	-13.05	-14.14	-15.23	-15.23	
	229	241	254	9"	9 1/2"	10"	-5.17	-4.54	-5.68	-6.82	-6.82	-7.95	-9.09	-10.22	-11.36	-12.50	-13.63	-14.77	-15.90	-15.90	
	235	248	260	9 1/4"	9 3/4"	10 1/4"	-5.39	-4.74	-5.92	-7.11	-7.11	-8.29	-9.47	-10.66	-11.84	-13.03	-14.21	-15.39	-16.58	-16.58	
	241	254	267	9 1/2"	10"	10 1/2"	-5.60	-4.93	-6.16	-7.39	-7.39	-8.63	-9.86	-11.09	-12.32	-13.56	-14.79	-16.02	-17.25	-17.25	
	248	260	273	9 3/4"	10 1/4"	10 3/4"	-5.82	-5.12	-6.40	-7.68	-7.68	-8.97	-10.25	-11.53	-12.81	-14.09	-15.37	-16.65	-17.93	-17.93	
	254	267	279	10"	10 1/2"	11"	-6.04	-5.32	-6.64	-7.97	-7.97	-9.30	-10.63	-11.96	-13.29	-14.62	-15.95	-17.28	-18.61	-18.61	
	260	273	286	10 1/4"	10 3/4"	11 1/4"	-6.26	-5.51	-6.89	-8.26	-8.26	-9.64	-11.02	-12.40	-13.77	-15.15	-16.53	-17.90	-19.28	-19.28	
	267	279	292	10 1/2"	11"	11 1/2"	-6.47	-5.70	-7.13	-8.55	-8.55	-9.98	-11.40	-12.83	-14.25	-15.68	-17.11	-18.53	-19.96	-19.96	
	273	286	298	10 3/4"	11 1/4"	11 3/4"	-6.69	-5.89	-7.37	-8.84	-8.84	-10.32	-11.79	-13.26	-14.74	-16.21	-17.68	-19.16	-20.63	-20.63	
	279	292	305	11"	11 1/2"	12"	-6.91	-6.09	-7.61	-9.13	-9.13	-10.65	-12.18	-13.70	-15.22	-16.74	-18.26	-19.79	-21.31	-21.31	
	286	298		11 1/4"	11 3/4"		-7.12	-6.28	-7.85	-9.42	-9.42	-10.99	-12.56	-14.13	-15.70	-17.27	-18.84	-20.41	-21.98	-21.98	
	292	305		11 1/2"	12"		-7.34	-6.47	-8.09	-9.71	-9.71	-11.33	-12.95	-14.57	-16.18	-17.80	-19.42	-21.04	-22.66	-22.66	
	298			11 3/4"			-7.56	-6.67	-8.33	-10.00	-10.00	-11.67	-13.33	-15.00	-16.67	-18.33	-20.00	-21.67	-23.33	-23.33	
	305			12"			-7.77	-6.86	-8.57	-10.29	-10.29	-12.00	-13.72	-15.43	-17.15	-18.86	-20.58	-22.29	-24.01	-24.01	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]															
	C38	C51	C63	1 1/2"	2"	2 1/2"																
height of connection [mm / in]	VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	1.81	3.62	
	V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	3.21	6.43
	V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	4.82	10.07
	V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	-
	V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	10.07	6.29
	V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+1.81 / -1.81	+0.90 / -0.90
	V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+3.62 / -2.71	+3.62 / -2.71	+3.62 / -2.71	+3.62 / -2.71	+3.62 / -2.71	+3.62 / -2.71	+3.62 / -2.71	+3.62 / -2.71	+4.82 / -3.21	+4.82 / -3.21	+4.82 / -3.21	+4.82 / -3.21	+4.82 / -3.21	+4.82 / -3.21	+2.41 / -1.61
	V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+7.55 / -7.55	+3.78 / -3.78

Shear force level VS to V4 also possible with lifting shear force (-1.8 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egcoibox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egcoibox[®] type MM - per Egcoibox[®] element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox[®] type MM - per ft

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		Rotation spring stiffness [kip-ft/rad/ft]																	
concrete cover top [in]																			
C38	C51	C63	1 1/2"	2"	2 1/2"														
159	171	184	6 1/4"	6 3/4"	7 1/4"	311	214	257	297	311	352	406	460	514	568	622	676	730	730
165	178	191	6 1/2"	7"	7 1/2"	361	250	300	346	362	410	473	536	599	662	725	788	850	850
171	184	197	6 3/4"	7 1/4"	7 3/4"	415	288	345	399	418	472	546	618	691	763	836	908	980	980
178	191	203	7"	7 1/2"	8"	472	329	395	455	477	540	623	706	789	872	955	1,037	1,120	1,120
184	197	210	7 1/4"	7 3/4"	8 1/4"	534	372	447	516	541	611	706	800	894	988	1,081	1,175	1,268	1,268
191	203	216	7 1/2"	8"	8 1/2"	599	419	503	580	608	687	794	899	1,005	1,110	1,216	1,321	1,426	1,426
197	210	222	7 3/4"	8 1/4"	8 3/4"	668	468	561	648	679	768	886	1,005	1,123	1,241	1,358	1,476	1,593	1,593
203	216	229	8"	8 1/2"	9"	740	519	624	720	754	853	985	1,116	1,247	1,378	1,508	1,639	1,769	1,769
210	222	235	8 1/4"	8 3/4"	9 1/4"	817	574	689	795	833	942	1,088	1,233	1,378	1,522	1,667	1,811	1,955	1,955
216	229	241	8 1/2"	9"	9 1/2"	897	631	758	874	916	1,036	1,196	1,356	1,515	1,674	1,833	1,991	2,150	2,150
222	235	248	8 3/4"	9 1/4"	9 3/4"	981	691	829	957	1,003	1,134	1,310	1,485	1,659	1,833	2,007	2,180	2,354	2,354
229	241	254	9"	9 1/2"	10"	1,069	754	905	1,044	1,094	1,237	1,429	1,619	1,809	1,999	2,189	2,378	2,567	2,567
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,160	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	2,790
241	254	267	9 1/2"	10"	10 1/2"	1,255	887	1,065	1,229	1,288	1,456	1,681	1,906	2,130	2,353	2,576	2,799	3,021	3,021
248	260	273	9 3/4"	10 1/4"	10 3/4"	1,354	958	1,150	1,327	1,391	1,572	1,815	2,058	2,299	2,541	2,781	3,022	3,262	3,262
254	267	279	10"	10 1/2"	11"	1,457	1,031	1,238	1,429	1,497	1,693	1,955	2,216	2,476	2,735	2,995	3,254	3,513	3,513
260	273	286	10 1/4"	10 3/4"	11 1/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
267	279	292	10 1/2"	11"	11 1/2"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
273	286	298	10 3/4"	11 1/4"	11 3/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
279	292	305	11"	11 1/2"	12"	1,673	1,186	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,445	3,743	4,041	4,041
286	298		11 1/4"	11 3/4"		1,787	1,268	1,522	1,757	1,841	2,081	2,404	2,724	3,044	3,363	3,682	4,001	4,319	4,319
292	305		11 1/2"	12"		1,905	1,352	1,623	1,874	1,964	2,220	2,563	2,906	3,247	3,587	3,927	4,267	4,606	4,606
298			11 3/4"			2,026	1,439	1,728	1,994	2,090	2,363	2,728	3,093	3,456	3,818	4,180	4,542	4,903	4,903
305			12"			2,151	1,529	1,836	2,119	2,220	2,510	2,899	3,285	3,671	4,056	4,441	4,825	5,209	5,209

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{kb} [ft]$

On-site reinforcement Egcoibox® type MM - concrete strength $\geq 2,900$ psi / 20.0 MPa (Imperial); - per ft

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egcoibox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egcoibox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / ft - option 1														
$\geq a_g$ [in ²]	0.23	0.23	0.28	0.34	0.34	0.40	0.45	0.51	0.57	0.62	0.68	0.74	0.79	0.79
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / ft - option 2														
$\geq a_g$ [in ²]	0.30	0.28	0.35	0.42	0.42	0.49	0.57	0.64	0.71	0.78	0.85	0.92	0.99	0.99
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / ft														
shear force level VS $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06
shear force level V1 $\geq a_g$ [in ²]	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10
shear force level V2 $\geq a_g$ [in ²]	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.15
shear force level V3 $\geq a_g$ [in ²]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	-
shear force level V4 $\geq a_g$ [in ²]	-	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.19
shear force level VS± $\geq a_g$ [in ²]	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06
shear force level V1± $\geq a_g$ [in ²]	-	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.10
shear force level V2± $\geq a_g$ [in ²]	-	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.15
shear force level V3± $\geq a_g$ [in ²]	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	-
shear force level V4± $\geq a_g$ [in ²]	-	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.19
shear force level V6± $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
shear force level V7± $\geq a_g$ [in ²]	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.07	0.07	0.07	0.07	0.07	0.07	0.07
shear force level V8± $\geq a_g$ [in ²]	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

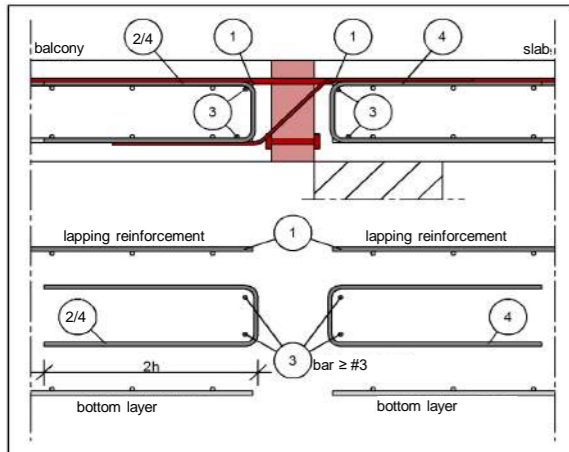
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

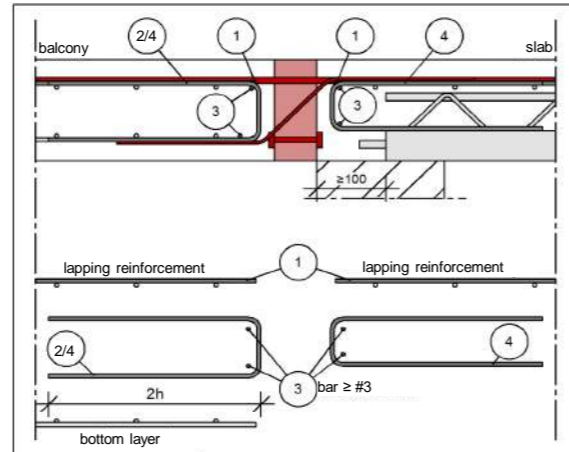
The specifications apply to good bonding conditions.

design proposal

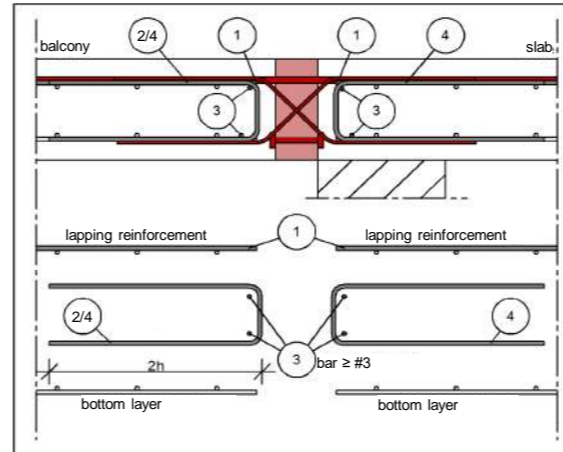
direct support



direct support (semi-prefab slab)



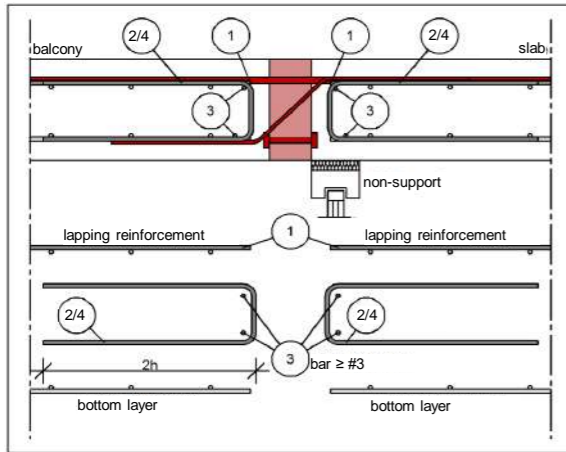
direct support with alternating shear force (V6±, V7±, V8±)



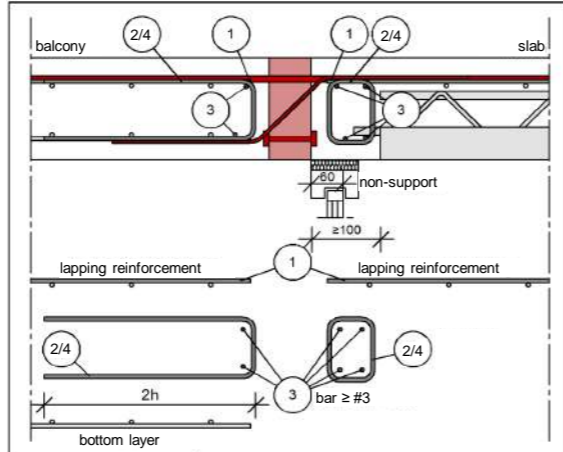
For the Egcoibox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



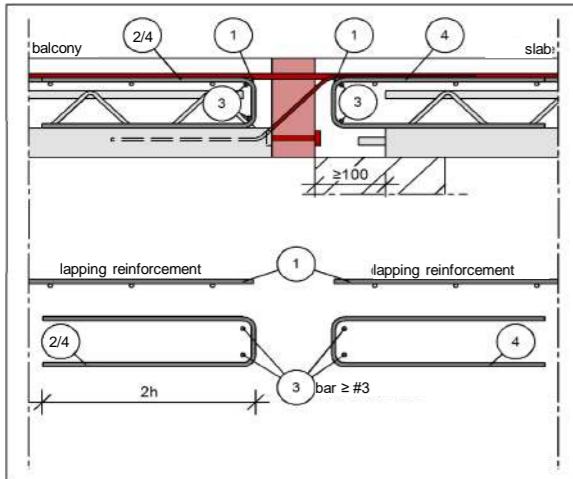
indirect support (semi-prefab slab)



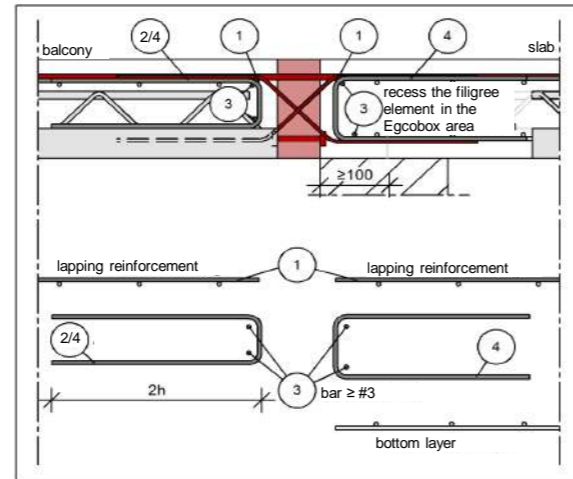
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

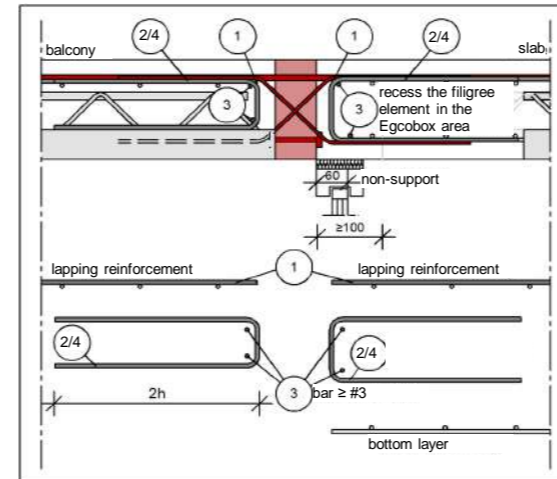
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



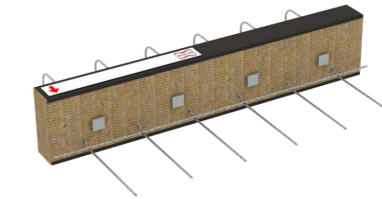
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per ft

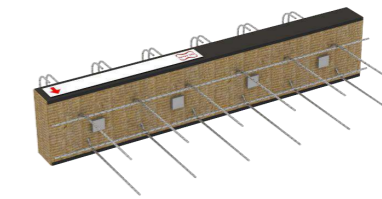
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type						VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399	
length of element [ft in]						3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]										
C38	C51	C64	1 1/2"	2"	2 1/2"											
height of connection [mm]			height of connection [in]													
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	1.81	2.26	3.21	4.02	4.82	6.43	8.04	9.64	-	-	
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	1.81	2.26	3.21	4.02	4.82	6.43	8.04	9.64	41.30	49.56	

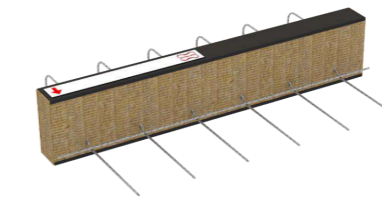
Reinforcement											
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10	
minimum wall / beam width [in]	7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"	
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12	
applicable expansion joint distances [ft in]	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per ft

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type						VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]						7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	0.90	1.61	2.41	3.21	4.02	-	5.63	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	0.90	1.61	2.41	3.21	4.02	16.52	5.63	24.78

Reinforcement											
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10			
minimum wall / beam width [in]	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"			
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12			
applicable expansion joint distances [ft in]	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"			

All Egcoibox types can also be produced in the following variants:

VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K

VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

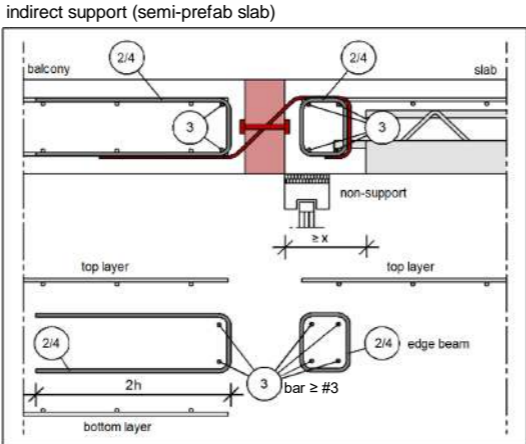
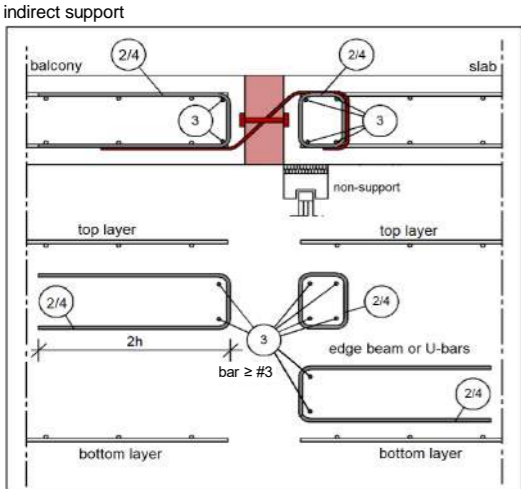
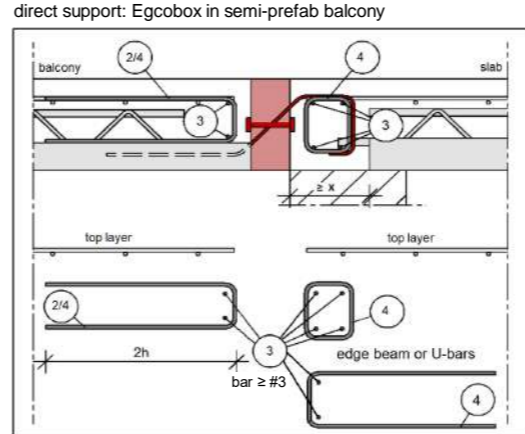
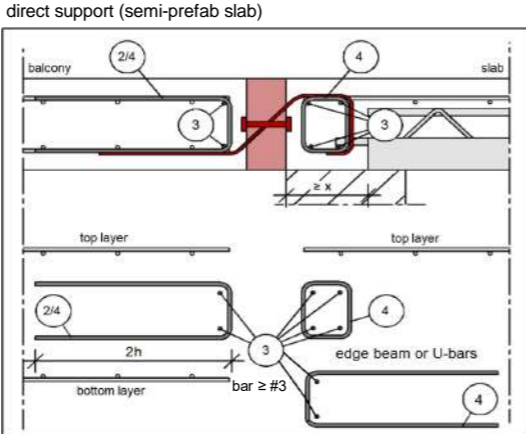
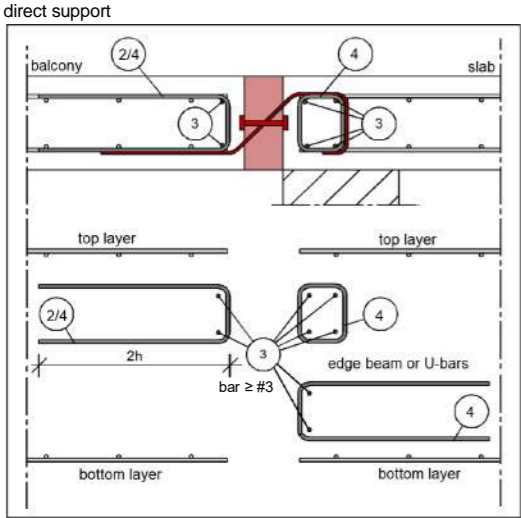
On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 2,900$ psi / 20.0 MPa (Imperial); - per ft

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / ft										
$\geq a_s$ [in ²]	0.03	0.03	0.05	0.06	0.07	0.10	0.12	0.15	0.19	0.23
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / ft								
$\geq a_s$ [in ²]	0.01	0.02	0.04	0.05	0.06	0.08	0.09	0.12
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement
 On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.
 The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.
 The specifications apply to good bonding conditions.

design proposal

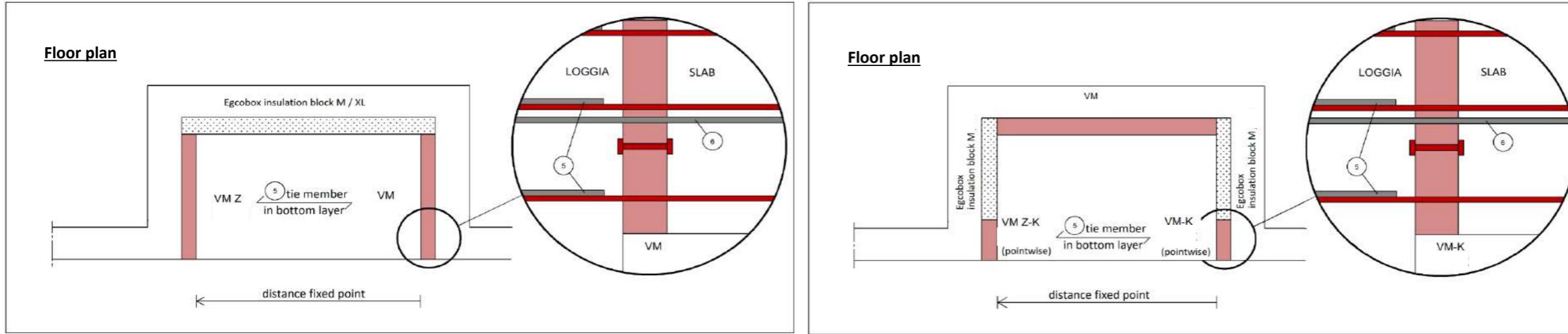


Note Egccobox in semi-prefab balcony:
 It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

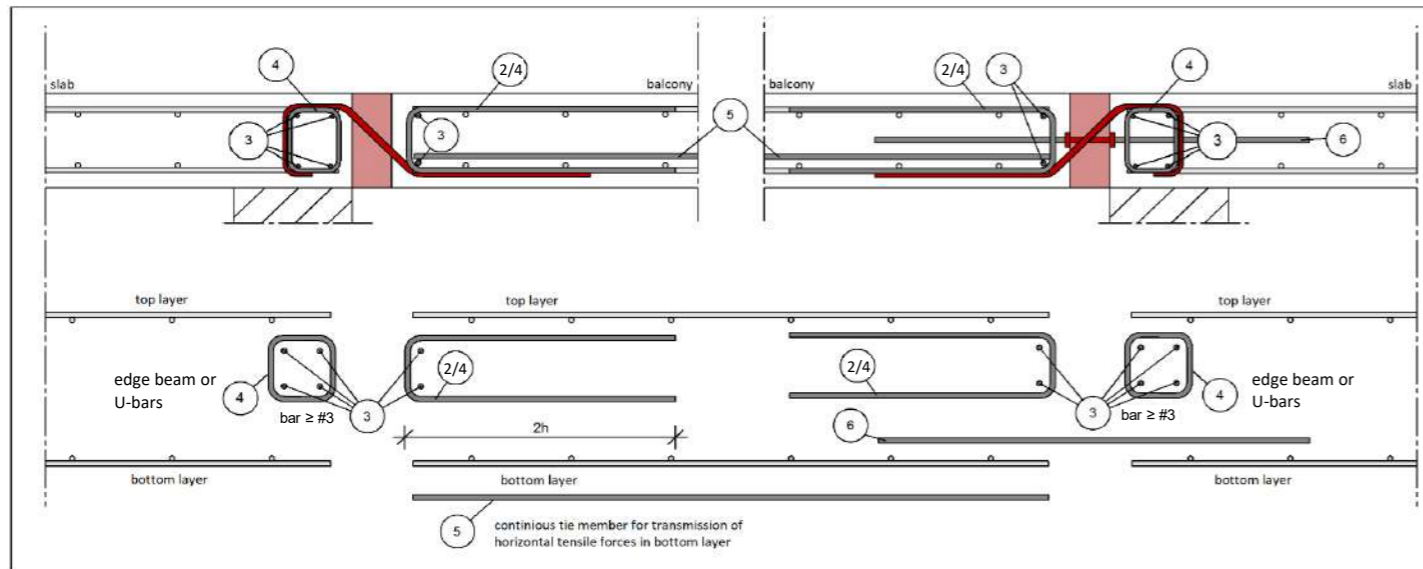
Note indirect support (semi-prefab slab):
 The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

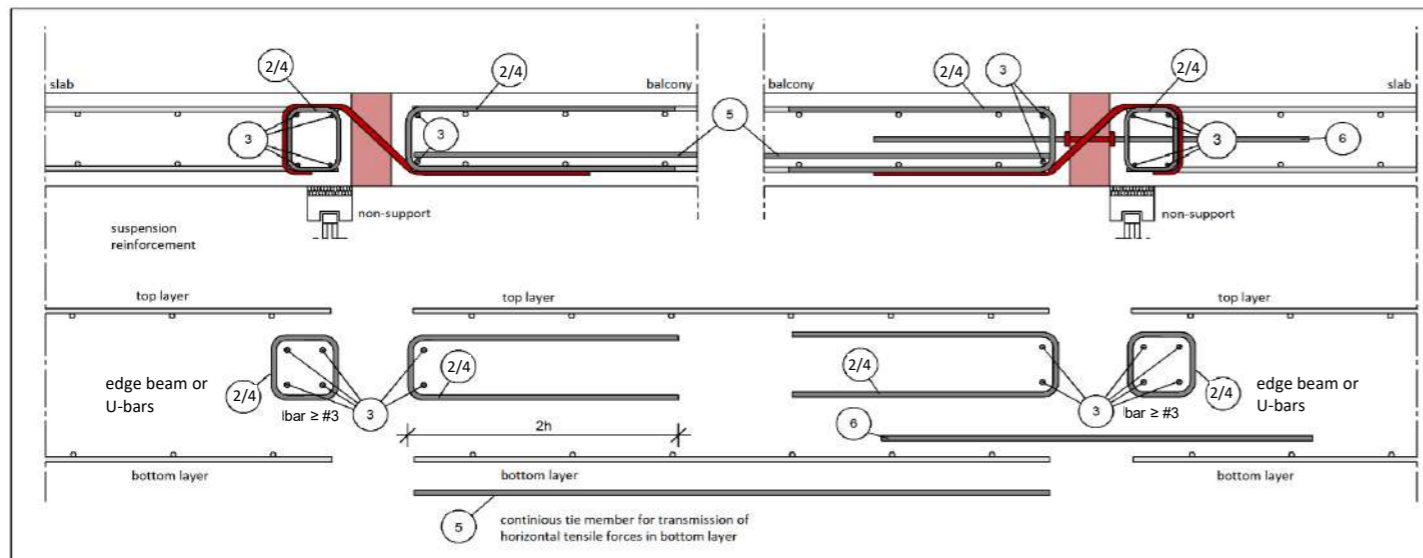


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per ft

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM_n [kip-ft]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±2.53	±3.16	±3.80	±4.43	±5.06	±5.69	±6.33	±6.33	±7.24	±8.14	±9.05	±10.86	±12.67	±14.48	±22.38	
	178	203	229	7"	8"	9"	±2.72	±3.40	±4.08	±4.77	±5.45	±6.13	±6.81	±6.83	±7.80	±8.78	±9.76	±11.71	±13.66	±15.61	±24.17	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±2.92	±3.65	±4.37	±5.10	±5.83	±6.56	±7.29	±7.32	±8.37	±9.42	±10.46	±12.56	±14.65	±16.74	±25.97	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±3.11	±3.89	±4.66	±5.44	±6.22	±7.00	±7.77	±7.82	±8.94	±10.05	±11.17	±13.40	±15.64	±17.87	±27.76	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±3.30	±4.13	±4.95	±5.78	±6.60	±7.43	±8.26	±8.31	±9.50	±10.69	±11.88	±14.25	±16.63	±19.00	±29.55	
	203	229	254	8"	9"	10"	±3.50	±4.37	±5.24	±6.12	±6.99	±7.86	±8.74	±8.81	±10.07	±11.33	±12.58	±15.10	±17.62	±20.14	±31.34	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±3.69	±4.61	±5.53	±6.45	±7.38	±8.30	±9.22	±9.30	±10.63	±11.96	±13.29	±15.95	±18.61	±21.27	±33.14	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±3.88	±4.85	±5.82	±6.79	±7.76	±8.73	±9.70	±9.80	±11.20	±12.60	±14.00	±16.80	±19.60	±22.40	±34.93	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±4.07	±5.09	±6.11	±7.13	±8.15	±9.17	±10.19	±10.29	±11.76	±13.24	±14.71	±17.65	±20.59	±23.53	±36.72	
	229	254	279	9"	10"	11"	±4.27	±5.33	±6.40	±7.47	±8.53	±9.60	±10.67	±10.79	±12.33	±13.87	±15.41	±18.50	±21.58	±24.66	±38.52	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±4.46	±5.58	±6.69	±7.81	±8.92	±10.04	±11.15	±11.28	±12.90	±14.51	±16.12	±19.34	±22.57	±25.79	±40.31	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±4.65	±5.82	±6.98	±8.14	±9.31	±10.47	±11.63	±11.78	±13.46	±15.14	±16.83	±20.19	±23.56	±26.92	±42.10	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±4.85	±6.06	±7.27	±8.48	±9.69	±10.90	±12.12	±12.27	±14.03	±15.78	±17.53	±21.04	±24.55	±28.06	±43.90	
	254	279	305	10"	11"	12"	±5.04	±6.30	±7.56	±8.82	±10.08	±11.34	±12.60	±12.77	±14.59	±16.42	±18.24	±21.89	±25.54	±29.19	±45.69	
	260	286		10 1/4"	11 1/4"		±5.23	±6.54	±7.85	±9.16	±10.46	±11.77	±13.08	±13.26	±15.16	±17.05	±18.95	±22.74	±26.53	±30.32	±47.48	
	267	292		10 1/2"	11 1/2"		±5.43	±6.78	±8.14	±9.49	±10.85	±12.21	±13.56	±13.76	±15.73	±17.69	±19.66	±23.59	±27.52	±31.45	±49.28	
	273	298		10 3/4"	11 3/4"		±5.62	±7.02	±8.43	±9.83	±11.24	±12.64	±14.05	±14.25	±16.29	±18.33	±20.36	±24.44	±28.51	±32.58	±51.07	
	279	305		11"	12"		±5.81	±7.26	±8.72	±10.17	±11.62	±13.08	±14.53	±14.75	±16.86	±18.96	±21.07	±25.28	±29.50	±33.71	±52.86	
	286			11 1/4"			±6.00	±7.51	±9.01	±10.51	±12.01	±13.51	±15.01	±15.24	±17.42	±19.60	±21.78	±26.13	±30.49	±34.84	±54.66	
	292			11 1/2"			±6.20	±7.75	±9.30	±10.85	±12.39	±13.94	±15.49	±15.74	±17.99	±20.24	±22.49	±26.98	±31.48	±35.98	±56.45	
298			11 3/4"			±6.39	±7.99	±9.59	±11.18	±12.78	±14.38	±15.98	±16.23	±18.55	±20.87	±23.19	±27.83	±32.47	±37.11	±58.24		
305			12"			±6.58	±8.23	±9.88	±11.52	±13.17	±14.81	±16.46	±16.73	±19.12	±21.51	±23.90	±28.68	±33.46	±38.24	±60.03		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV_n [kip/ft]															
	C38	C51	C63	1 1/2"	2"	2 1/2"																
VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36	±2.36
V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18	±4.18
V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27	±6.27
V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±8.36	±8.36	±8.36	±8.36	±8.36	±8.36	±8.36	±8.36	±8.36	±8.36	±8.36	-	-	-	-	-
V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±9.80	±9.80	±9.80	±9.80	±9.80	±9.80	±9.80	±9.80	±9.80	-	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±13.07	±13.07	±13.07	±13.07	±13.07	±13.07	±13.07	-	-	-	-	-

concrete cover for top and bottom reinforcement Egccobox®
other heights on request



Reinforcement Egcoibox® type MM± - per Egcoibox® element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egcoibox® type MM± - per ft

Egcoibox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"				
concrete cover [mm]		concrete cover [in]		Rotation spring stiffness [kip-ft/rad/ft]																
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	141	176	211	246	281	316	351	337	386	434	482	578	675	771	874
178	203	229	7"	8"	9"	163	203	244	285	325	366	407	392	448	504	560	672	784	896	1,019
184	210	235	7 1/4"	8 1/4"	9 1/4"	187	233	280	326	373	420	466	451	515	580	644	773	902	1,030	1,175
191	216	241	7 1/2"	8 1/2"	9 1/2"	212	265	318	371	424	477	530	514	587	660	734	880	1,027	1,174	1,343
197	222	248	7 3/4"	8 3/4"	9 3/4"	239	299	359	418	478	538	598	581	663	746	829	995	1,161	1,327	1,522
203	229	254	8"	9"	10"	268	335	402	469	536	603	669	652	745	838	931	1,117	1,303	1,489	1,712
210	235	260	8 1/4"	9 1/4"	10 1/4"	298	373	447	522	596	671	745	727	831	934	1,038	1,246	1,454	1,661	1,913
216	241	267	8 1/2"	9 1/2"	10 1/2"	330	413	495	578	660	743	825	806	921	1,036	1,151	1,382	1,612	1,842	2,125
222	248	273	8 3/4"	9 3/4"	10 3/4"	364	455	546	636	727	818	909	889	1,016	1,143	1,271	1,525	1,779	2,033	2,348
229	254	279	9"	10"	11"	399	499	598	698	798	898	997	977	1,116	1,256	1,395	1,675	1,954	2,233	2,583
235	260	286	9 1/4"	10 1/4"	11 1/4"	436	545	654	763	871	980	1,089	1,068	1,221	1,374	1,526	1,832	2,137	2,442	2,829
241	267	292	9 1/2"	10 1/2"	11 1/2"	474	593	711	830	948	1,067	1,186	1,164	1,330	1,497	1,663	1,996	2,328	2,661	3,086
248	273	298	9 3/4"	10 3/4"	11 3/4"	514	643	771	900	1,029	1,157	1,286	1,264	1,444	1,625	1,805	2,167	2,528	2,889	3,354
254	279	305	10"	11"	12"	556	695	834	973	1,112	1,251	1,390	1,368	1,563	1,758	1,954	2,345	2,735	3,126	3,633
260	286		10 1/4"	11 1/4"		599	749	899	1,049	1,199	1,349	1,499	1,476	1,686	1,897	2,108	2,530	2,951	3,373	3,923
267	292		10 1/2"	11 1/2"		644	805	967	1,128	1,289	1,450	1,611	1,588	1,815	2,041	2,268	2,722	3,175	3,629	4,225
273	298		10 3/4"	11 3/4"		691	864	1,036	1,209	1,382	1,555	1,727	1,704	1,947	2,191	2,434	2,921	3,408	3,895	4,537
279	305		11"	12"		739	924	1,109	1,294	1,478	1,663	1,848	1,824	2,085	2,345	2,606	3,127	3,648	4,169	4,861
286			11 1/4"			789	986	1,184	1,381	1,578	1,775	1,973	1,948	2,227	2,505	2,784	3,340	3,897	4,454	5,196
292			11 1/2"			841	1,051	1,261	1,471	1,681	1,891	2,101	2,077	2,374	2,670	2,967	3,561	4,154	4,747	5,543
298			11 3/4"			894	1,117	1,341	1,564	1,787	2,011	2,234	2,210	2,525	2,841	3,156	3,788	4,419	5,050	5,900
305			12"			948	1,186	1,423	1,660	1,897	2,134	2,371	2,346	2,681	3,017	3,352	4,022	4,692	5,363	6,268

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{cb} [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 2,900 psi / 20.0 MPa (Imperial); - per ft

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l _p [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / ft - option 1															
≥ a _s [in ²]	0.45	0.28	0.34	0.40	0.45	0.51	0.57	0.58	0.66	0.74	0.82	0.49	0.58	1.32	1.33
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / ft - option 2															
≥ a _s [in ²]	0.57	0.35	0.42	0.49	0.57	0.64	0.71	0.69	0.79	0.89	0.99	0.59	0.69	1.58	1.51
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / ft															
shear force level VS ≥ a _s [in ²]	0.07	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.07	0.07
shear force level V1 ≥ a _s [in ²]	0.13	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.13	0.13
shear force level V2 ≥ a _s [in ²]	0.19	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.19	0.19
shear force level V3 ≥ a _s [in ²]	0.26	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	-	-	-	-
shear force level V4 ≥ a _s [in ²]	-	-	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-	-	-	-
shear force level V5 ≥ a _s [in ²]	-	-	-	-	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

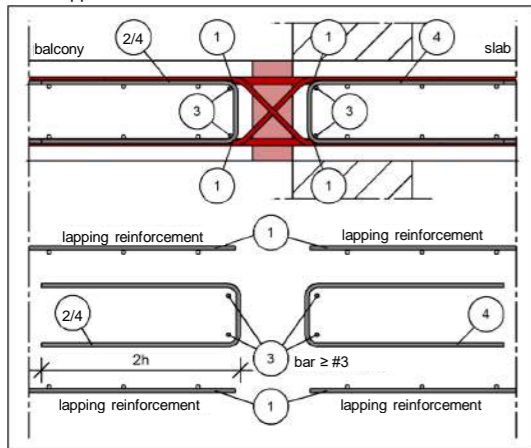
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

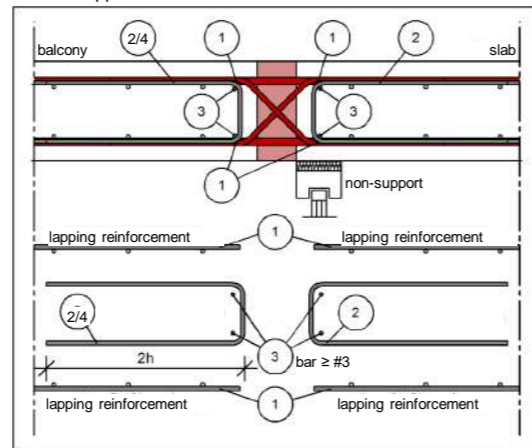
The specifications apply to good bonding conditions.

design proposal

direct support



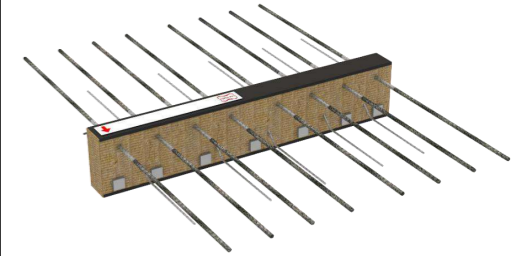
indirect support



Design table Egcoibox® type MM - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per ft

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egcoibox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM_n [kip-ft/ft]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-3.12	-2.71	-3.38	-4.06	-4.06	-4.74	-5.41	-6.09	-6.77	-7.44	-8.12	-8.80	-9.47	-9.47	
165	178	191	6 1/2"	7"	7 1/2"		-3.36	-2.92	-3.65	-4.38	-4.38	-5.11	-5.84	-6.58	-7.31	-8.04	-8.77	-9.50	-10.23	-10.23	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-3.60	-3.14	-3.92	-4.71	-4.71	-5.49	-6.28	-7.06	-7.85	-8.63	-9.41	-10.20	-10.98	-10.98	
178	191	203	7"	7 1/2"	8"		-3.84	-3.35	-4.19	-5.03	-5.03	-5.87	-6.71	-7.55	-8.39	-9.22	-10.06	-10.90	-11.74	-11.74	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-4.09	-3.57	-4.46	-5.35	-5.35	-6.25	-7.14	-8.03	-8.92	-9.82	-10.71	-11.60	-12.49	-12.49	
191	203	216	7 1/2"	8"	8 1/2"		-4.33	-3.79	-4.73	-5.68	-5.68	-6.62	-7.57	-8.52	-9.46	-10.41	-11.36	-12.30	-13.25	-13.25	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-4.57	-4.00	-5.00	-6.00	-6.00	-7.00	-8.00	-9.00	-10.00	-11.00	-12.00	-13.00	-14.00	-14.00	
203	216	229	8"	8 1/2"	9"		-4.81	-4.22	-5.27	-6.33	-6.33	-7.38	-8.43	-9.49	-10.54	-11.60	-12.65	-13.71	-14.76	-14.76	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-5.05	-4.43	-5.54	-6.65	-6.65	-7.76	-8.87	-9.97	-11.08	-12.19	-13.30	-14.41	-15.52	-15.52	
216	229	241	8 1/2"	9"	9 1/2"		-5.30	-4.65	-5.81	-6.97	-6.97	-8.14	-9.30	-10.46	-11.62	-12.78	-13.95	-15.11	-16.27	-16.27	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-5.54	-4.86	-6.08	-7.30	-7.30	-8.51	-9.73	-10.95	-12.16	-13.38	-14.59	-15.81	-17.03	-17.03	
229	241	254	9"	9 1/2"	10"		-5.78	-5.08	-6.35	-7.62	-7.62	-8.89	-10.16	-11.43	-12.70	-13.97	-15.24	-16.51	-17.78	-17.78	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-6.02	-5.30	-6.62	-7.94	-7.94	-9.27	-10.59	-11.92	-13.24	-14.56	-15.89	-17.21	-18.54	-18.54	
241	254	267	9 1/2"	10"	10 1/2"		-6.27	-5.51	-6.89	-8.27	-8.27	-9.65	-11.02	-12.40	-13.78	-15.16	-16.54	-17.91	-19.29	-19.29	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-6.51	-5.73	-7.16	-8.59	-8.59	-10.02	-11.46	-12.89	-14.32	-15.75	-17.18	-18.62	-20.05	-20.05	
254	267	279	10"	10 1/2"	11"		-6.75	-5.94	-7.43	-8.92	-8.92	-10.40	-11.89	-13.37	-14.86	-16.34	-17.83	-19.32	-20.80	-20.80	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-6.99	-6.16	-7.70	-9.24	-9.24	-10.78	-12.32	-13.86	-15.40	-16.94	-18.48	-20.02	-21.56	-21.56	
267	279	292	10 1/2"	11"	11 1/2"		-7.24	-6.38	-7.97	-9.56	-9.56	-11.16	-12.75	-14.34	-15.94	-17.53	-19.13	-20.72	-22.31	-22.31	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-7.48	-6.59	-8.24	-9.89	-9.89	-11.53	-13.18	-14.83	-16.48	-18.12	-19.77	-21.42	-23.07	-23.07	
279	292	305	11"	11 1/2"	12"		-7.72	-6.81	-8.51	-10.21	-10.21	-11.91	-13.61	-15.31	-17.02	-18.72	-20.42	-22.12	-23.82	-23.82	
286	298		11 1/4"	11 3/4"			-7.96	-7.02	-8.78	-10.53	-10.53	-12.29	-14.04	-15.80	-17.56	-19.31	-21.07	-22.82	-24.58	-24.58	
292	305		11 1/2"	12"			-8.21	-7.24	-9.05	-10.86	-10.86	-12.67	-14.48	-16.29	-18.10	-19.91	-21.71	-23.52	-25.33	-25.33	
298			11 3/4"				-8.45	-7.45	-9.32	-11.18	-11.18	-13.04	-14.91	-16.77	-18.63	-20.50	-22.36	-24.23	-26.09	-26.09	
305			12"				-8.69	-7.67	-9.59	-11.50	-11.50	-13.42	-15.34	-17.26	-19.17	-21.09	-23.01	-24.93	-26.84	-26.84	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]																
	C38	C51	C63	1 1/2"	2"	2 1/2"																	
VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	2.02	4.04	
V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	3.59	7.19
V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	5.39	11.26
V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	7.19	-
V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	11.26	7.04
V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+2.02 / -2.02	+1.01 / -1.01	
V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+4.04 / -3.03	+4.04 / -3.03	+4.04 / -3.03	+4.04 / -3.03	+4.04 / -3.03	+4.04 / -3.03	+4.04 / -3.03	+4.04 / -3.03	+5.39 / -3.59	+5.39 / -3.59	+5.39 / -3.59	+5.39 / -3.59	+5.39 / -3.59	+5.39 / -3.59	+5.39 / -3.59	+5.39 / -3.59	+2.70 / -1.80
V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+8.44 / -8.44	+4.22 / -4.22	

Shear force level VS to V4 also possible with lifting shear force (-2 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egcoibox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egccobox® type MM - per Egccobox® element

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egccobox® type MM - per ft

Egccobox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K					
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"					
concrete cover top [mm]		Rotation spring stiffness [kip-ft/rad/ft]																		
concrete cover top [in]																				
C38																				
C51																				
C63																				
1 1/2"																				
2"																				
2 1/2"																				
height of connection [mm / in]	159	171	184	6 1/4"	6 3/4"	7 1/4"	311	214	257	297	311	352	406	460	514	568	622	676	730	730
	165	178	191	6 1/2"	7"	7 1/2"	361	250	300	346	362	410	473	536	599	662	725	788	850	850
	171	184	197	6 3/4"	7 1/4"	7 3/4"	415	288	345	399	418	472	546	618	691	763	836	908	980	980
	178	191	203	7"	7 1/2"	8"	472	329	395	455	477	540	623	706	789	872	955	1,037	1,120	1,120
	184	197	210	7 1/4"	7 3/4"	8 1/4"	534	372	447	516	541	611	706	800	894	988	1,081	1,175	1,268	1,268
	191	203	216	7 1/2"	8"	8 1/2"	599	419	503	580	608	687	794	899	1,005	1,110	1,216	1,321	1,426	1,426
	197	210	222	7 3/4"	8 1/4"	8 3/4"	668	468	561	648	679	768	886	1,005	1,123	1,241	1,358	1,476	1,593	1,593
	203	216	229	8"	8 1/2"	9"	740	519	624	720	754	853	985	1,116	1,247	1,378	1,508	1,639	1,769	1,769
	210	222	235	8 1/4"	8 3/4"	9 1/4"	817	574	689	795	833	942	1,088	1,233	1,378	1,522	1,667	1,811	1,955	1,955
	216	229	241	8 1/2"	9"	9 1/2"	897	631	758	874	916	1,036	1,196	1,356	1,515	1,674	1,833	1,991	2,150	2,150
	222	235	248	8 3/4"	9 1/4"	9 3/4"	981	691	829	957	1,003	1,134	1,310	1,485	1,659	1,833	2,007	2,180	2,354	2,354
	229	241	254	9"	9 1/2"	10"	1,069	754	905	1,044	1,094	1,237	1,429	1,619	1,809	1,999	2,189	2,378	2,567	2,567
	235	248	260	9 1/4"	9 3/4"	10 1/4"	1,160	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	2,790
	241	254	267	9 1/2"	10"	10 1/2"	1,255	887	1,065	1,229	1,288	1,456	1,681	1,906	2,130	2,353	2,576	2,799	3,021	3,021
	248	260	273	9 3/4"	10 1/4"	10 3/4"	1,354	958	1,150	1,327	1,391	1,572	1,815	2,058	2,299	2,541	2,781	3,022	3,262	3,262
	254	267	279	10"	10 1/2"	11"	1,457	1,031	1,238	1,429	1,497	1,693	1,955	2,216	2,476	2,735	2,995	3,254	3,513	3,513
	260	273	286	10 1/4"	10 3/4"	11 1/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
	267	279	292	10 1/2"	11"	11 1/2"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
	273	286	298	10 3/4"	11 1/4"	11 3/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
	279	292	305	11"	11 1/2"	12"	1,673	1,186	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,445	3,743	4,041	4,041
286	298		11 1/4"	11 3/4"		1,787	1,268	1,522	1,757	1,841	2,081	2,404	2,724	3,044	3,363	3,682	4,001	4,319	4,319	
292	305		11 1/2"	12"		1,905	1,352	1,623	1,874	1,964	2,220	2,563	2,906	3,247	3,587	3,927	4,267	4,606	4,606	
298			11 3/4"			2,026	1,439	1,728	1,994	2,090	2,363	2,728	3,093	3,456	3,818	4,180	4,542	4,903	4,903	
305			12"			2,151	1,529	1,836	2,119	2,220	2,510	2,899	3,285	3,671	4,056	4,441	4,825	5,209	5,209	

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{kb} [ft]$

On-site reinforcement Egcoibox® type MM - concrete strength $\geq 3,630$ psi / 25.0 MPa (Imperial); - per ft

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egcoibox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egcoibox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / ft - option 1														
$\geq a_g$ [in ²]	0.23	0.23	0.28	0.34	0.34	0.40	0.45	0.51	0.57	0.62	0.68	0.74	0.79	0.79
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / ft - option 2														
$\geq a_g$ [in ²]	0.30	0.28	0.35	0.42	0.42	0.49	0.57	0.64	0.71	0.78	0.85	0.92	0.99	0.99
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / ft														
shear force level VS $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06
shear force level V1 $\geq a_g$ [in ²]	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.11
shear force level V2 $\geq a_g$ [in ²]	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.17
shear force level V3 $\geq a_g$ [in ²]	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-
shear force level V4 $\geq a_g$ [in ²]	-	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.22
shear force level VS± $\geq a_g$ [in ²]	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.06
shear force level V1± $\geq a_g$ [in ²]	-	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.11
shear force level V2± $\geq a_g$ [in ²]	-	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.17
shear force level V3± $\geq a_g$ [in ²]	-	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	-
shear force level V4± $\geq a_g$ [in ²]	-	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.22
shear force level V6± $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
shear force level V7± $\geq a_g$ [in ²]	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.08	0.08	0.08	0.08	0.08	0.08	0.08
shear force level V8± $\geq a_g$ [in ²]	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

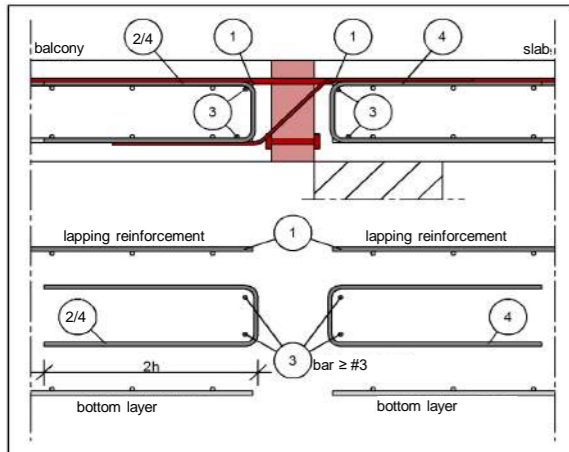
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_a / f_{yd}$.

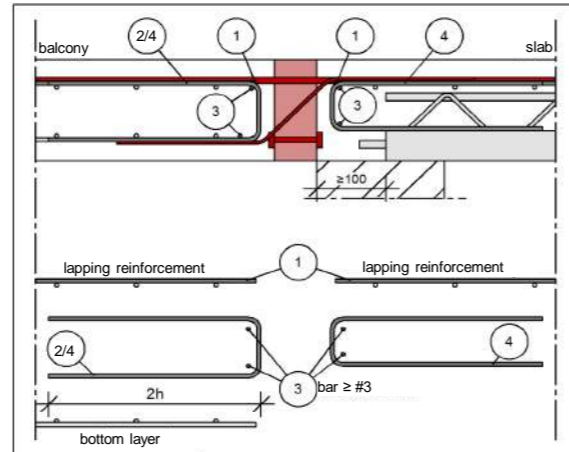
The specifications apply to good bonding conditions.

design proposal

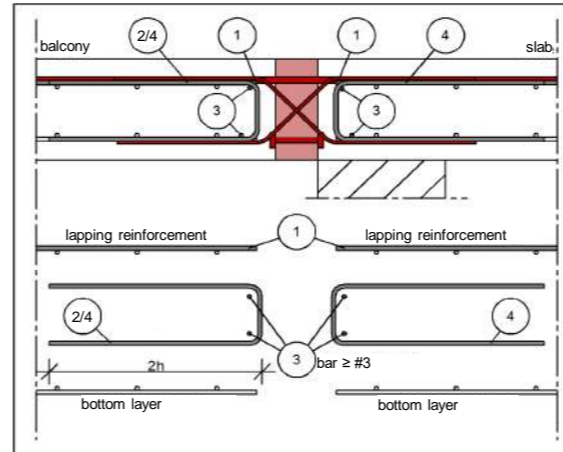
direct support



direct support (semi-prefab slab)



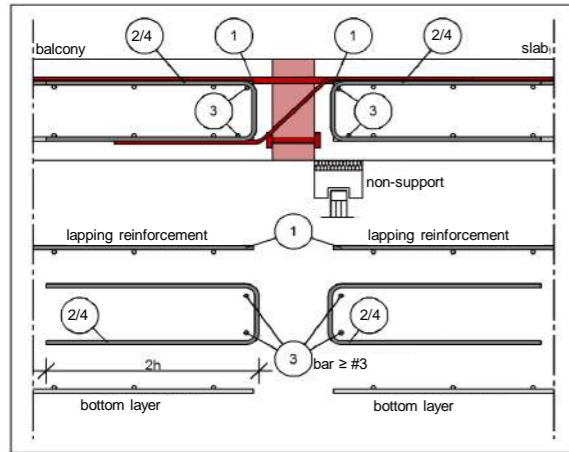
direct support with alternating shear force (V6±, V7±, V8±)



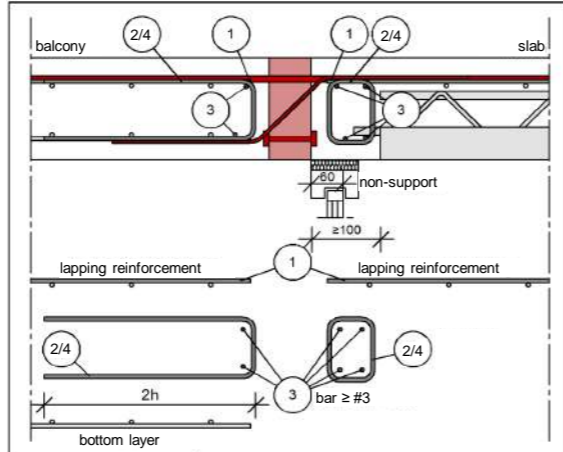
For the Egcoibox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



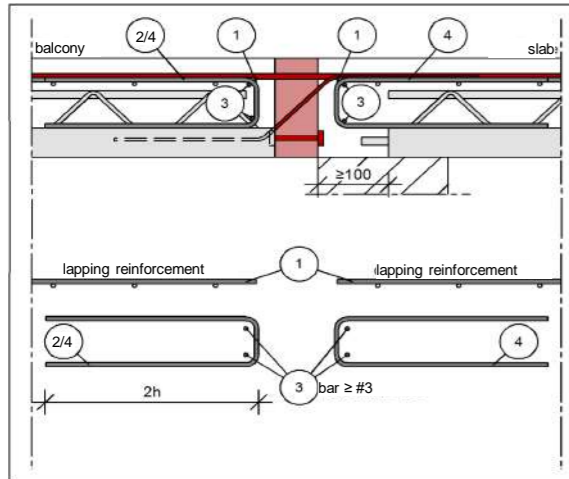
indirect support (semi-prefab slab)



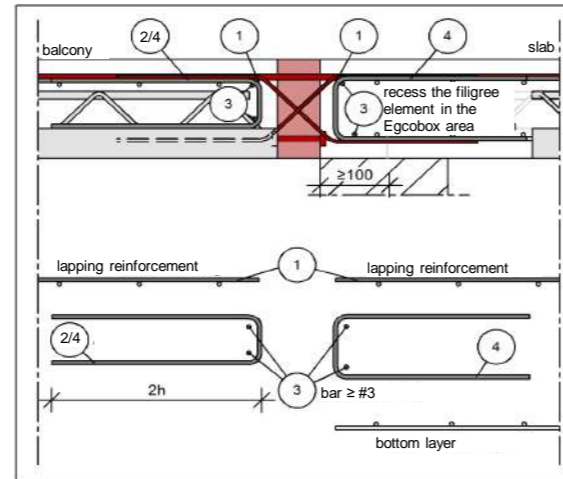
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

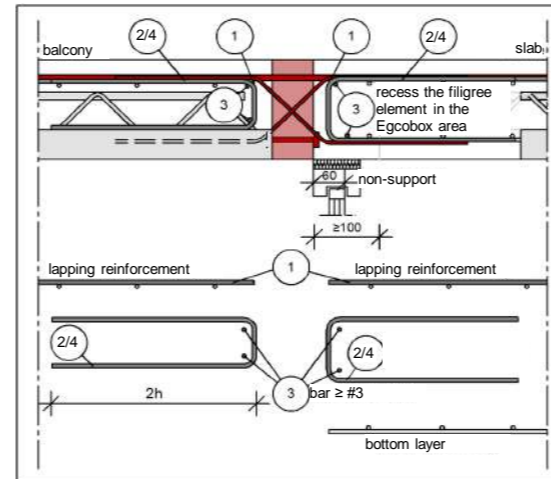
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



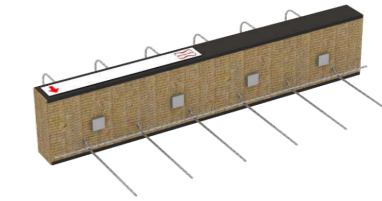
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per ft

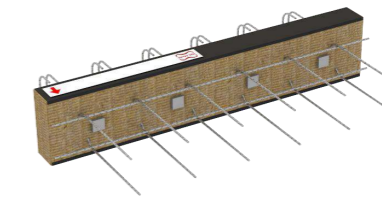
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399			
length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]									
C38	C51	C64	1 1/2"	2"	2 1/2"										
height of connection [mm]			height of connection [in]												
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	2.02	2.53	3.59	4.49	5.39	7.19	8.98	10.78	-	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	2.02	2.53	3.59	4.49	5.39	7.19	8.98	10.78	46.18	55.41

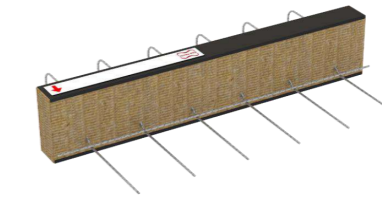
Reinforcement												
shear force bars [qty ϕ mm]			4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10
minimum wall / beam width [in]			7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"
compression bearings [qty ϕ mm]			4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per ft

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K			
length of element [ft in]			7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	1.01	1.80	2.70	3.59	4.49	-	6.29	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	1.01	1.80	2.70	3.59	4.49	18.47	6.29	27.71

Reinforcement										
shear force bars [qty ϕ mm]			2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10
minimum wall / beam width [in]			7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"
compression bearings [qty ϕ mm]			1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"

All Egcoibox types can also be produced in the following variants:

VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K

VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 3,630$ psi / 25.0 MPa (Imperial); - per ft

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / ft										
$\geq a_s$ [in ²]	0.03	0.04	0.06	0.07	0.08	0.11	0.14	0.17	0.22	0.26
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / ft								
$\geq a_s$ [in ²]	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.13
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

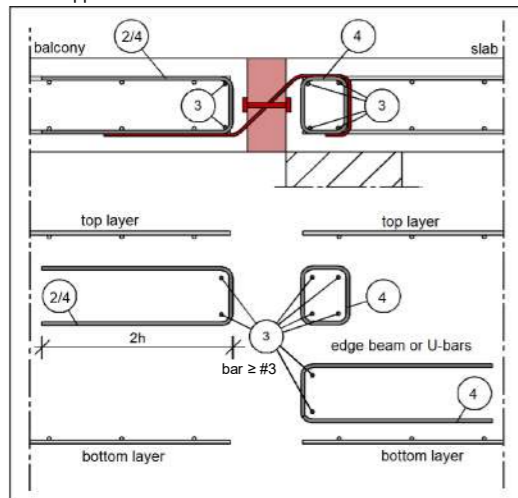
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

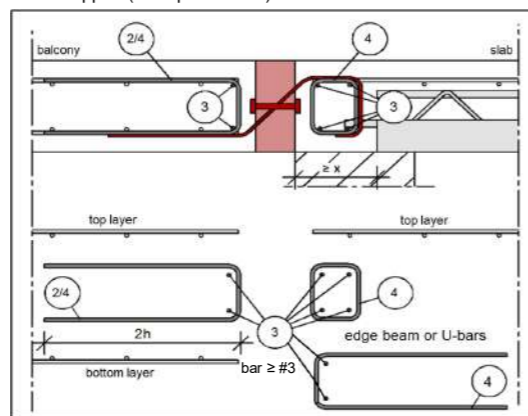
The specifications apply to good bonding conditions.

design proposal

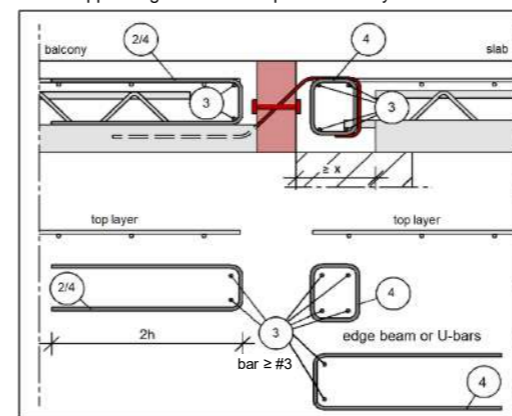
direct support



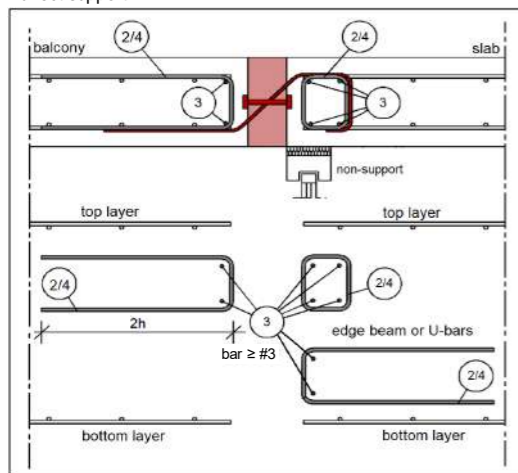
direct support (semi-prefab slab)



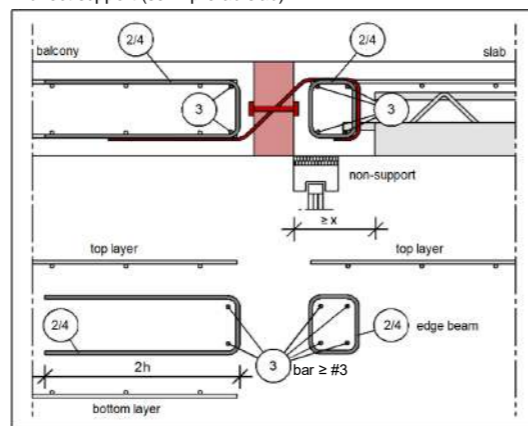
direct support: Egccobox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egccobox in semi-prefab balcony:

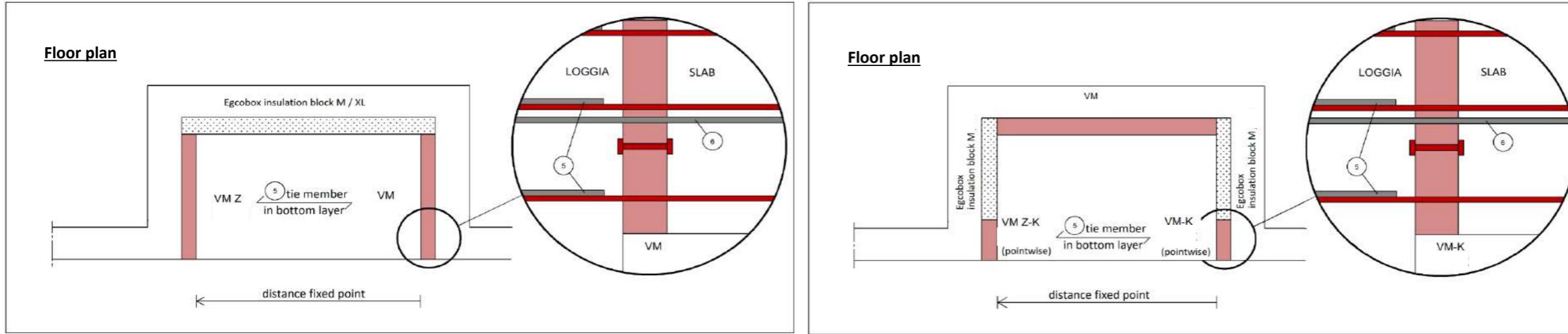
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

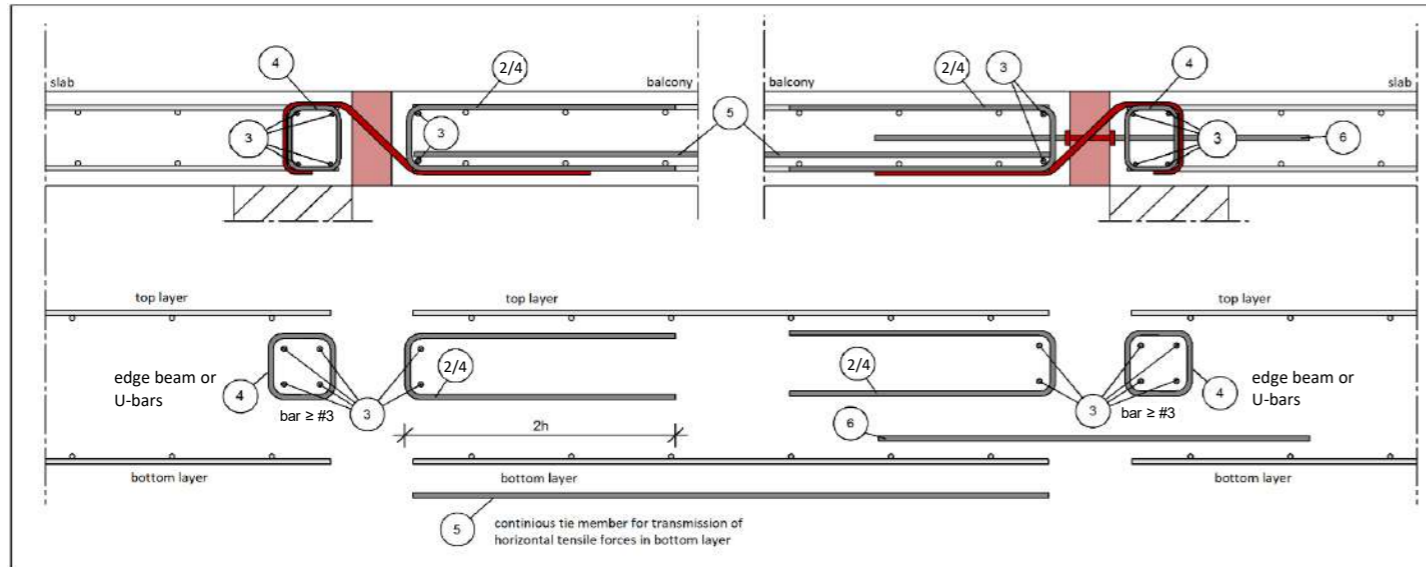
The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_{-K±}. VM Z₋ / VM Z_{-K}, VM Z_± / VM Z_{-K±} is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

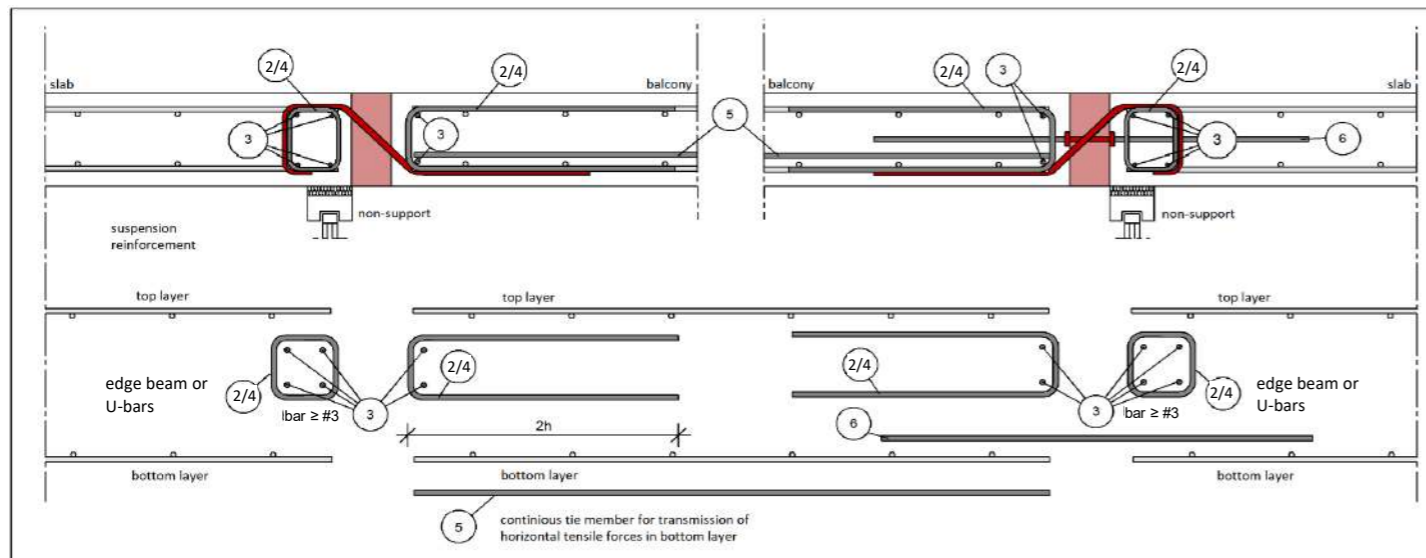


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per ft

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM_n [kip-ft/ft]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±2.83	±3.54	±4.24	±4.95	±5.66	±6.37	±7.07	±7.08	±8.09	±9.11	±10.12	±12.14	±14.16	±16.19	±22.38	
	178	203	229	7"	8"	9"	±3.04	±3.81	±4.57	±5.33	±6.09	±6.85	±7.61	±7.64	±8.73	±9.82	±10.91	±13.09	±15.27	±17.45	±24.17	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±3.26	±4.08	±4.89	±5.71	±6.52	±7.34	±8.15	±8.19	±9.36	±10.53	±11.70	±14.04	±16.38	±18.72	±25.97	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±3.48	±4.35	±5.21	±6.08	±6.95	±7.82	±8.69	±8.74	±9.99	±11.24	±12.49	±14.99	±17.48	±19.98	±27.76	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±3.69	±4.62	±5.54	±6.46	±7.38	±8.31	±9.23	±9.30	±10.62	±11.95	±13.28	±15.94	±18.59	±21.25	±29.55	
	203	229	254	8"	9"	10"	±3.91	±4.88	±5.86	±6.84	±7.82	±8.79	±9.77	±9.85	±11.26	±12.66	±14.07	±16.88	±19.70	±22.51	±31.34	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±4.12	±5.15	±6.19	±7.22	±8.25	±9.28	±10.31	±10.40	±11.89	±13.37	±14.86	±17.83	±20.81	±23.78	±33.14	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±4.34	±5.42	±6.51	±7.59	±8.68	±9.76	±10.85	±10.96	±12.52	±14.09	±15.65	±18.78	±21.91	±25.04	±34.93	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±4.56	±5.69	±6.83	±7.97	±9.11	±10.25	±11.39	±11.51	±13.15	±14.80	±16.44	±19.73	±23.02	±26.31	±36.72	
	229	254	279	9"	10"	11"	±4.77	±5.96	±7.16	±8.35	±9.54	±10.73	±11.93	±12.06	±13.79	±15.51	±17.23	±20.68	±24.13	±27.57	±38.52	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±4.99	±6.23	±7.48	±8.73	±9.97	±11.22	±12.47	±12.62	±14.42	±16.22	±18.02	±21.63	±25.23	±28.84	±40.31	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±5.20	±6.50	±7.80	±9.10	±10.41	±11.71	±13.01	±13.17	±15.05	±16.93	±18.81	±22.58	±26.34	±30.10	±42.10	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±5.42	±6.77	±8.13	±9.48	±10.84	±12.19	±13.55	±13.72	±15.68	±17.64	±19.60	±23.53	±27.45	±31.37	±43.90	
	254	279	305	10"	11"	12"	±5.63	±7.04	±8.45	±9.86	±11.27	±12.68	±14.09	±14.28	±16.32	±18.36	±20.40	±24.47	±28.55	±32.63	±45.69	
	260	286		10 1/4"	11 1/4"		±5.85	±7.31	±8.78	±10.24	±11.70	±13.16	±14.63	±14.83	±16.95	±19.07	±21.19	±25.42	±29.66	±33.90	±47.48	
	267	292		10 1/2"	11 1/2"		±6.07	±7.58	±9.10	±10.62	±12.13	±13.65	±15.16	±15.38	±17.58	±19.78	±21.98	±26.37	±30.77	±35.16	±49.28	
	273	298		10 3/4"	11 3/4"		±6.28	±7.85	±9.42	±10.99	±12.56	±14.13	±15.70	±15.94	±18.21	±20.49	±22.77	±27.32	±31.87	±36.43	±51.07	
	279	305		11"	12"		±6.50	±8.12	±9.75	±11.37	±12.99	±14.62	±16.24	±16.49	±18.85	±21.20	±23.56	±28.27	±32.98	±37.69	±52.86	
	286			11 1/4"			±6.71	±8.39	±10.07	±11.75	±13.43	±15.10	±16.78	±17.04	±19.48	±21.91	±24.35	±29.22	±34.09	±38.96	±54.66	
	292			11 1/2"			±6.93	±8.66	±10.39	±12.13	±13.86	±15.59	±17.32	±17.60	±20.11	±22.63	±25.14	±30.17	±35.20	±40.22	±56.45	
298			11 3/4"			±7.14	±8.93	±10.72	±12.50	±14.29	±16.08	±17.86	±18.15	±20.74	±23.34	±25.93	±31.12	±36.30	±41.49	±58.24		
305			12"			±7.36	±9.20	±11.04	±12.88	±14.72	±16.56	±18.40	±18.70	±21.38	±24.05	±26.72	±32.07	±37.41	±42.75	±60.03		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV_n [kip/ft]															
	C38	C51	C63	1 1/2"	2"	2 1/2"																
VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64	±2.64
V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67	±4.67
V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01	±7.01
V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±9.35	±9.35	±9.35	±9.35	±9.35	±9.35	±9.35	±9.35	±9.35	±9.35	±9.35	±9.35	-	-	-	-
V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±10.96	±10.96	±10.96	±10.96	±10.96	±10.96	±10.96	±10.96	±10.96	±10.96	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±14.61	±14.61	±14.61	±14.61	±14.61	±14.61	±14.61	±14.61	-	-	-	-

concrete cover for top and bottom reinforcement Egccobox®
other heights on request



Reinforcement Egccobox® type MM± - per Egccobox® element

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egccobox® type MM± - per ft

Egccobox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"				
concrete cover [mm]		concrete cover [in]			Rotation spring stiffness [kip-ft/rad/ft]															
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	141	176	211	246	281	316	351	337	386	434	482	578	675	771	874
178	203	229	7"	8"	9"	163	203	244	285	325	366	407	392	448	504	560	672	784	896	1,019
184	210	235	7 1/4"	8 1/4"	9 1/4"	187	233	280	326	373	420	466	451	515	580	644	773	902	1,030	1,175
191	216	241	7 1/2"	8 1/2"	9 1/2"	212	265	318	371	424	477	530	514	587	660	734	880	1,027	1,174	1,343
197	222	248	7 3/4"	8 3/4"	9 3/4"	239	299	359	418	478	538	598	581	663	746	829	995	1,161	1,327	1,522
203	229	254	8"	9"	10"	268	335	402	469	536	603	669	652	745	838	931	1,117	1,303	1,489	1,712
210	235	260	8 1/4"	9 1/4"	10 1/4"	298	373	447	522	596	671	745	727	831	934	1,038	1,246	1,454	1,661	1,913
216	241	267	8 1/2"	9 1/2"	10 1/2"	330	413	495	578	660	743	825	806	921	1,036	1,151	1,382	1,612	1,842	2,125
222	248	273	8 3/4"	9 3/4"	10 3/4"	364	455	546	636	727	818	909	889	1,016	1,143	1,271	1,525	1,779	2,033	2,348
229	254	279	9"	10"	11"	399	499	598	698	798	898	997	977	1,116	1,256	1,395	1,675	1,954	2,233	2,583
235	260	286	9 1/4"	10 1/4"	11 1/4"	436	545	654	763	871	980	1,089	1,068	1,221	1,374	1,526	1,832	2,137	2,442	2,829
241	267	292	9 1/2"	10 1/2"	11 1/2"	474	593	711	830	948	1,067	1,186	1,164	1,330	1,497	1,663	1,996	2,328	2,661	3,086
248	273	298	9 3/4"	10 3/4"	11 3/4"	514	643	771	900	1,029	1,157	1,286	1,264	1,444	1,625	1,805	2,167	2,528	2,889	3,354
254	279	305	10"	11"	12"	556	695	834	973	1,112	1,251	1,390	1,368	1,563	1,758	1,954	2,345	2,735	3,126	3,633
260	286		10 1/4"	11 1/4"		599	749	899	1,049	1,199	1,349	1,499	1,476	1,686	1,897	2,108	2,530	2,951	3,373	3,923
267	292		10 1/2"	11 1/2"		644	805	967	1,128	1,289	1,450	1,611	1,588	1,815	2,041	2,268	2,722	3,175	3,629	4,225
273	298		10 3/4"	11 3/4"		691	864	1,036	1,209	1,382	1,555	1,727	1,704	1,947	2,191	2,434	2,921	3,408	3,895	4,537
279	305		11"	12"		739	924	1,109	1,294	1,478	1,663	1,848	1,824	2,085	2,345	2,606	3,127	3,648	4,169	4,861
286			11 1/4"			789	986	1,184	1,381	1,578	1,775	1,973	1,948	2,227	2,505	2,784	3,340	3,897	4,454	5,196
292			11 1/2"			841	1,051	1,261	1,471	1,681	1,891	2,101	2,077	2,374	2,670	2,967	3,561	4,154	4,747	5,543
298			11 3/4"			894	1,117	1,341	1,564	1,787	2,011	2,234	2,210	2,525	2,841	3,156	3,788	4,419	5,050	5,900
305			12"			948	1,186	1,423	1,660	1,897	2,134	2,371	2,346	2,681	3,017	3,352	4,022	4,692	5,363	6,268

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{cb} [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 3,630 psi / 25.0 MPa (Imperial); - per ft

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l _p [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / ft - option 1															
≥ a _s [in²]	0.45	0.28	0.34	0.40	0.45	0.51	0.57	0.58	0.66	0.74	0.82	0.49	0.58	1.32	1.33
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / ft - option 2															
≥ a _s [in²]	0.57	0.35	0.42	0.49	0.57	0.64	0.71	0.69	0.79	0.89	0.99	0.59	0.69	1.58	1.35
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / ft															
shear force level VS ≥ a _s [in²]	0.08	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.08
shear force level V1 ≥ a _s [in²]	0.14	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.14	0.14
shear force level V2 ≥ a _s [in²]	0.21	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.21	0.21
shear force level V3 ≥ a _s [in²]	0.29	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	-	-	-	-
shear force level V4 ≥ a _s [in²]	-	-	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	-	-	-	-
shear force level V5 ≥ a _s [in²]	-	-	-	-	0.22	0.22	0.22	0.22	0.22	0.22	0.22	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.

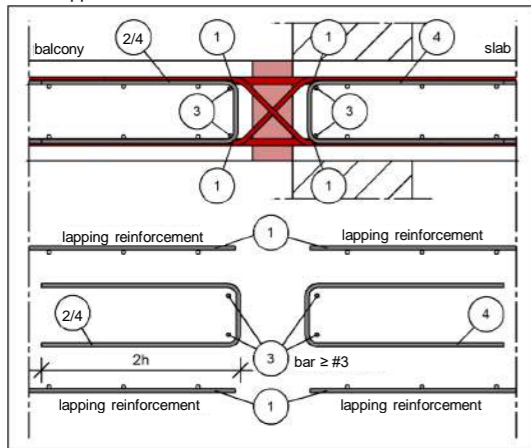
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

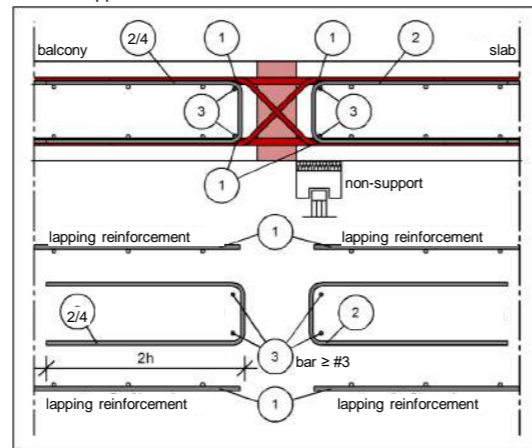
The specifications apply to good bonding conditions.

design proposal

direct support



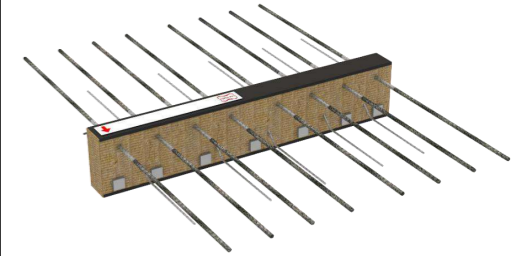
indirect support



Design table Egcoibox® type MM - concrete strength ≥ 4,000 psi / 27.6 MPa (Imperial); - per ft

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egcoibox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM_n [kip-ft/ft]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-3.27	-2.84	-3.55	-4.26	-4.26	-4.97	-5.69	-6.40	-7.11	-7.82	-8.53	-9.24	-9.95	-9.95	
165	178	191	6 1/2"	7"	7 1/2"		-3.53	-3.07	-3.84	-4.60	-4.60	-5.37	-6.14	-6.91	-7.67	-8.44	-9.21	-9.98	-10.74	-10.74	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-3.78	-3.30	-4.12	-4.94	-4.94	-5.77	-6.59	-7.42	-8.24	-9.06	-9.89	-10.71	-11.54	-11.54	
178	191	203	7"	7 1/2"	8"		-4.04	-3.52	-4.40	-5.28	-5.28	-6.16	-7.05	-7.93	-8.81	-9.69	-10.57	-11.45	-12.33	-12.33	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-4.29	-3.75	-4.69	-5.62	-5.62	-6.56	-7.50	-8.44	-9.37	-10.31	-11.25	-12.19	-13.12	-13.12	
191	203	216	7 1/2"	8"	8 1/2"		-4.55	-3.98	-4.97	-5.96	-5.96	-6.96	-7.95	-8.95	-9.94	-10.93	-11.93	-12.92	-13.92	-13.92	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-4.80	-4.20	-5.25	-6.30	-6.30	-7.35	-8.41	-9.46	-10.51	-11.56	-12.61	-13.66	-14.71	-14.71	
203	216	229	8"	8 1/2"	9"		-5.05	-4.43	-5.54	-6.64	-6.64	-7.75	-8.86	-9.97	-11.07	-12.18	-13.29	-14.40	-15.50	-15.50	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-5.31	-4.66	-5.82	-6.98	-6.98	-8.15	-9.31	-10.48	-11.64	-12.80	-13.97	-15.13	-16.30	-16.30	
216	229	241	8 1/2"	9"	9 1/2"		-5.56	-4.88	-6.10	-7.32	-7.32	-8.54	-9.77	-10.99	-12.21	-13.43	-14.65	-15.87	-17.09	-17.09	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-5.82	-5.11	-6.39	-7.66	-7.66	-8.94	-10.22	-11.50	-12.77	-14.05	-15.33	-16.61	-17.88	-17.88	
229	241	254	9"	9 1/2"	10"		-6.07	-5.34	-6.67	-8.00	-8.00	-9.34	-10.67	-12.01	-13.34	-14.67	-16.01	-17.34	-18.68	-18.68	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-6.33	-5.56	-6.95	-8.34	-8.34	-9.73	-11.13	-12.52	-13.91	-15.30	-16.69	-18.08	-19.47	-19.47	
241	254	267	9 1/2"	10"	10 1/2"		-6.58	-5.79	-7.24	-8.68	-8.68	-10.13	-11.58	-13.03	-14.47	-15.92	-17.37	-18.81	-20.26	-20.26	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-6.84	-6.02	-7.52	-9.02	-9.02	-10.53	-12.03	-13.54	-15.04	-16.54	-18.05	-19.55	-21.06	-21.06	
254	267	279	10"	10 1/2"	11"		-7.09	-6.24	-7.80	-9.36	-9.36	-10.92	-12.48	-14.05	-15.61	-17.17	-18.73	-20.29	-21.85	-21.85	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-7.35	-6.47	-8.09	-9.70	-9.70	-11.32	-12.94	-14.56	-16.17	-17.79	-19.41	-21.02	-22.64	-22.64	
267	279	292	10 1/2"	11"	11 1/2"		-7.60	-6.70	-8.37	-10.04	-10.04	-11.72	-13.39	-15.07	-16.74	-18.41	-20.09	-21.76	-23.44	-23.44	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-7.85	-6.92	-8.65	-10.38	-10.38	-12.11	-13.84	-15.58	-17.31	-19.04	-20.77	-22.50	-24.23	-24.23	
279	292	305	11"	11 1/2"	12"		-8.11	-7.15	-8.94	-10.72	-10.72	-12.51	-14.30	-16.09	-17.87	-19.66	-21.45	-23.23	-25.02	-25.02	
286	298		11 1/4"	11 3/4"			-8.36	-7.38	-9.22	-11.06	-11.06	-12.91	-14.75	-16.60	-18.44	-20.28	-22.13	-23.97	-25.81	-25.81	
292	305		11 1/2"	12"			-8.62	-7.60	-9.50	-11.40	-11.40	-13.30	-15.20	-17.11	-19.01	-20.91	-22.81	-24.71	-26.61	-26.61	
298			11 3/4"				-8.87	-7.83	-9.79	-11.74	-11.74	-13.70	-15.66	-17.62	-19.57	-21.53	-23.49	-25.44	-27.40	-27.40	
305			12"				-9.13	-8.06	-10.07	-12.08	-12.08	-14.10	-16.11	-18.13	-20.14	-22.15	-24.17	-26.18	-28.19	-28.19	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]														
	C38	C51	C63	1 1/2"	2"	2 1/2"															
VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	2.12	4.25
V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	3.77	7.55
V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	5.66	11.83
V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	7.55	-
V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83	11.83	7.39
V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+2.12 / -2.12	+1.06 / -1.06
V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+4.25 / -3.18	+2.83 / -1.89
V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+8.87 / -8.87	+4.43 / -4.43

Shear force level VS to V4 also possible with lifting shear force (-2.1 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egcoibox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egcoibox[®] type MM - per Egcoibox[®] element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox[®] type MM - per ft

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		Rotation spring stiffness [kip-ft/rad/ft]																	
concrete cover top [in]																			
C38	C51	C63	1 1/2"	2"	2 1/2"														
159	171	184	6 1/4"	6 3/4"	7 1/4"	311	214	257	297	311	352	406	460	514	568	622	676	730	730
165	178	191	6 1/2"	7"	7 1/2"	361	250	300	346	362	410	473	536	599	662	725	788	850	850
171	184	197	6 3/4"	7 1/4"	7 3/4"	415	288	345	399	418	472	546	618	691	763	836	908	980	980
178	191	203	7"	7 1/2"	8"	472	329	395	455	477	540	623	706	789	872	955	1,037	1,120	1,120
184	197	210	7 1/4"	7 3/4"	8 1/4"	534	372	447	516	541	611	706	800	894	988	1,081	1,175	1,268	1,268
191	203	216	7 1/2"	8"	8 1/2"	599	419	503	580	608	687	794	899	1,005	1,110	1,216	1,321	1,426	1,426
197	210	222	7 3/4"	8 1/4"	8 3/4"	668	468	561	648	679	768	886	1,005	1,123	1,241	1,358	1,476	1,593	1,593
203	216	229	8"	8 1/2"	9"	740	519	624	720	754	853	985	1,116	1,247	1,378	1,508	1,639	1,769	1,769
210	222	235	8 1/4"	8 3/4"	9 1/4"	817	574	689	795	833	942	1,088	1,233	1,378	1,522	1,667	1,811	1,955	1,955
216	229	241	8 1/2"	9"	9 1/2"	897	631	758	874	916	1,036	1,196	1,356	1,515	1,674	1,833	1,991	2,150	2,150
222	235	248	8 3/4"	9 1/4"	9 3/4"	981	691	829	957	1,003	1,134	1,310	1,485	1,659	1,833	2,007	2,180	2,354	2,354
229	241	254	9"	9 1/2"	10"	1,069	754	905	1,044	1,094	1,237	1,429	1,619	1,809	1,999	2,189	2,378	2,567	2,567
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,160	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	2,790
241	254	267	9 1/2"	10"	10 1/2"	1,255	887	1,065	1,229	1,288	1,456	1,681	1,906	2,130	2,353	2,576	2,799	3,021	3,021
248	260	273	9 3/4"	10 1/4"	10 3/4"	1,354	958	1,150	1,327	1,391	1,572	1,815	2,058	2,299	2,541	2,781	3,022	3,262	3,262
254	267	279	10"	10 1/2"	11"	1,457	1,031	1,238	1,429	1,497	1,693	1,955	2,216	2,476	2,735	2,995	3,254	3,513	3,513
260	273	286	10 1/4"	10 3/4"	11 1/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
267	279	292	10 1/2"	11"	11 1/2"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
273	286	298	10 3/4"	11 1/4"	11 3/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
279	292	305	11"	11 1/2"	12"	1,673	1,186	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,445	3,743	4,041	4,041
286	298		11 1/4"	11 3/4"		1,787	1,268	1,522	1,757	1,841	2,081	2,404	2,724	3,044	3,363	3,682	4,001	4,319	4,319
292	305		11 1/2"	12"		1,905	1,352	1,623	1,874	1,964	2,220	2,563	2,906	3,247	3,587	3,927	4,267	4,606	4,606
298			11 3/4"			2,026	1,439	1,728	1,994	2,090	2,363	2,728	3,093	3,456	3,818	4,180	4,542	4,903	4,903
305			12"			2,151	1,529	1,836	2,119	2,220	2,510	2,899	3,285	3,671	4,056	4,441	4,825	5,209	5,209

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{kb} [ft]$

On-site reinforcement Egcoibox® type MM - concrete strength $\geq 4,000$ psi / 27.6 MPa (Imperial); - per ft

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egcoibox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egcoibox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / ft - option 1														
$\geq a_g$ [in ²]	0.23	0.23	0.28	0.34	0.34	0.40	0.45	0.51	0.57	0.62	0.68	0.74	0.79	0.79
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / ft - option 2														
$\geq a_g$ [in ²]	0.30	0.28	0.35	0.42	0.42	0.49	0.57	0.64	0.71	0.78	0.85	0.92	0.99	0.99
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / ft														
shear force level VS $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07
shear force level V1 $\geq a_g$ [in ²]	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.12
shear force level V2 $\geq a_g$ [in ²]	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.18
shear force level V3 $\geq a_g$ [in ²]	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	-
shear force level V4 $\geq a_g$ [in ²]	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.23
shear force level VS± $\geq a_g$ [in ²]	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07
shear force level V1± $\geq a_g$ [in ²]	-	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.12
shear force level V2± $\geq a_g$ [in ²]	-	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.18
shear force level V3± $\geq a_g$ [in ²]	-	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	-
shear force level V4± $\geq a_g$ [in ²]	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.23
shear force level V6± $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
shear force level V7± $\geq a_g$ [in ²]	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.09	0.09	0.09	0.09	0.09	0.09	0.09
shear force level V8± $\geq a_g$ [in ²]	0.13	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.13

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

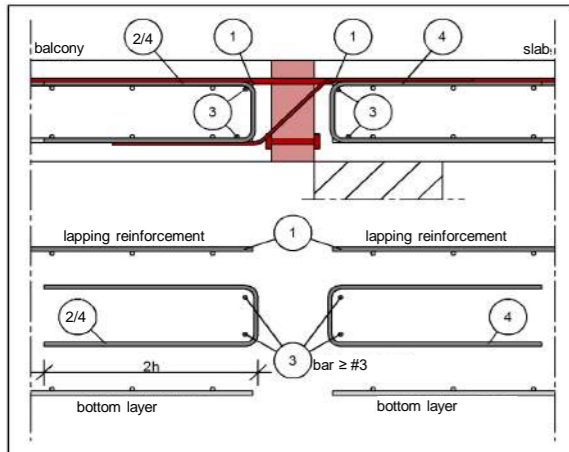
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

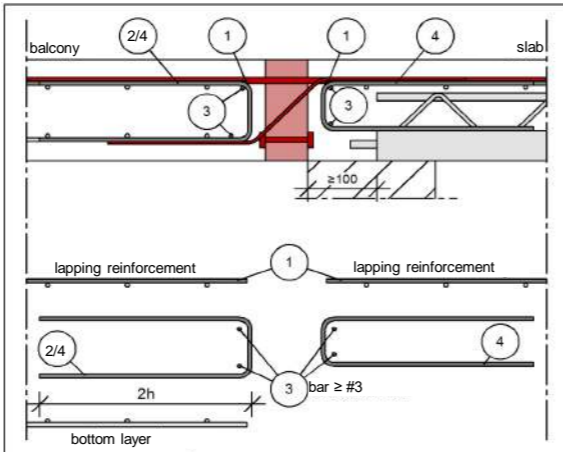
The specifications apply to good bonding conditions.

design proposal

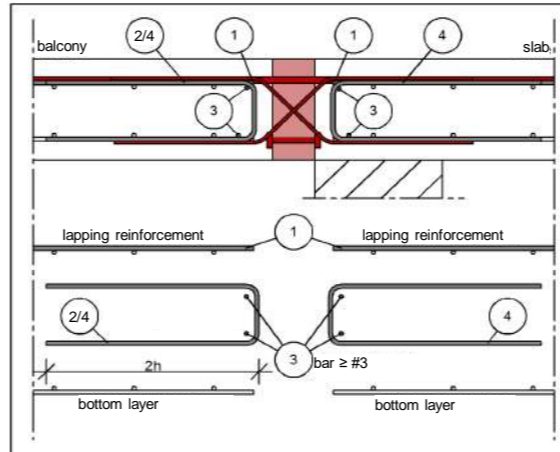
direct support



direct support (semi-prefab slab)



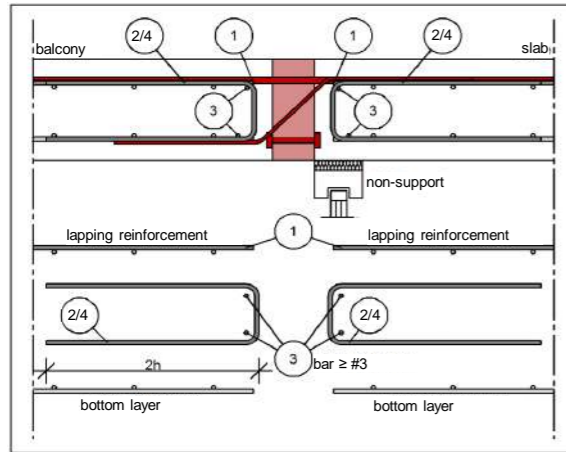
direct support with alternating shear force (V6±, V7±, V8±)



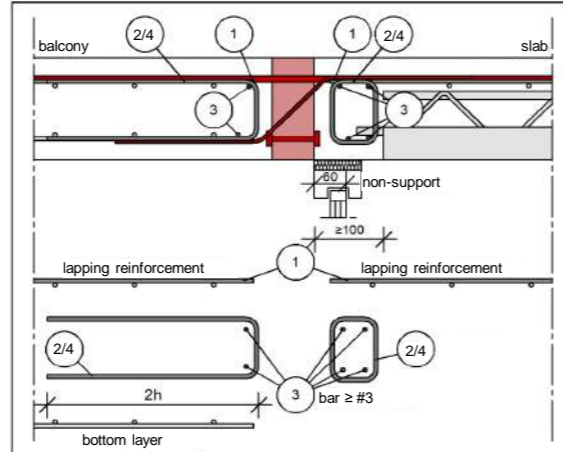
For the Egcoibox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



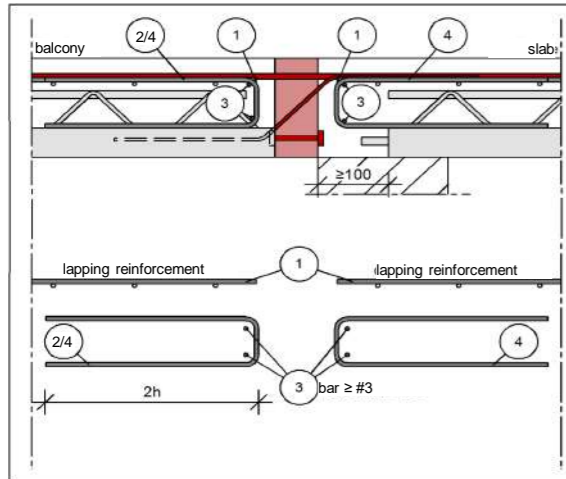
indirect support (semi-prefab slab)



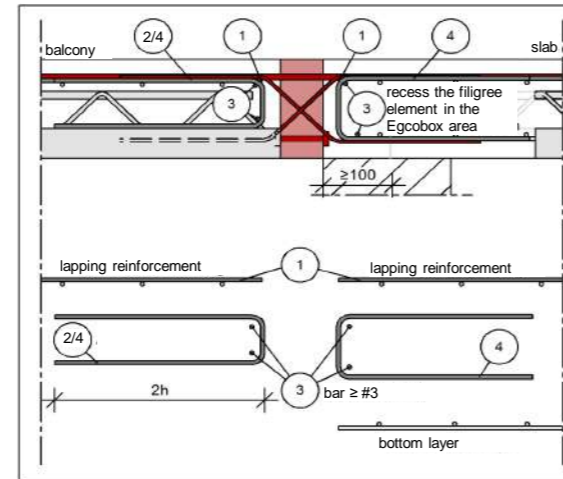
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

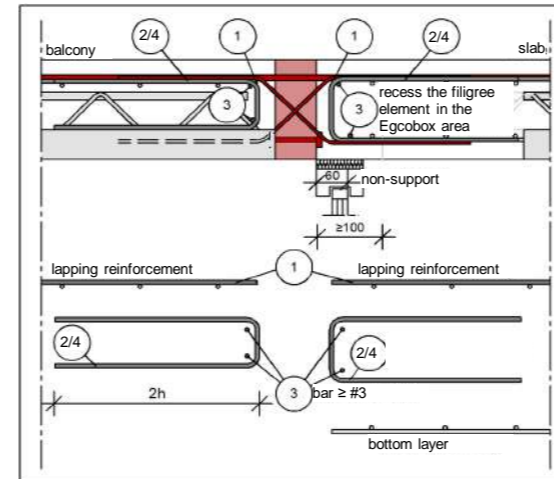
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



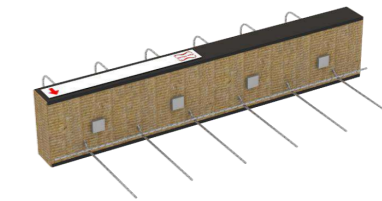
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 4,000 psi / 27.6 MPa (Imperial); - per ft

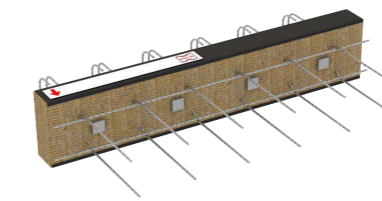
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399			
length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]									
C38	C51	C64	1 1/2"	2"	2 1/2"										
height of connection [mm]			height of connection [in]												
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	2.12	2.65	3.77	4.72	5.66	7.55	9.44	11.32	-	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	2.12	2.65	3.77	4.72	5.66	7.55	9.44	11.32	48.50	58.20

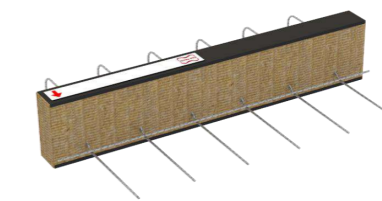
Reinforcement												
shear force bars [qty ϕ mm]			4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10
minimum wall / beam width [in]			7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"
compression bearings [qty ϕ mm]			4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 4,000 psi / 27.6 MPa (Imperial); - per ft

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K			
length of element [ft in]			7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	1.06	1.89	2.83	3.77	4.72	-	6.61	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	1.06	1.89	2.83	3.77	4.72	19.40	6.61	29.10

Reinforcement										
shear force bars [qty ϕ mm]			2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10
minimum wall / beam width [in]			7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"
compression bearings [qty ϕ mm]			1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"

All Egcoibox types can also be produced in the following variants:

VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K

VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 4,000$ psi / 27.6 MPa (Imperial); - per ft

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / ft										
$\geq a_s$ [in ²]	0.03	0.04	0.06	0.07	0.09	0.12	0.14	0.17	0.23	0.27
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / ft								
$\geq a_s$ [in ²]	0.02	0.03	0.04	0.06	0.07	0.09	0.10	0.14
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

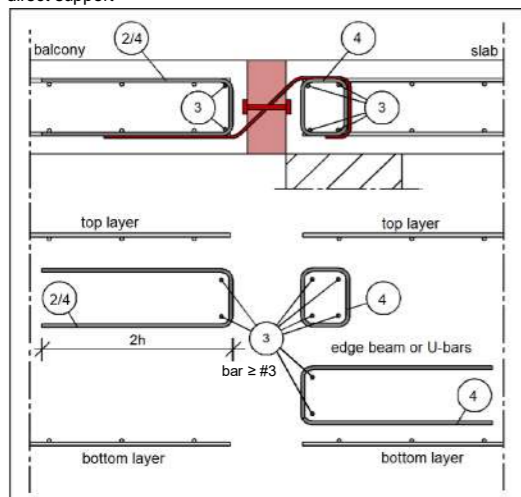
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

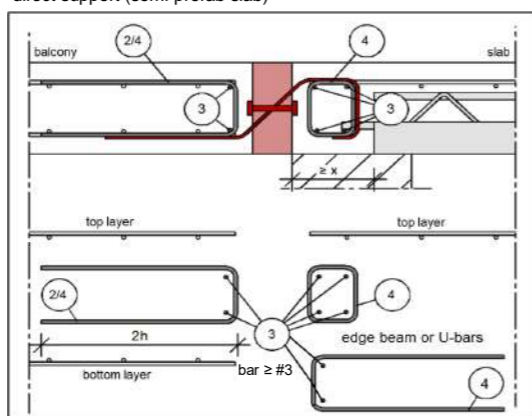
The specifications apply to good bonding conditions.

design proposal

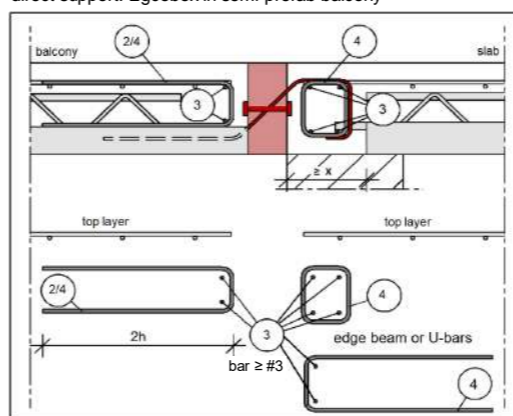
direct support



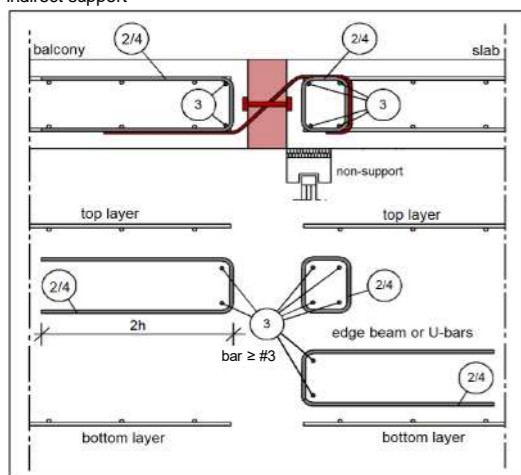
direct support (semi-prefab slab)



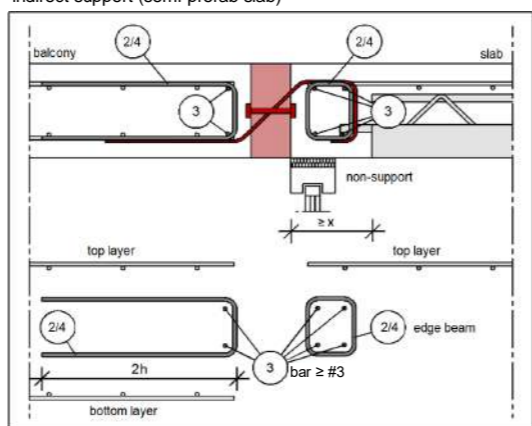
direct support: Egccobox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egccobox in semi-prefab balcony:

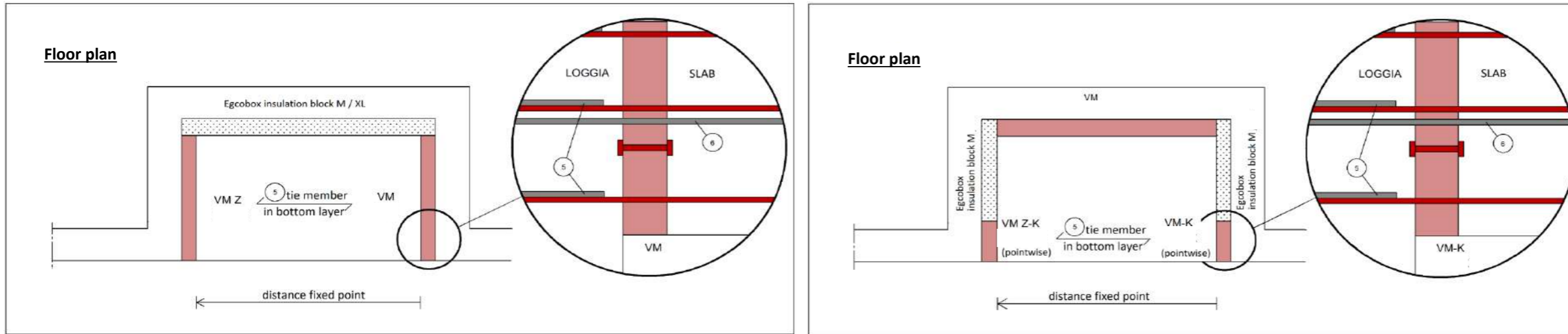
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

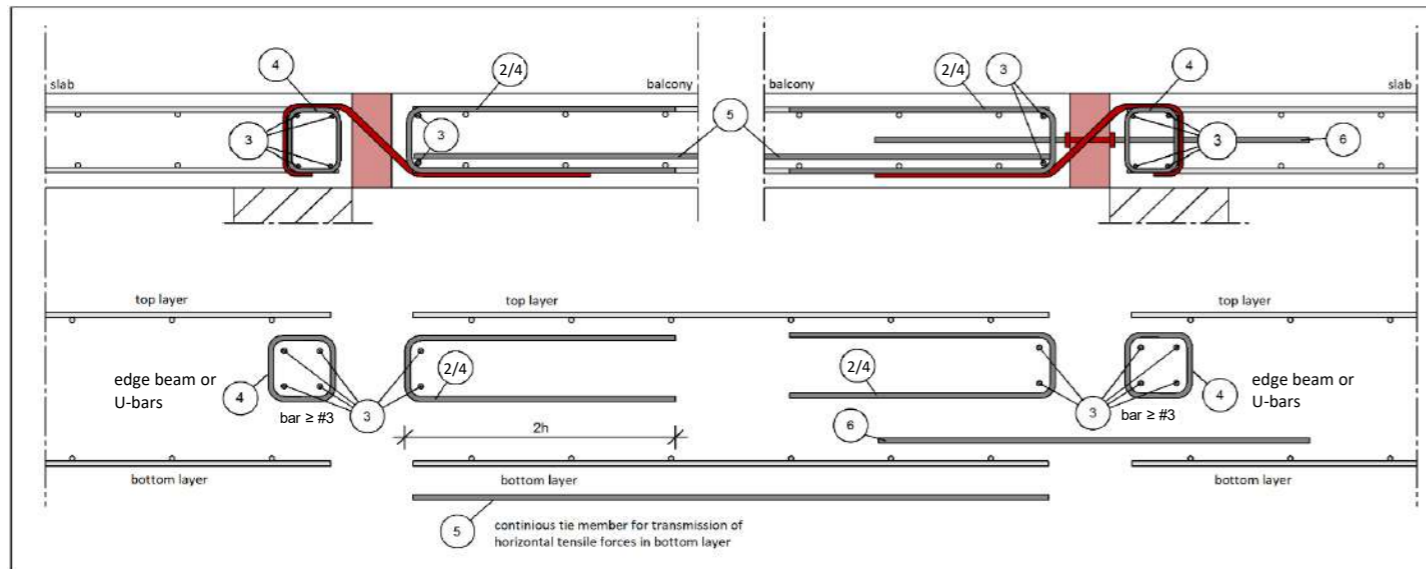
The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

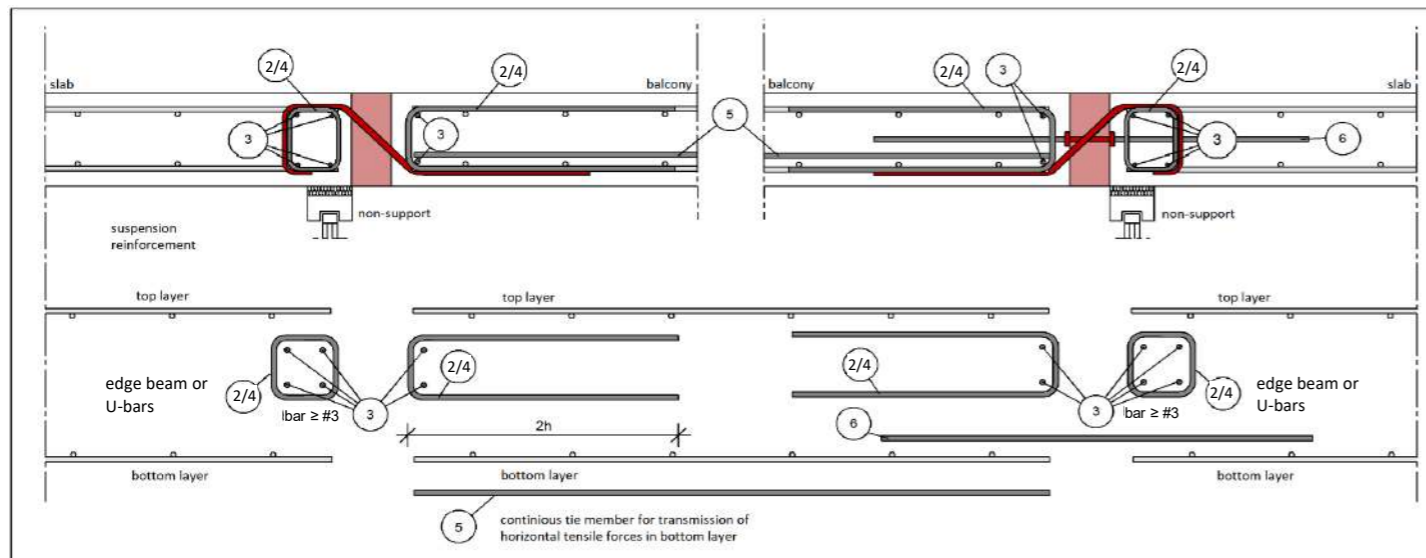


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Reinforcement Egcoibox® type MM± - per Egcoibox® element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egcoibox® type MM± - per ft

	Egcoibox type						MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
	length of element [ft in]						3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
	concrete cover [mm]			concrete cover [in]			Rotation spring stiffness [kip-ft/rad/ft]														
height of connection [mm / in]	C38	C51	C64	1 1/2"	2"	2 1/2"															
	171	197	222	6 3/4"	7 3/4"	8 3/4"	141	176	211	246	281	316	351	386	434	482	578	675	771	874	
178	203	229	7"	8"	9"	163	203	244	285	325	366	407	448	504	560	672	784	896	1,019		
184	210	235	7 1/4"	8 1/4"	9 1/4"	187	233	280	326	373	420	466	515	580	644	773	902	1,030	1,175		
191	216	241	7 1/2"	8 1/2"	9 1/2"	212	265	318	371	424	477	530	514	587	660	734	880	1,027	1,174	1,343	
197	222	248	7 3/4"	8 3/4"	9 3/4"	239	299	359	418	478	538	598	581	663	746	829	995	1,161	1,327	1,522	
203	229	254	8"	9"	10"	268	335	402	469	536	603	669	652	745	838	931	1,117	1,303	1,489	1,712	
210	235	260	8 1/4"	9 1/4"	10 1/4"	298	373	447	522	596	671	745	727	831	934	1,038	1,246	1,454	1,661	1,913	
216	241	267	8 1/2"	9 1/2"	10 1/2"	330	413	495	578	660	743	825	806	921	1,036	1,151	1,382	1,612	1,842	2,125	
222	248	273	8 3/4"	9 3/4"	10 3/4"	364	455	546	636	727	818	909	889	1,016	1,143	1,271	1,525	1,779	2,033	2,348	
229	254	279	9"	10"	11"	399	499	598	698	798	898	997	977	1,116	1,256	1,395	1,675	1,954	2,233	2,583	
235	260	286	9 1/4"	10 1/4"	11 1/4"	436	545	654	763	871	980	1,089	1,068	1,221	1,374	1,526	1,832	2,137	2,442	2,829	
241	267	292	9 1/2"	10 1/2"	11 1/2"	474	593	711	830	948	1,067	1,186	1,164	1,330	1,497	1,663	1,996	2,328	2,661	3,086	
248	273	298	9 3/4"	10 3/4"	11 3/4"	514	643	771	900	1,029	1,157	1,286	1,264	1,444	1,625	1,805	2,167	2,528	2,889	3,354	
254	279	305	10"	11"	12"	556	695	834	973	1,112	1,251	1,390	1,368	1,563	1,758	1,954	2,345	2,735	3,126	3,633	
260	286		10 1/4"	11 1/4"		599	749	899	1,049	1,199	1,349	1,499	1,476	1,686	1,897	2,108	2,530	2,951	3,373	3,923	
267	292		10 1/2"	11 1/2"		644	805	967	1,128	1,289	1,450	1,611	1,588	1,815	2,041	2,268	2,722	3,175	3,629	4,225	
273	298		10 3/4"	11 3/4"		691	864	1,036	1,209	1,382	1,555	1,727	1,704	1,947	2,191	2,434	2,921	3,408	3,895	4,537	
279	305		11"	12"		739	924	1,109	1,294	1,478	1,663	1,848	1,824	2,085	2,345	2,606	3,127	3,648	4,169	4,861	
286			11 1/4"			789	986	1,184	1,381	1,578	1,775	1,973	1,948	2,227	2,505	2,784	3,340	3,897	4,454	5,196	
292			11 1/2"			841	1,051	1,261	1,471	1,681	1,891	2,101	2,077	2,374	2,670	2,967	3,561	4,154	4,747	5,543	
298			11 3/4"			894	1,117	1,341	1,564	1,787	2,011	2,234	2,210	2,525	2,841	3,156	3,788	4,419	5,050	5,900	
305			12"			948	1,186	1,423	1,660	1,897	2,134	2,371	2,346	2,681	3,017	3,352	4,022	4,692	5,363	6,268	

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{cb} [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 4,000 psi / 27.6 MPa (Imperial); - per ft

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l _p [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / ft - option 1															
≥ a _s [in²]	0.45	0.28	0.34	0.40	0.45	0.51	0.57	0.58	0.66	0.74	0.82	0.49	0.58	1.32	1.33
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / ft - option 2															
≥ a _s [in²]	0.57	0.35	0.42	0.49	0.57	0.64	0.71	0.69	0.79	0.89	0.99	0.59	0.69	1.58	1.33
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / ft															
shear force level VS ≥ a _s [in²]	0.08	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.08	0.08
shear force level V1 ≥ a _s [in²]	0.15	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.15	0.15
shear force level V2 ≥ a _s [in²]	0.23	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.11	0.22	0.23
shear force level V3 ≥ a _s [in²]	0.30	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	-	-	-	-
shear force level V4 ≥ a _s [in²]	-	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	-	-	-	-
shear force level V5 ≥ a _s [in²]	-	-	-	-	0.24	0.24	0.24	0.24	0.24	0.24	0.24	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

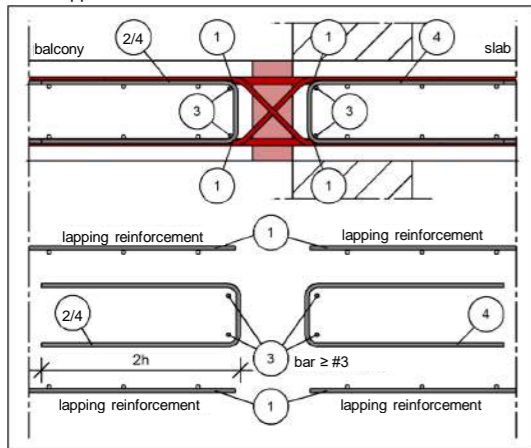
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

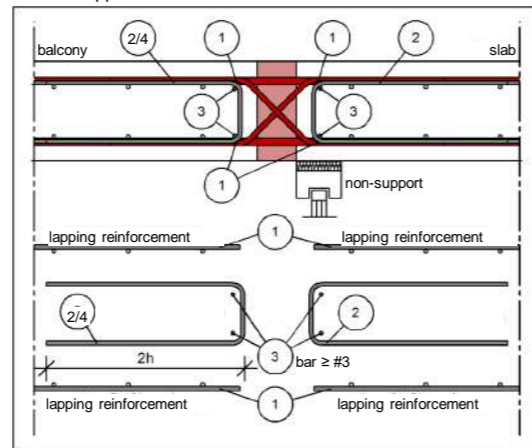
The specifications apply to good bonding conditions.

design proposal

direct support



indirect support



Reinforcement Egcoibox[®] type MM - per Egcoibox[®] element

Egcoibox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egcoibox[®] type MM - per ft

Egcoibox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		Rotation spring stiffness [kip-ft/rad/ft]																	
concrete cover top [in]																			
C38	C51	C63	1 1/2"	2"	2 1/2"														
159	171	184	6 1/4"	6 3/4"	7 1/4"	311	214	257	297	311	352	406	460	514	568	622	676	730	730
165	178	191	6 1/2"	7"	7 1/2"	361	250	300	346	362	410	473	536	599	662	725	788	850	850
171	184	197	6 3/4"	7 1/4"	7 3/4"	415	288	345	399	418	472	546	618	691	763	836	908	980	980
178	191	203	7"	7 1/2"	8"	472	329	395	455	477	540	623	706	789	872	955	1,037	1,120	1,120
184	197	210	7 1/4"	7 3/4"	8 1/4"	534	372	447	516	541	611	706	800	894	988	1,081	1,175	1,268	1,268
191	203	216	7 1/2"	8"	8 1/2"	599	419	503	580	608	687	794	899	1,005	1,110	1,216	1,321	1,426	1,426
197	210	222	7 3/4"	8 1/4"	8 3/4"	668	468	561	648	679	768	886	1,005	1,123	1,241	1,358	1,476	1,593	1,593
203	216	229	8"	8 1/2"	9"	740	519	624	720	754	853	985	1,116	1,247	1,378	1,508	1,639	1,769	1,769
210	222	235	8 1/4"	8 3/4"	9 1/4"	817	574	689	795	833	942	1,088	1,233	1,378	1,522	1,667	1,811	1,955	1,955
216	229	241	8 1/2"	9"	9 1/2"	897	631	758	874	916	1,036	1,196	1,356	1,515	1,674	1,833	1,991	2,150	2,150
222	235	248	8 3/4"	9 1/4"	9 3/4"	981	691	829	957	1,003	1,134	1,310	1,485	1,659	1,833	2,007	2,180	2,354	2,354
229	241	254	9"	9 1/2"	10"	1,069	754	905	1,044	1,094	1,237	1,429	1,619	1,809	1,999	2,189	2,378	2,567	2,567
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,160	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	2,790
241	254	267	9 1/2"	10"	10 1/2"	1,255	887	1,065	1,229	1,288	1,456	1,681	1,906	2,130	2,353	2,576	2,799	3,021	3,021
248	260	273	9 3/4"	10 1/4"	10 3/4"	1,354	958	1,150	1,327	1,391	1,572	1,815	2,058	2,299	2,541	2,781	3,022	3,262	3,262
254	267	279	10"	10 1/2"	11"	1,457	1,031	1,238	1,429	1,497	1,693	1,955	2,216	2,476	2,735	2,995	3,254	3,513	3,513
260	273	286	10 1/4"	10 3/4"	11 1/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
267	279	292	10 1/2"	11"	11 1/2"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
273	286	298	10 3/4"	11 1/4"	11 3/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
279	292	305	11"	11 1/2"	12"	1,673	1,186	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,445	3,743	4,041	4,041
286	298		11 1/4"	11 3/4"		1,787	1,268	1,522	1,757	1,841	2,081	2,404	2,724	3,044	3,363	3,682	4,001	4,319	4,319
292	305		11 1/2"	12"		1,905	1,352	1,623	1,874	1,964	2,220	2,563	2,906	3,247	3,587	3,927	4,267	4,606	4,606
298			11 3/4"			2,026	1,439	1,728	1,994	2,090	2,363	2,728	3,093	3,456	3,818	4,180	4,542	4,903	4,903
305			12"			2,151	1,529	1,836	2,119	2,220	2,510	2,899	3,285	3,671	4,056	4,441	4,825	5,209	5,209

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{kb} [ft]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 4,350$ psi / 30.0 MPa (Imperial); - per ft

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egccobox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / ft - option 1														
$\geq a_g$ [in ²]	0.23	0.23	0.28	0.34	0.34	0.40	0.45	0.51	0.57	0.62	0.68	0.74	0.79	0.79
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / ft - option 2														
$\geq a_g$ [in ²]	0.30	0.28	0.35	0.42	0.42	0.49	0.57	0.64	0.71	0.78	0.85	0.92	0.99	0.99
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / ft														
shear force level VS $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07
shear force level V1 $\geq a_g$ [in ²]	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.12
shear force level V2 $\geq a_g$ [in ²]	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	#WERT!
shear force level V3 $\geq a_g$ [in ²]	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	-
shear force level V4 $\geq a_g$ [in ²]	-	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24
shear force level VS± $\geq a_g$ [in ²]	-	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.07
shear force level V1± $\geq a_g$ [in ²]	-	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.12
shear force level V2± $\geq a_g$ [in ²]	-	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	#WERT!
shear force level V3± $\geq a_g$ [in ²]	-	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	-
shear force level V4± $\geq a_g$ [in ²]	-	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.19	0.24
shear force level V6± $\geq a_g$ [in ²]	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03
shear force level V7± $\geq a_g$ [in ²]	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.09	0.09	0.09	0.09	0.09	0.09	0.09
shear force level V8± $\geq a_g$ [in ²]	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14	0.14

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

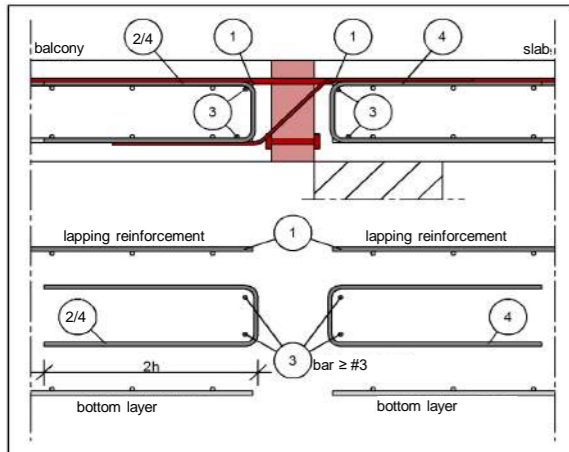
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

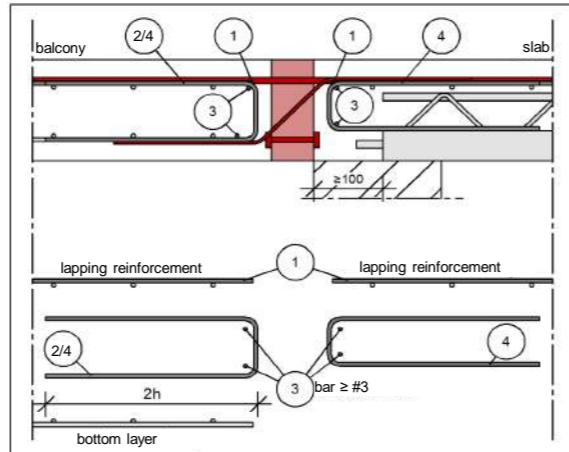
The specifications apply to good bonding conditions.

design proposal

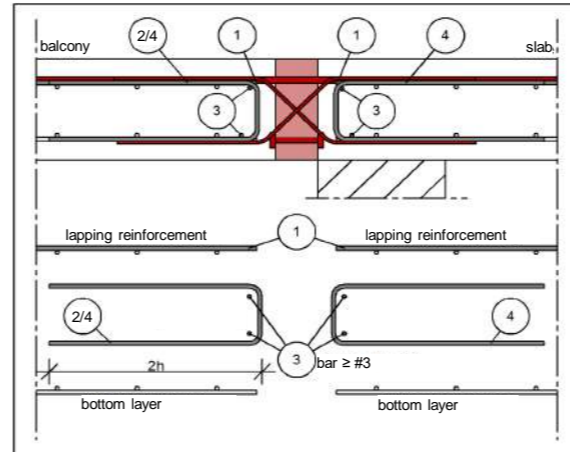
direct support



direct support (semi-prefab slab)



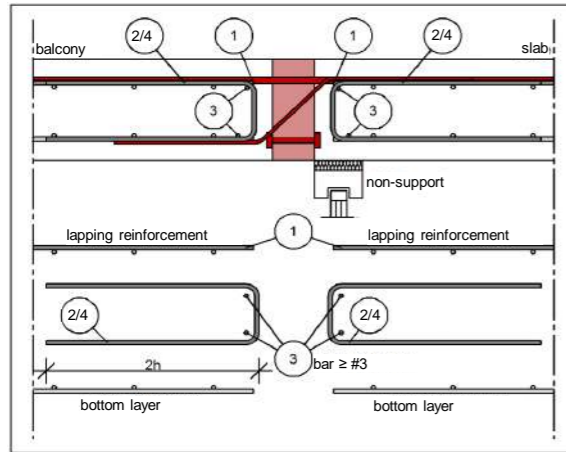
direct support with alternating shear force (V6±, V7±, V8±)



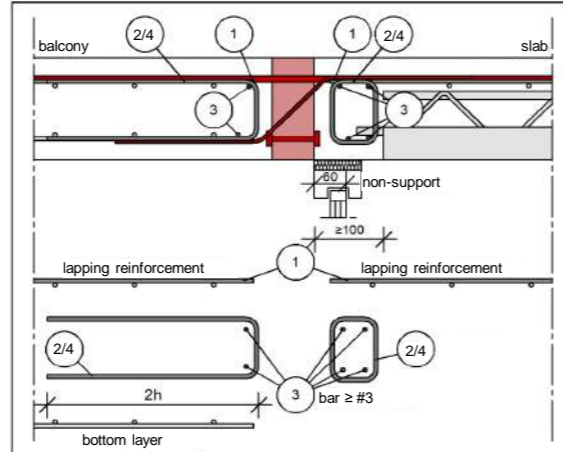
For the Egccobox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



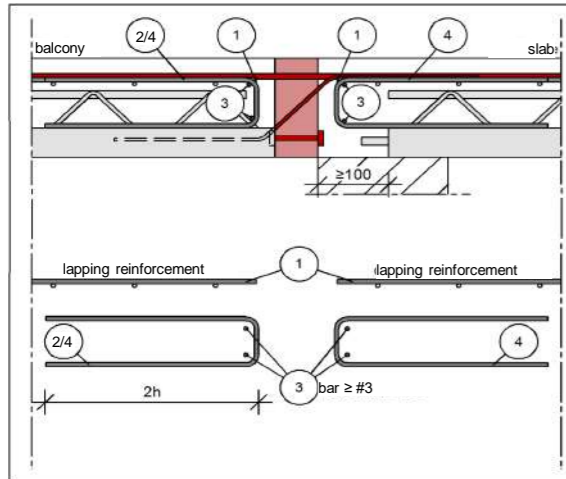
indirect support (semi-prefab slab)



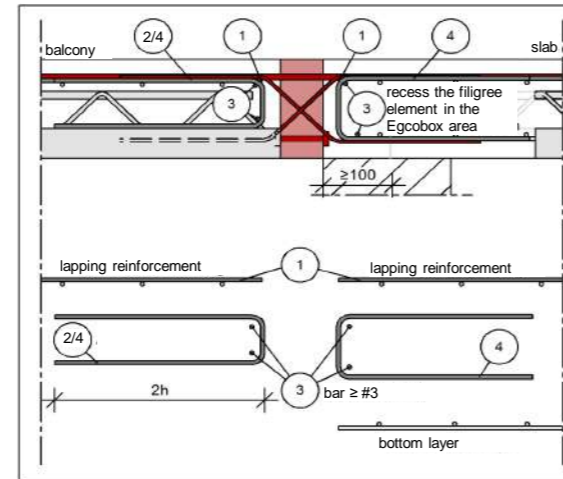
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

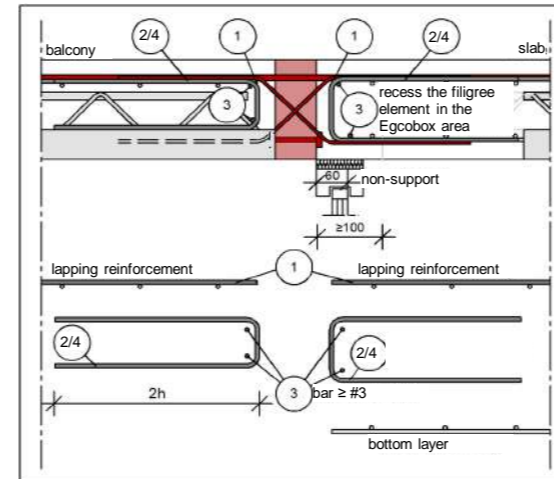
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



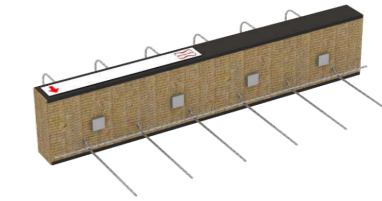
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egcoibox® type VM - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per ft

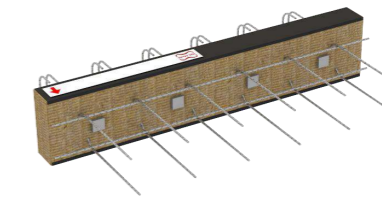
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type						VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399	
length of element [ft in]						3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]										
C38	C51	C64	1 1/2"	2"	2 1/2"											
height of connection [mm]			height of connection [in]													
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	2.21	2.77	3.94	4.92	5.90	7.87	9.84	11.81	-	-	
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	2.21	2.77	3.94	4.92	5.90	7.87	9.84	11.81	50.58	60.69	

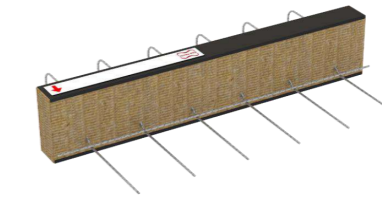
Reinforcement											
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10	
minimum wall / beam width [in]	7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"	
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12	
applicable expansion joint distances [ft in]	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcoibox® type VM-K - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per ft

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egcoibox type						VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]						7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	1.11	1.97	2.95	3.94	4.92	-	6.89	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	1.11	1.97	2.95	3.94	4.92	20.23	6.89	30.35

Reinforcement											
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10			
minimum wall / beam width [in]	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"			
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12			
applicable expansion joint distances [ft in]	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"			

All Egcoibox types can also be produced in the following variants:

VM_± / VM-K_± - Egcoibox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egcoibox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM / VM-K

VM Z_± / VM Z_-K± - Egcoibox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcoibox® VM± / VM-K±

Egcoibox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 4,350$ psi / 30.0 MPa (Imperial); - per ft

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / ft										
$\geq a_s$ [in ²]	0.03	0.04	0.06	0.08	0.09	0.12	0.15	0.18	0.24	0.28
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / ft								
$\geq a_s$ [in ²]	0.02	0.03	0.05	0.06	0.08	0.09	0.11	0.14
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

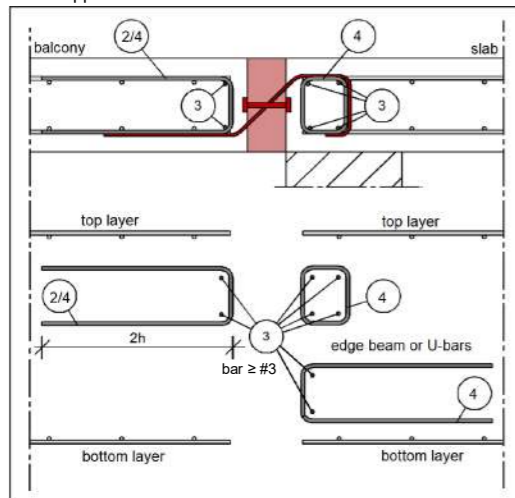
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

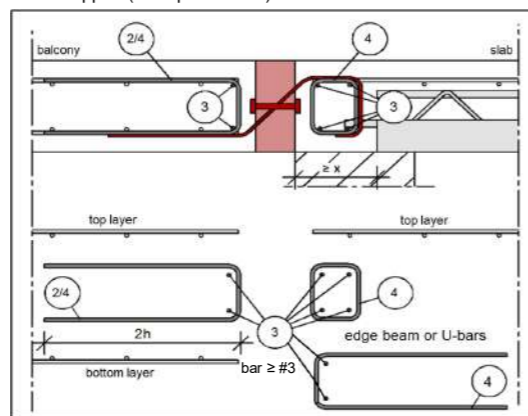
The specifications apply to good bonding conditions.

design proposal

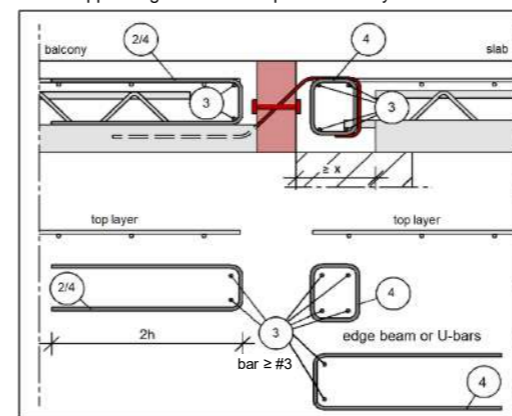
direct support



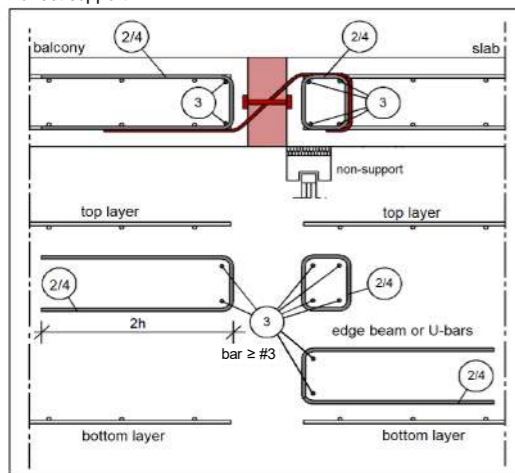
direct support (semi-prefab slab)



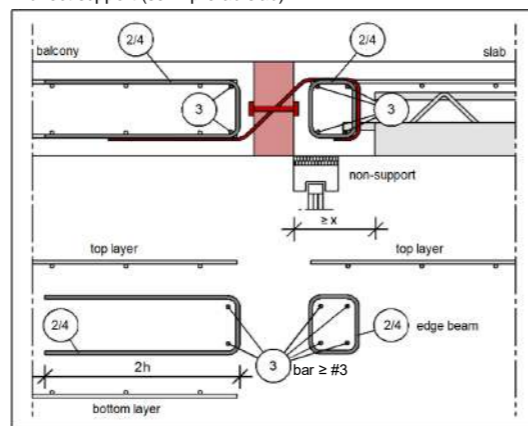
direct support: Egccobox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egccobox in semi-prefab balcony:

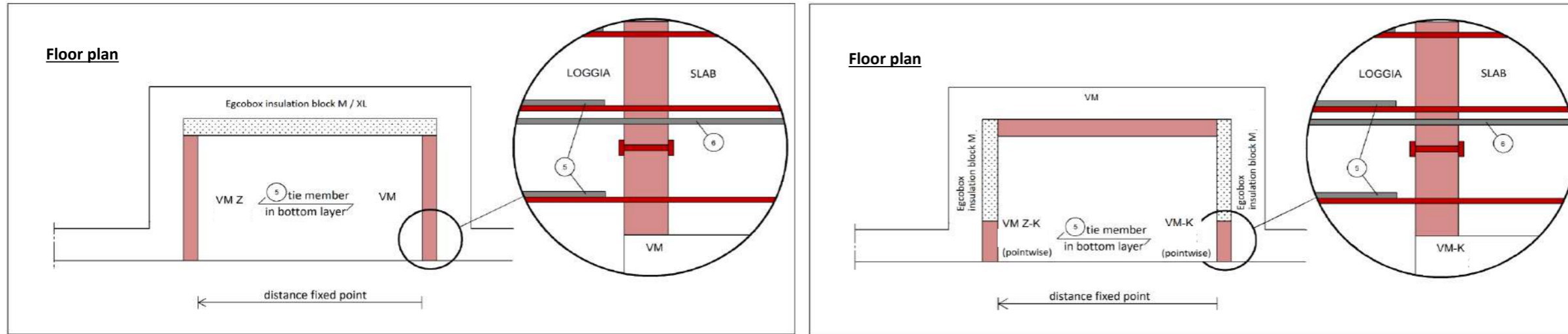
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

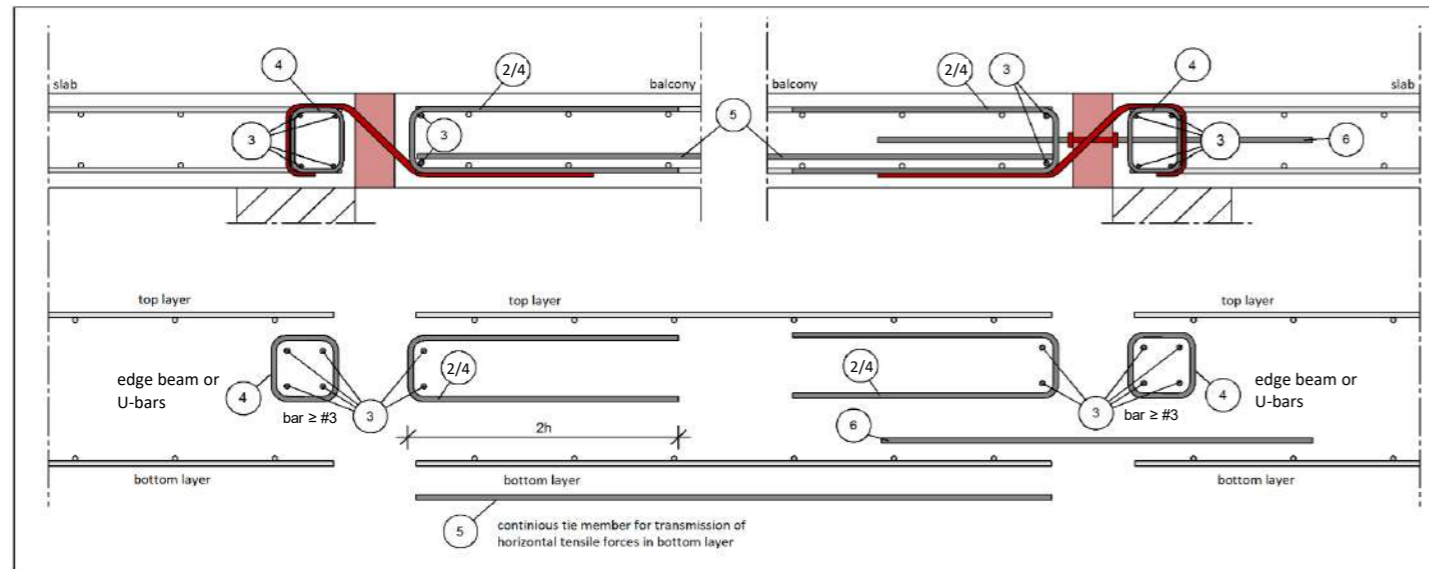
The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

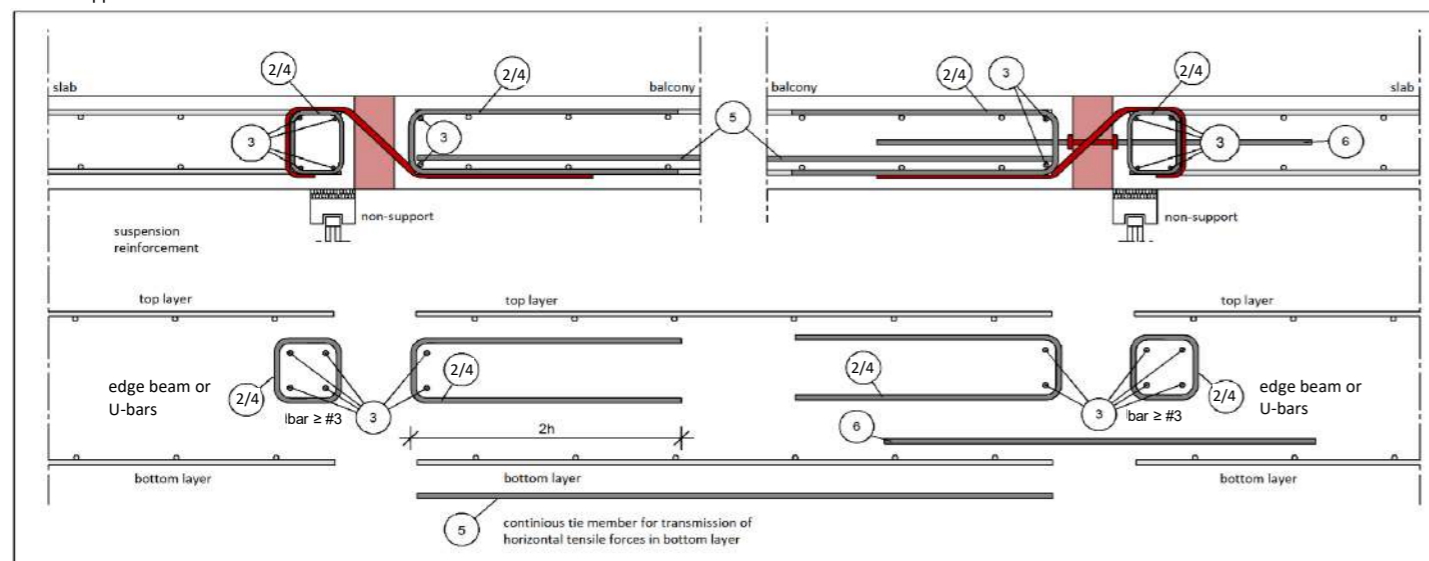


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per ft

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM_n [kip-ft/ft]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±3.10	±3.87	±4.65	±5.42	±6.20	±6.97	±7.75	±7.76	±8.86	±9.97	±11.08	±13.30	±15.51	±17.73	±22.38	
	178	203	229	7"	8"	9"	±3.33	±4.17	±5.00	±5.84	±6.67	±7.50	±8.34	±8.36	±9.56	±10.75	±11.95	±14.34	±16.73	±19.12	±24.17	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±3.57	±4.46	±5.36	±6.25	±7.14	±8.04	±8.93	±8.97	±10.25	±11.53	±12.81	±15.38	±17.94	±20.50	±25.97	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±3.81	±4.76	±5.71	±6.66	±7.62	±8.57	±9.52	±9.58	±10.94	±12.31	±13.68	±16.41	±19.15	±21.89	±27.76	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±4.04	±5.06	±6.07	±7.08	±8.09	±9.10	±10.11	±10.18	±11.64	±13.09	±14.54	±17.45	±20.36	±23.27	±29.55	
	203	229	254	8"	9"	10"	±4.28	±5.35	±6.42	±7.49	±8.56	±9.63	±10.70	±10.79	±12.33	±13.87	±15.41	±18.49	±21.58	±24.66	±31.34	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±4.52	±5.65	±6.78	±7.90	±9.03	±10.16	±11.29	±11.39	±13.02	±14.65	±16.28	±19.53	±22.79	±26.04	±33.14	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±4.75	±5.94	±7.13	±8.32	±9.51	±10.69	±11.88	±12.00	±13.71	±15.43	±17.14	±20.57	±24.00	±27.43	±34.93	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±4.99	±6.24	±7.48	±8.73	±9.98	±11.23	±12.47	±12.61	±14.41	±16.21	±18.01	±21.61	±25.21	±28.81	±36.72	
	229	254	279	9"	10"	11"	±5.23	±6.53	±7.84	±9.15	±10.45	±11.76	±13.06	±13.21	±15.10	±16.99	±18.88	±22.65	±26.43	±30.20	±38.52	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±5.46	±6.83	±8.19	±9.56	±10.92	±12.29	±13.66	±13.82	±15.79	±17.77	±19.74	±23.69	±27.64	±31.59	±40.31	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±5.70	±7.12	±8.55	±9.97	±11.40	±12.82	±14.25	±14.42	±16.49	±18.55	±20.61	±24.73	±28.85	±32.97	±42.10	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±5.93	±7.42	±8.90	±10.39	±11.87	±13.35	±14.84	±15.03	±17.18	±19.33	±21.47	±25.77	±30.06	±34.36	±43.90	
	254	279	305	10"	11"	12"	±6.17	±7.71	±9.26	±10.80	±12.34	±13.89	±15.43	±15.64	±17.87	±20.11	±22.34	±26.81	±31.27	±35.74	±45.69	
	260	286		10 1/4"	11 1/4"		±6.41	±8.01	±9.61	±11.21	±12.82	±14.42	±16.02	±16.24	±18.56	±20.88	±23.21	±27.85	±32.49	±37.13	±47.48	
	267	292		10 1/2"	11 1/2"		±6.64	±8.30	±9.97	±11.63	±13.29	±14.95	±16.61	±16.85	±19.26	±21.66	±24.07	±28.89	±33.70	±38.51	±49.28	
	273	298		10 3/4"	11 3/4"		±6.88	±8.60	±10.32	±12.04	±13.76	±15.48	±17.20	±17.46	±19.95	±22.44	±24.94	±29.92	±34.91	±39.90	±51.07	
	279	305		11"	12"		±7.12	±8.90	±10.67	±12.45	±14.23	±16.01	±17.79	±18.06	±20.64	±23.22	±25.80	±30.96	±36.12	±41.29	±52.86	
	286			11 1/4"			±7.35	±9.19	±11.03	±12.87	±14.71	±16.54	±18.38	±18.67	±21.34	±24.00	±26.67	±32.00	±37.34	±42.67	±54.66	
	292			11 1/2"			±7.59	±9.49	±11.38	±13.28	±15.18	±17.08	±18.97	±19.27	±22.03	±24.78	±27.54	±33.04	±38.55	±44.06	±56.45	
298			11 3/4"			±7.83	±9.78	±11.74	±13.69	±15.65	±17.61	±19.56	±19.88	±22.72	±25.56	±28.40	±34.08	±39.76	±45.44	±58.24		
305			12"			±8.06	±10.08	±12.09	±14.11	±16.12	±18.14	±20.15	±20.49	±23.41	±26.34	±29.27	±35.12	±40.97	±46.83	±60.03		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV_n [kip/ft]															
	C38	C51	C63	1 1/2"	2"	2 1/2"																
VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89	±2.89
V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12	±5.12
V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68	±7.68
V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±10.24	±10.24	±10.24	±10.24	±10.24	±10.24	±10.24	±10.24	±10.24	±10.24	±10.24	-	-	-	-	-
V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±12.00	±12.00	±12.00	±12.00	±12.00	±12.00	±12.00	±12.00	±12.00	-	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±16.00	±16.00	±16.00	±16.00	±16.00	±16.00	±16.00	-	-	-	-	-

concrete cover for top and bottom reinforcement Egccobox® other heights on request



Reinforcement Egccobox® type MM± - per Egccobox® element

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egccobox® type MM± - per ft

Egccobox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"				
concrete cover [mm]		concrete cover [in]			Rotation spring stiffness [kip-ft/rad/ft]															
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	141	176	211	246	281	316	351	337	386	434	482	578	675	771	874
178	203	229	7"	8"	9"	163	203	244	285	325	366	407	392	448	504	560	672	784	896	1,019
184	210	235	7 1/4"	8 1/4"	9 1/4"	187	233	280	326	373	420	466	451	515	580	644	773	902	1,030	1,175
191	216	241	7 1/2"	8 1/2"	9 1/2"	212	265	318	371	424	477	530	514	587	660	734	880	1,027	1,174	1,343
197	222	248	7 3/4"	8 3/4"	9 3/4"	239	299	359	418	478	538	598	581	663	746	829	995	1,161	1,327	1,522
203	229	254	8"	9"	10"	268	335	402	469	536	603	669	652	745	838	931	1,117	1,303	1,489	1,712
210	235	260	8 1/4"	9 1/4"	10 1/4"	298	373	447	522	596	671	745	727	831	934	1,038	1,246	1,454	1,661	1,913
216	241	267	8 1/2"	9 1/2"	10 1/2"	330	413	495	578	660	743	825	806	921	1,036	1,151	1,382	1,612	1,842	2,125
222	248	273	8 3/4"	9 3/4"	10 3/4"	364	455	546	636	727	818	909	889	1,016	1,143	1,271	1,525	1,779	2,033	2,348
229	254	279	9"	10"	11"	399	499	598	698	798	898	997	977	1,116	1,256	1,395	1,675	1,954	2,233	2,583
235	260	286	9 1/4"	10 1/4"	11 1/4"	436	545	654	763	871	980	1,089	1,068	1,221	1,374	1,526	1,832	2,137	2,442	2,829
241	267	292	9 1/2"	10 1/2"	11 1/2"	474	593	711	830	948	1,067	1,186	1,164	1,330	1,497	1,663	1,996	2,328	2,661	3,086
248	273	298	9 3/4"	10 3/4"	11 3/4"	514	643	771	900	1,029	1,157	1,286	1,264	1,444	1,625	1,805	2,167	2,528	2,889	3,354
254	279	305	10"	11"	12"	556	695	834	973	1,112	1,251	1,390	1,368	1,563	1,758	1,954	2,345	2,735	3,126	3,633
260	286		10 1/4"	11 1/4"		599	749	899	1,049	1,199	1,349	1,499	1,476	1,686	1,897	2,108	2,530	2,951	3,373	3,923
267	292		10 1/2"	11 1/2"		644	805	967	1,128	1,289	1,450	1,611	1,588	1,815	2,041	2,268	2,722	3,175	3,629	4,225
273	298		10 3/4"	11 3/4"		691	864	1,036	1,209	1,382	1,555	1,727	1,704	1,947	2,191	2,434	2,921	3,408	3,895	4,537
279	305		11"	12"		739	924	1,109	1,294	1,478	1,663	1,848	1,824	2,085	2,345	2,606	3,127	3,648	4,169	4,861
286			11 1/4"			789	986	1,184	1,381	1,578	1,775	1,973	1,948	2,227	2,505	2,784	3,340	3,897	4,454	5,196
292			11 1/2"			841	1,051	1,261	1,471	1,681	1,891	2,101	2,077	2,374	2,670	2,967	3,561	4,154	4,747	5,543
298			11 3/4"			894	1,117	1,341	1,564	1,787	2,011	2,234	2,210	2,525	2,841	3,156	3,788	4,419	5,050	5,900
305			12"			948	1,186	1,423	1,660	1,897	2,134	2,371	2,346	2,681	3,017	3,352	4,022	4,692	5,363	6,268

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{cb} [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 4,350 psi / 30.0 MPa (Imperial); - per ft

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l _p [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / ft - option 1															
≥ a _s [in ²]	0.45	0.28	0.34	0.40	0.45	0.51	0.57	0.58	0.66	0.74	0.82	0.49	0.58	1.32	1.33
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / ft - option 2															
≥ a _s [in ²]	0.57	0.35	0.42	0.49	0.57	0.64	0.71	0.69	0.79	0.89	0.99	0.59	0.69	1.58	1.33
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / ft															
shear force level VS ≥ a _s [in ²]	0.09	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.09	0.09
shear force level V1 ≥ a _s [in ²]	0.16	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.16	0.16
shear force level V2 ≥ a _s [in ²]	0.24	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.24	0.24
shear force level V3 ≥ a _s [in ²]	0.31	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	-	-	-	-
shear force level V4 ≥ a _s [in ²]	-	-	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	-	-	-	-
shear force level V5 ≥ a _s [in ²]	-	-	-	-	0.25	0.25	0.25	0.25	0.25	0.25	0.25	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

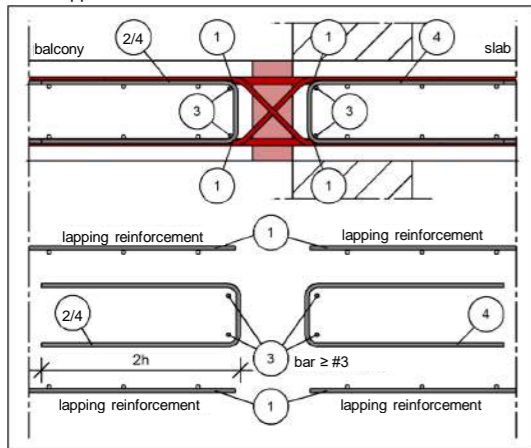
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

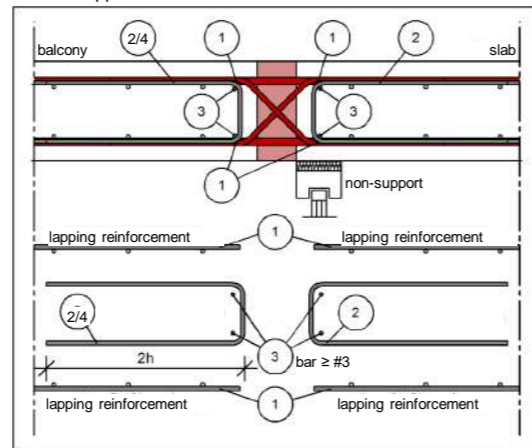
The specifications apply to good bonding conditions.

design proposal

direct support



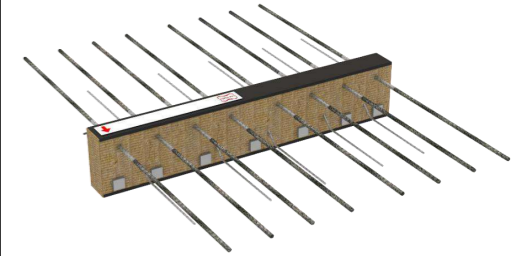
indirect support



Design table Egcoibox® type MM - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per ft

for cantilever slabs for transmission of moment and shear force, insulation 3 1/8"

Egcoibox type							MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K	
length of element [ft in]							1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
concrete cover top [mm]							ϕM_n [kip-ft/ft]														
concrete cover top [in]																					
C38	C51	C64	1 1/2"	2"	2 1/2"																
159	171	184	6 1/4"	6 3/4"	7 1/4"		-3.66	-3.18	-3.97	-4.59	-4.77	-5.56	-6.36	-7.15	-7.95	-8.74	-9.54	-10.33	-11.12	-11.12	
165	178	191	6 1/2"	7"	7 1/2"		-3.94	-3.43	-4.29	-4.96	-5.15	-6.01	-6.86	-7.72	-8.58	-9.44	-10.30	-11.15	-12.01	-12.01	
171	184	197	6 3/4"	7 1/4"	7 3/4"		-4.23	-3.69	-4.61	-5.32	-5.53	-6.45	-7.37	-8.29	-9.21	-10.13	-11.06	-11.98	-12.90	-12.90	
178	191	203	7"	7 1/2"	8"		-4.51	-3.94	-4.92	-5.69	-5.91	-6.89	-7.88	-8.86	-9.85	-10.83	-11.82	-12.80	-13.79	-13.79	
184	197	210	7 1/4"	7 3/4"	8 1/4"		-4.80	-4.19	-5.24	-6.05	-6.29	-7.34	-8.38	-9.43	-10.48	-11.53	-12.58	-13.62	-14.67	-14.67	
191	203	216	7 1/2"	8"	8 1/2"		-5.08	-4.45	-5.56	-6.42	-6.67	-7.78	-8.89	-10.00	-11.11	-12.22	-13.34	-14.45	-15.56	-15.56	
197	210	222	7 3/4"	8 1/4"	8 3/4"		-5.37	-4.70	-5.87	-6.79	-7.05	-8.22	-9.40	-10.57	-11.75	-12.92	-14.10	-15.27	-16.45	-16.45	
203	216	229	8"	8 1/2"	9"		-5.65	-4.95	-6.19	-7.15	-7.43	-8.67	-9.90	-11.14	-12.38	-13.62	-14.86	-16.09	-17.33	-17.33	
210	222	235	8 1/4"	8 3/4"	9 1/4"		-5.94	-5.21	-6.51	-7.52	-7.81	-9.11	-10.41	-11.71	-13.01	-14.32	-15.62	-16.92	-18.22	-18.22	
216	229	241	8 1/2"	9"	9 1/2"		-6.22	-5.46	-6.82	-7.88	-8.19	-9.55	-10.92	-12.28	-13.65	-15.01	-16.38	-17.74	-19.11	-19.11	
222	235	248	8 3/4"	9 1/4"	9 3/4"		-6.50	-5.71	-7.14	-8.25	-8.57	-10.00	-11.42	-12.85	-14.28	-15.71	-17.14	-18.57	-19.99	-19.99	
229	241	254	9"	9 1/2"	10"		-6.79	-5.97	-7.46	-8.62	-8.95	-10.44	-11.93	-13.42	-14.91	-16.41	-17.90	-19.39	-20.88	-20.88	
235	248	260	9 1/4"	9 3/4"	10 1/4"		-7.07	-6.22	-7.77	-8.98	-9.33	-10.88	-12.44	-13.99	-15.55	-17.10	-18.66	-20.21	-21.77	-21.77	
241	254	267	9 1/2"	10"	10 1/2"		-7.36	-6.47	-8.09	-9.35	-9.71	-11.33	-12.95	-14.56	-16.18	-17.80	-19.42	-21.04	-22.65	-22.65	
248	260	273	9 3/4"	10 1/4"	10 3/4"		-7.64	-6.73	-8.41	-9.72	-10.09	-11.77	-13.45	-15.13	-16.81	-18.50	-20.18	-21.86	-23.54	-23.54	
254	267	279	10"	10 1/2"	11"		-7.93	-6.98	-8.72	-10.08	-10.47	-12.21	-13.96	-15.70	-17.45	-19.19	-20.94	-22.68	-24.43	-24.43	
260	273	286	10 1/4"	10 3/4"	11 1/4"		-8.21	-7.23	-9.04	-10.45	-10.85	-12.66	-14.47	-16.27	-18.08	-19.89	-21.70	-23.51	-25.31	-25.31	
267	279	292	10 1/2"	11"	11 1/2"		-8.50	-7.49	-9.36	-10.81	-11.23	-13.10	-14.97	-16.84	-18.72	-20.59	-22.46	-24.33	-26.20	-26.20	
273	286	298	10 3/4"	11 1/4"	11 3/4"		-8.78	-7.74	-9.67	-11.18	-11.61	-13.54	-15.48	-17.41	-19.35	-21.28	-23.22	-25.15	-27.09	-27.09	
279	292	305	11"	11 1/2"	12"		-9.07	-7.99	-9.99	-11.55	-11.99	-13.99	-15.99	-17.98	-19.98	-21.98	-23.98	-25.98	-27.98	-27.98	
286	298		11 1/4"	11 3/4"			-9.35	-8.25	-10.31	-11.91	-12.37	-14.43	-16.49	-18.55	-20.62	-22.68	-24.74	-26.80	-28.86	-28.86	
292	305		11 1/2"	12"			-9.64	-8.50	-10.62	-12.28	-12.75	-14.87	-17.00	-19.12	-21.25	-23.37	-25.50	-27.62	-29.75	-29.75	
298			11 3/4"				-9.92	-8.75	-10.94	-12.64	-13.13	-15.32	-17.51	-19.69	-21.88	-24.07	-26.26	-28.45	-30.64	-30.64	
305			12"				-10.20	-9.01	-11.26	-13.01	-13.51	-15.76	-18.01	-20.26	-22.52	-24.77	-27.02	-29.27	-31.52	-31.52	



Shear force level	concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]															
	C38	C51	C63	1 1/2"	2"	2 1/2"																
VS	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	2.37	4.75	
V1	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	4.22	8.44
V2	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	13.22
V3	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	8.44	-
V4	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	-	13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22	13.22	8.26
V6±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+2.37 / -2.37	+1.19 / -1.19	
V7±	≥159	≥171	≥184	≥6 1/4"	≥6 3/4"	≥7 1/4"	+4.75 / -3.56	+4.75 / -3.56	+4.75 / -3.56	+4.75 / -3.56	+4.75 / -3.56	+4.75 / -3.56	+4.75 / -3.56	+4.75 / -3.56	+6.33 / -4.22	+6.33 / -4.22	+6.33 / -4.22	+6.33 / -4.22	+6.33 / -4.22	+6.33 / -4.22	+3.17 / -2.11	
V8±	≥184	≥197	≥210	≥7 1/4"	≥7 3/4"	≥8 1/4"	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+9.92 / -9.92	+4.96 / -4.96	

Shear force level VS to V4 also possible with lifting shear force (-2.4 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥ 7 1/4" (concrete cover 1 1/2"), ≥ 7 3/4" (concrete cover 2"), ≥ 8 1/4" (concrete cover 2 1/2")

The Egcoibox® is also available as semi-prefab version in variant 'FO' (height ≥ 7 3/4") or 'F' (height ≥ 6 1/4"): e.g. MM50-FO-V1-C38-h184

Reinforcement Egccobox® type MM - per Egccobox® element

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars [ft in]	1'-7 7/8"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"
compression bearings [qty ø mm]	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [ft in]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS [qty ø mm]	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1 [qty ø mm]	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2 [qty ø mm]	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3 [qty ø mm]	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4 [qty ø mm]	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS± [qty ø mm]	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1± [qty ø mm]	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2± [qty ø mm]	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3± [qty ø mm]	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4± [qty ø mm]	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6± [qty ø mm]	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7± [qty ø mm]	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	3 ø 8 / 2 ø 8
shear force bars V8± [qty ø mm]	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 ø 10
applicable expansion joint distances [ft in]	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"	38'-4 3/8"

Rotation spring stiffness Egccobox® type MM - per ft

Egccobox type		MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K				
length of element [ft in]		1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"				
concrete cover top [mm]		Rotation spring stiffness [kip-ft/rad/ft]																	
concrete cover top [in]																			
C38	C51	C63	1 1/2"	2"	2 1/2"														
159	171	184	6 1/4"	6 3/4"	7 1/4"	311	214	257	297	311	352	406	460	514	568	622	676	730	730
165	178	191	6 1/2"	7"	7 1/2"	361	250	300	346	362	410	473	536	599	662	725	788	850	850
171	184	197	6 3/4"	7 1/4"	7 3/4"	415	288	345	399	418	472	546	618	691	763	836	908	980	980
178	191	203	7"	7 1/2"	8"	472	329	395	455	477	540	623	706	789	872	955	1,037	1,120	1,120
184	197	210	7 1/4"	7 3/4"	8 1/4"	534	372	447	516	541	611	706	800	894	988	1,081	1,175	1,268	1,268
191	203	216	7 1/2"	8"	8 1/2"	599	419	503	580	608	687	794	899	1,005	1,110	1,216	1,321	1,426	1,426
197	210	222	7 3/4"	8 1/4"	8 3/4"	668	468	561	648	679	768	886	1,005	1,123	1,241	1,358	1,476	1,593	1,593
203	216	229	8"	8 1/2"	9"	740	519	624	720	754	853	985	1,116	1,247	1,378	1,508	1,639	1,769	1,769
210	222	235	8 1/4"	8 3/4"	9 1/4"	817	574	689	795	833	942	1,088	1,233	1,378	1,522	1,667	1,811	1,955	1,955
216	229	241	8 1/2"	9"	9 1/2"	897	631	758	874	916	1,036	1,196	1,356	1,515	1,674	1,833	1,991	2,150	2,150
222	235	248	8 3/4"	9 1/4"	9 3/4"	981	691	829	957	1,003	1,134	1,310	1,485	1,659	1,833	2,007	2,180	2,354	2,354
229	241	254	9"	9 1/2"	10"	1,069	754	905	1,044	1,094	1,237	1,429	1,619	1,809	1,999	2,189	2,378	2,567	2,567
235	248	260	9 1/4"	9 3/4"	10 1/4"	1,160	819	983	1,135	1,189	1,344	1,552	1,760	1,966	2,172	2,378	2,584	2,790	2,790
241	254	267	9 1/2"	10"	10 1/2"	1,255	887	1,065	1,229	1,288	1,456	1,681	1,906	2,130	2,353	2,576	2,799	3,021	3,021
248	260	273	9 3/4"	10 1/4"	10 3/4"	1,354	958	1,150	1,327	1,391	1,572	1,815	2,058	2,299	2,541	2,781	3,022	3,262	3,262
254	267	279	10"	10 1/2"	11"	1,457	1,031	1,238	1,429	1,497	1,693	1,955	2,216	2,476	2,735	2,995	3,254	3,513	3,513
260	273	286	10 1/4"	10 3/4"	11 1/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
267	279	292	10 1/2"	11"	11 1/2"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
273	286	298	10 3/4"	11 1/4"	11 3/4"	1,563	1,108	1,329	1,534	1,608	1,818	2,099	2,379	2,659	2,938	3,216	3,494	3,772	3,772
279	292	305	11"	11 1/2"	12"	1,673	1,186	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,445	3,743	4,041	4,041
286	298		11 1/4"	11 3/4"		1,787	1,268	1,522	1,757	1,841	2,081	2,404	2,724	3,044	3,363	3,682	4,001	4,319	4,319
292	305		11 1/2"	12"		1,905	1,352	1,623	1,874	1,964	2,220	2,563	2,906	3,247	3,587	3,927	4,267	4,606	4,606
298			11 3/4"			2,026	1,439	1,728	1,994	2,090	2,363	2,728	3,093	3,456	3,818	4,180	4,542	4,903	4,903
305			12"			2,151	1,529	1,836	2,119	2,220	2,510	2,899	3,285	3,671	4,056	4,441	4,825	5,209	5,209

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{kb} [ft]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 5,000$ psi / 34.5 MPa (Imperial); - per ft

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [ft in]	1'-7 1/16"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"
Egccobox® tensile bars [qty ϕ mm]	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [ft in]	1'-6 1/2"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"
item ① - lapping reinforcement / ft - option 1														
$\geq a_g$ [in ²]	0.23	0.23	0.28	0.34	0.34	0.40	0.45	0.51	0.57	0.62	0.68	0.74	0.79	0.79
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / ft - option 2														
$\geq a_g$ [in ²]	0.30	0.28	0.35	0.42	0.42	0.49	0.57	0.64	0.71	0.78	0.85	0.92	0.99	0.99
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / ft														
shear force level VS $\geq a_g$ [in ²]	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.07
shear force level V1 $\geq a_g$ [in ²]	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.13
shear force level V2 $\geq a_g$ [in ²]	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20
shear force level V3 $\geq a_g$ [in ²]	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	-
shear force level V4 $\geq a_g$ [in ²]	-	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.25
shear force level VS \pm $\geq a_g$ [in ²]	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.07
shear force level V1 \pm $\geq a_g$ [in ²]	-	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.06	0.13
shear force level V2 \pm $\geq a_g$ [in ²]	-	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.20
shear force level V3 \pm $\geq a_g$ [in ²]	-	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	-
shear force level V4 \pm $\geq a_g$ [in ²]	-	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.25
shear force level V6 \pm $\geq a_g$ [in ²]	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
shear force level V7 \pm $\geq a_g$ [in ²]	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.10	0.10	0.10	0.10	0.10	0.10	0.10
shear force level V8 \pm $\geq a_g$ [in ²]	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15

item ③+④ - structural reinforcement

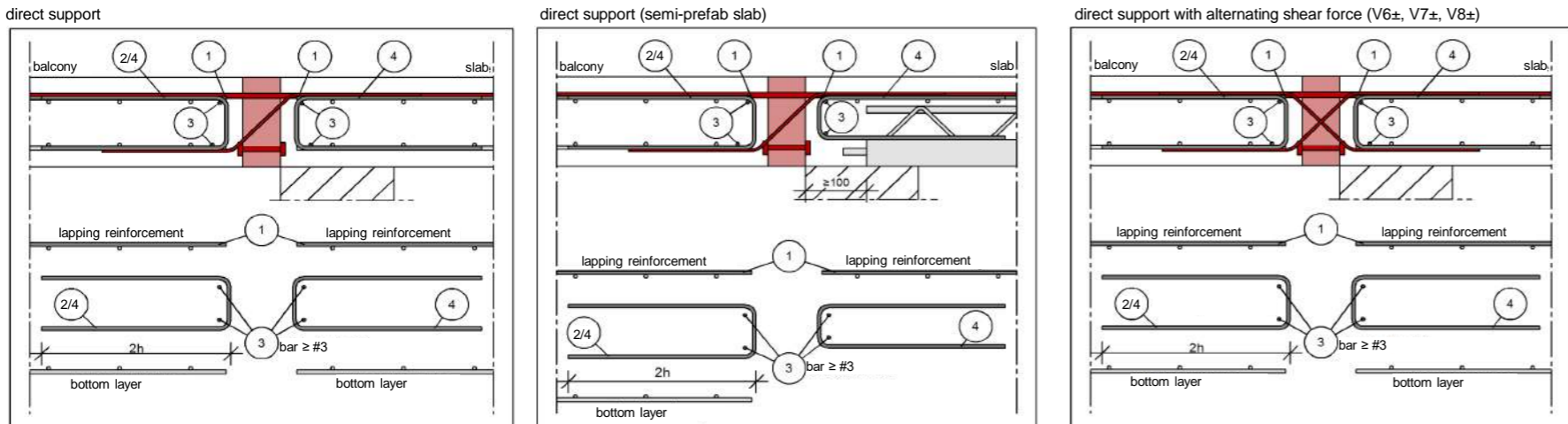
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ \geq #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

The specifications apply to good bonding conditions.

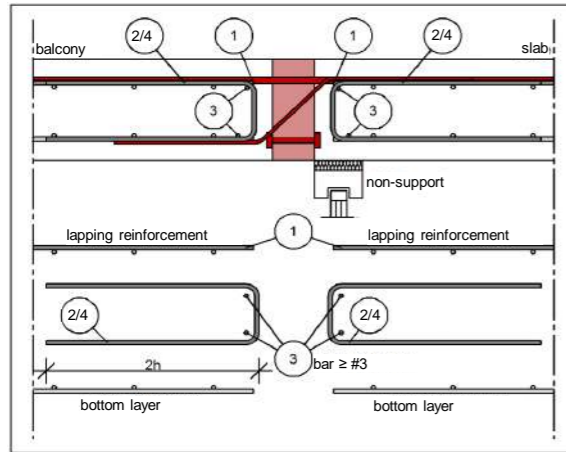
design proposal



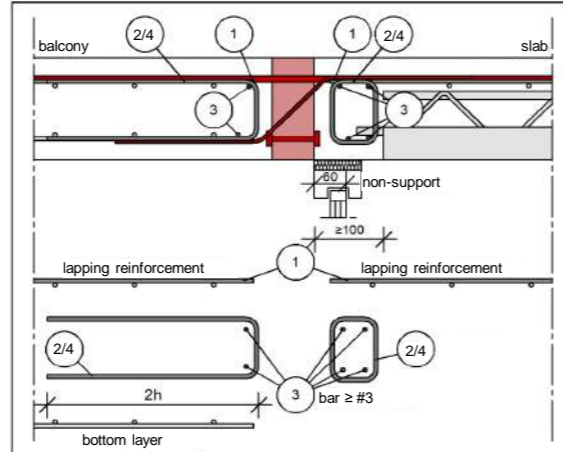
For the Egccobox shear force levels VS \pm to V4 \pm , a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



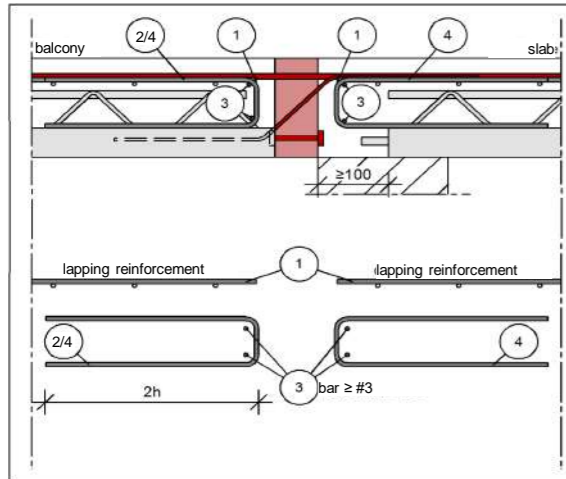
indirect support (semi-prefab slab)



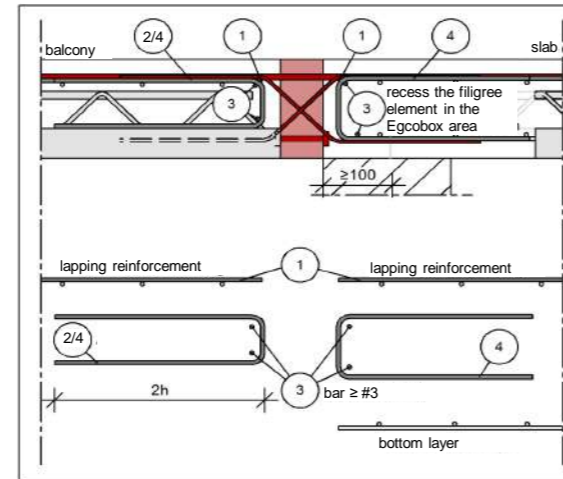
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

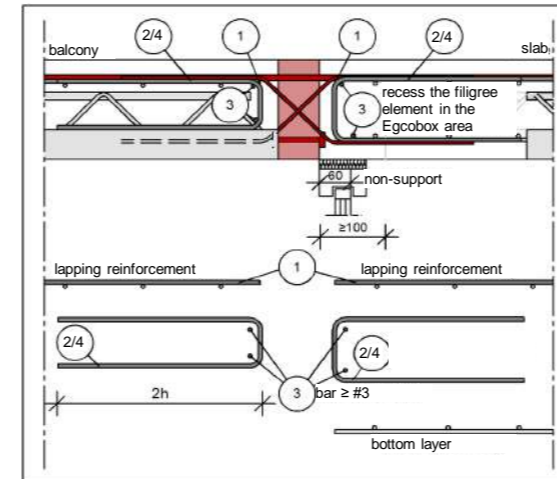
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



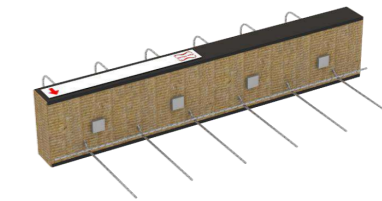
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels V_{S±} to V_{4±}, a constructive edging on the balcony side is generally sufficient.

Design table Egccobox® type VM - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per ft

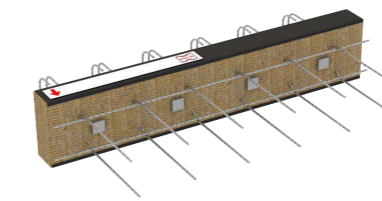
for supported plates for the transmission of shear forces, insulation 3 1/8"

Egccobox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399			
length of element [ft in]			3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]									
C38	C51	C64	1 1/2"	2"	2 1/2"										
height of connection [mm]			height of connection [in]												
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	2.37	2.97	4.22	5.28	6.33	8.44	10.55	12.66	-	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	2.37	2.97	4.22	5.28	6.33	8.44	10.55	12.66	54.22	65.07

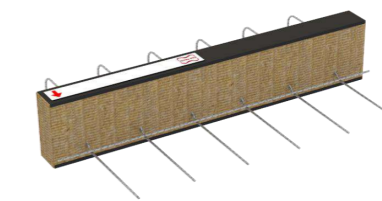
Reinforcement												
shear force bars [qty ϕ mm]			4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10
minimum wall / beam width [in]			7"	7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	8 1/2"
compression bearings [qty ϕ mm]			4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egccobox® type VM-K - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per ft

for supported plates for the transmission of shear forces, insulation 3 1/8"

Egccobox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K			
length of element [ft in]			7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"			
concrete cover top [mm]			concrete cover top [in]			ϕV_n [kip/ft]							
C38	C51	C64	1 1/2"	2"	2 1/2"								
height of connection [mm]			height of connection [in]										
159-305	171-305	184-305	6 1/4"-12"	6 3/4"-12"	7 1/4"-12"	1.19	2.11	3.17	4.22	5.28	-	7.39	-
184-305	197-305	210-305	7 1/4"-12"	7 3/4"-12"	8 1/4"-12"	1.19	2.11	3.17	4.22	5.28	21.69	7.39	32.53

Reinforcement										
shear force bars [qty ϕ mm]			2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10
minimum wall / beam width [in]			7"	7 3/4"	7 3/4"	7 3/4"	7 3/4"	8 1/2"	7 3/4"	8 1/2"
compression bearings [qty ϕ mm]			1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12
applicable expansion joint distances [ft in]			38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"

All Egccobox types can also be produced in the following variants:

VM_± / VM-K_± - Egccobox® to transfer positive and negative shear forces (shear bars ±)

VM Z_ / VM Z_-K - Egccobox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egccobox® VM / VM-K

VM Z_± / VM Z_-K± - Egccobox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egccobox® VM± / VM-K±

Egccobox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 5,000$ psi / 34.5 MPa (Imperial); - per ft

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
item ② - based on ϕV_n : suspension reinforcement shear force / ft										
$\geq a_s$ [in ²]	0.04	0.05	0.06	0.08	0.10	0.13	0.16	0.19	0.25	0.30
x = shear force bar embedment depth (slab) [in]	6"	6"	7"	7"	7"	7"	7"	7"	7 3/4"	7 3/4"

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [ft in]	7 7/8"	9 13/16"	9 13/16"	11 13/16"	1'-3 3/4"	1'-3 3/4"	1'-7 11/16"	1'-7 11/16"
item ② - based on ϕV_n : suspension reinforcement shear force / ft								
$\geq a_s$ [in ²]	0.02	0.03	0.05	0.06	0.08	0.10	0.11	0.15
x = shear force bar embedment depth (slab) [in]	6"	7"	7"	7"	7"	7 3/4"	7"	7 3/4"

item ③+④ - structural reinforcement

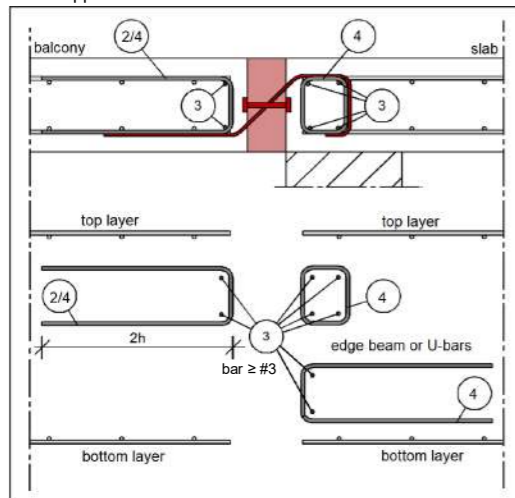
On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \#3$) must generally be planned. On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply. In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

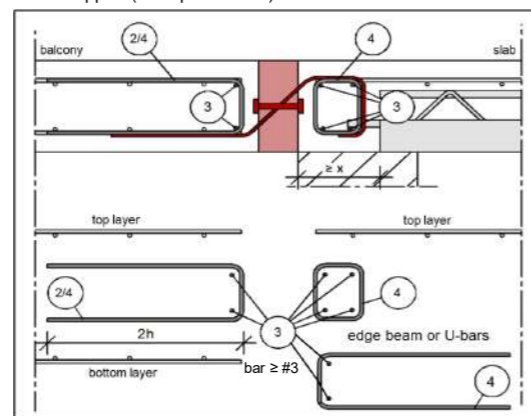
The specifications apply to good bonding conditions.

design proposal

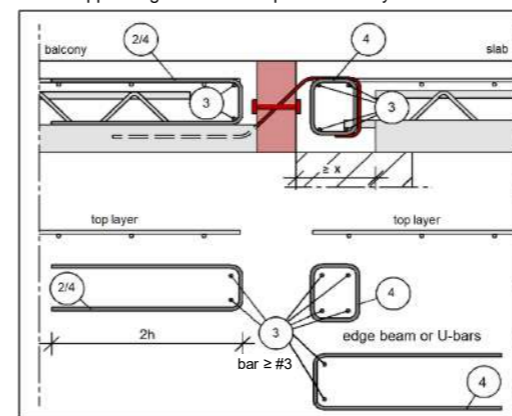
direct support



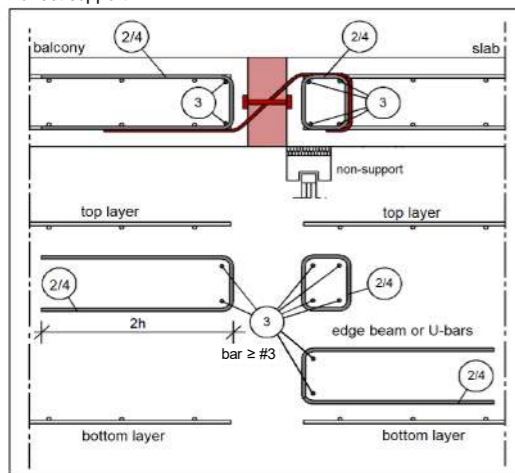
direct support (semi-prefab slab)



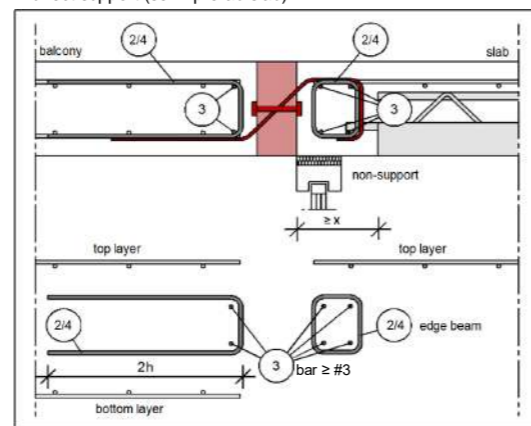
direct support: Egccobox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egccobox in semi-prefab balcony:

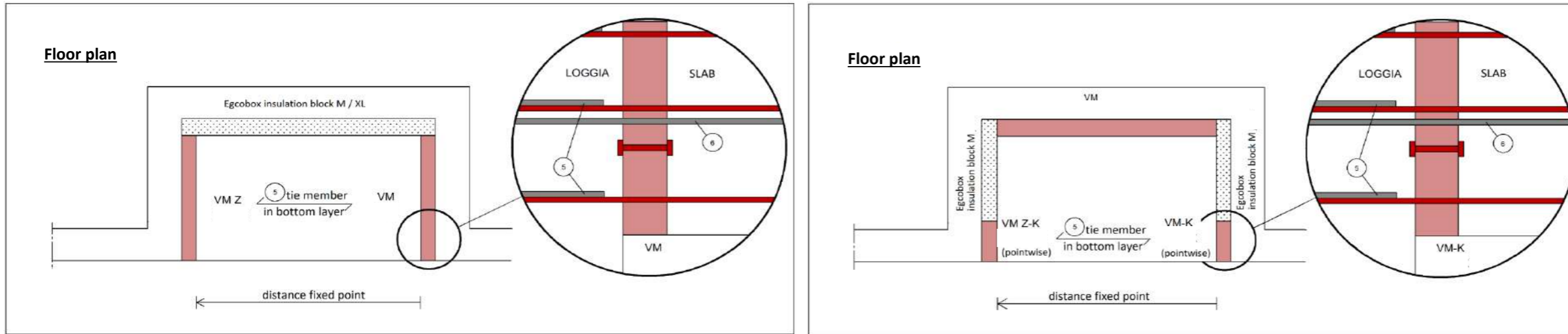
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

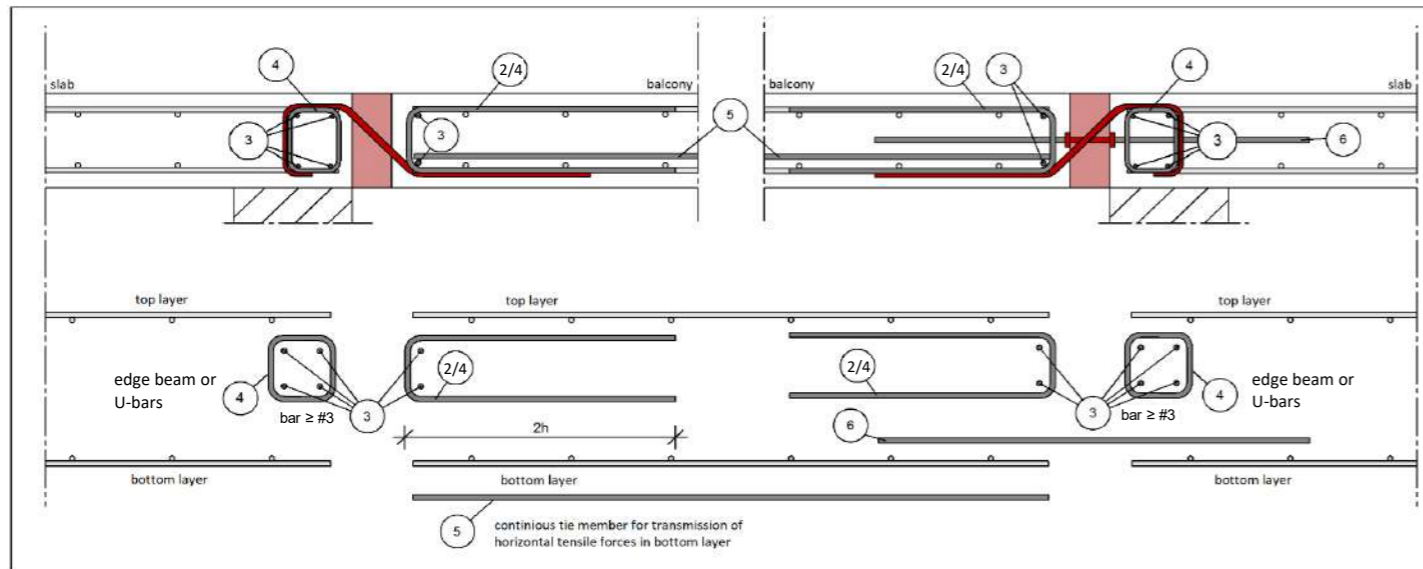
The information on the minimum required connection reinforcement of the Egccobox of the slab-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_-K±. VM Z_ / VM Z_-K, VM Z_± / VM Z_-K± is similar.

additional information design proposal EgcoBox® VM Z_ / VM Z_-K



direct support

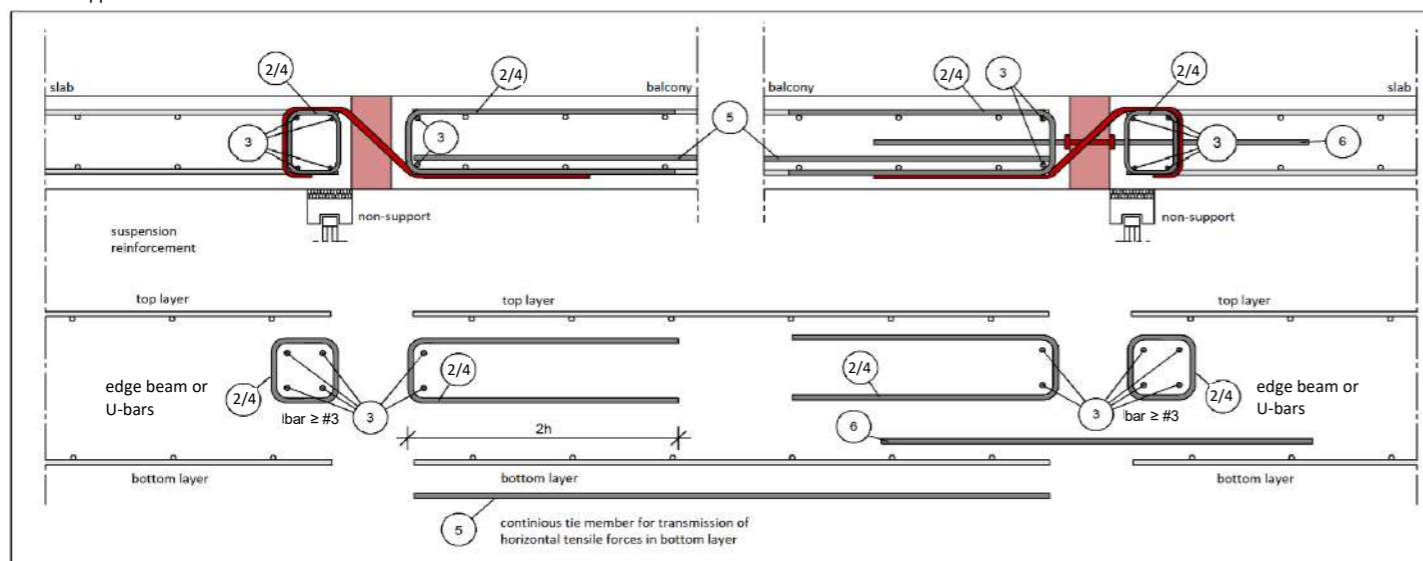


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_g as the bars of the EgcoBox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the EgcoBox VM_ or VM_-K.

indirect support



Design table Egccobox® type MM± - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per ft

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 3 1/8"

Egccobox type							MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [ft in]							3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
concrete cover [mm]			concrete cover [in]				ϕM _n [kip-ft/ft]															
C38	C51	C64	1 1/2"	2"	2 1/2"																	
height of connection [mm / in]	171	197	222	6 3/4"	7 3/4"	8 3/4"	±3.18	±3.98	±4.77	±5.57	±6.36	±7.16	±7.95	±8.20	±9.37	±10.54	±11.71	±14.05	±16.39	±18.73	±22.38	
	178	203	229	7"	8"	9"	±3.42	±4.28	±5.14	±5.99	±6.85	±7.70	±8.56	±8.84	±10.10	±11.36	±12.62	±15.15	±17.67	±20.20	±24.17	
	184	210	235	7 1/4"	8 1/4"	9 1/4"	±3.67	±4.58	±5.50	±6.42	±7.33	±8.25	±9.17	±9.48	±10.83	±12.18	±13.54	±16.25	±18.95	±21.66	±25.97	
	191	216	241	7 1/2"	8 1/2"	9 1/2"	±3.91	±4.89	±5.86	±6.84	±7.82	±8.80	±9.77	±10.12	±11.56	±13.01	±14.45	±17.34	±20.23	±23.12	±27.76	
	197	222	248	7 3/4"	8 3/4"	9 3/4"	±4.15	±5.19	±6.23	±7.27	±8.30	±9.34	±10.38	±10.76	±12.29	±13.83	±15.37	±18.44	±21.52	±24.59	±29.55	
	203	229	254	8"	9"	10"	±4.39	±5.49	±6.59	±7.69	±8.79	±9.89	±10.99	±11.40	±13.03	±14.65	±16.28	±19.54	±22.80	±26.05	±31.34	
	210	235	260	8 1/4"	9 1/4"	10 1/4"	±4.64	±5.80	±6.96	±8.11	±9.27	±10.43	±11.59	±12.04	±13.76	±15.48	±17.20	±20.64	±24.08	±27.52	±33.14	
	216	241	267	8 1/2"	9 1/2"	10 1/2"	±4.88	±6.10	±7.32	±8.54	±9.76	±10.98	±12.20	±12.68	±14.49	±16.30	±18.11	±21.74	±25.36	±28.98	±34.93	
	222	248	273	8 3/4"	9 3/4"	10 3/4"	±5.12	±6.40	±7.68	±8.96	±10.24	±11.52	±12.81	±13.32	±15.22	±17.13	±19.03	±22.83	±26.64	±30.44	±36.72	
	229	254	279	9"	10"	11"	±5.36	±6.71	±8.05	±9.39	±10.73	±12.07	±13.41	±13.96	±15.95	±17.95	±19.94	±23.93	±27.92	±31.91	±38.52	
	235	260	286	9 1/4"	10 1/4"	11 1/4"	±5.61	±7.01	±8.41	±9.81	±11.21	±12.62	±14.02	±14.60	±16.69	±18.77	±20.86	±25.03	±29.20	±33.37	±40.31	
	241	267	292	9 1/2"	10 1/2"	11 1/2"	±5.85	±7.31	±8.78	±10.24	±11.70	±13.16	±14.63	±15.24	±17.42	±19.60	±21.77	±26.13	±30.48	±34.84	±42.10	
	248	273	298	9 3/4"	10 3/4"	11 3/4"	±6.09	±7.62	±9.14	±10.66	±12.19	±13.71	±15.23	±15.88	±18.15	±20.42	±22.69	±27.23	±31.76	±36.30	±43.90	
	254	279	305	10"	11"	12"	±6.34	±7.92	±9.50	±11.09	±12.67	±14.25	±15.84	±16.52	±18.88	±21.24	±23.60	±28.32	±33.04	±37.76	±45.69	
	260	286		10 1/4"	11 1/4"		±6.58	±8.22	±9.87	±11.51	±13.16	±14.80	±16.44	±17.16	±19.61	±22.07	±24.52	±29.42	±34.33	±39.23	±47.48	
	267	292		10 1/2"	11 1/2"		±6.82	±8.53	±10.23	±11.94	±13.64	±15.35	±17.05	±17.80	±20.35	±22.89	±25.43	±30.52	±35.61	±40.69	±49.28	
	273	298		10 3/4"	11 3/4"		±7.06	±8.83	±10.59	±12.36	±14.13	±15.89	±17.66	±18.44	±21.08	±23.71	±26.35	±31.62	±36.89	±42.16	±51.07	
	279	305		11"	12"		±7.31	±9.13	±10.96	±12.79	±14.61	±16.44	±18.26	±19.08	±21.81	±24.54	±27.26	±32.72	±38.17	±43.62	±52.86	
	286			11 1/4"			±7.55	±9.44	±11.32	±13.21	±15.10	±16.98	±18.87	±19.72	±22.54	±25.36	±28.18	±33.81	±39.45	±45.09	±54.66	
	292			11 1/2"			±7.79	±9.74	±11.69	±13.63	±15.58	±17.53	±19.48	±20.37	±23.27	±26.18	±29.09	±34.91	±40.73	±46.55	±56.45	
298			11 3/4"			±8.03	±10.04	±12.05	±14.06	±16.07	±18.08	±20.08	±21.01	±24.01	±27.01	±30.01	±36.01	±42.01	±48.01	±58.24		
305			12"			±8.28	±10.35	±12.41	±14.48	±16.55	±18.62	±20.69	±21.65	±24.74	±27.83	±30.92	±37.11	±43.29	±49.48	±60.03		

Shear force level	concrete cover [mm]			concrete cover [in]			ϕV _n [kip/ft]															
	C38	C51	C63	1 1/2"	2"	2 1/2"	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	
VS	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10	±3.10
V1	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49	±5.49
V2	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23	±8.23
V3	≥171	≥197	≥222	≥6 3/4"	≥7 3/4"	≥8 3/4"	±10.98	±10.98	±10.98	±10.98	±10.98	±10.98	±10.98	±10.98	±10.98	±10.98	±10.98	-	-	-	-	-
V4	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	±12.87	±12.87	±12.87	±12.87	±12.87	±12.87	±12.87	±12.87	±12.87	-	-	-	-	-
V5	≥191	≥216	≥241	≥7 1/2"	≥8 1/2"	≥9 1/2"	-	-	-	-	±17.16	±17.16	±17.16	±17.16	±17.16	±17.16	±17.16	-	-	-	-	-

concrete cover for top and bottom reinforcement Egccobox® other heights on request



Reinforcement Egcoibox[®] type MM± - per Egcoibox[®] element

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"
tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
compression bearings [qty ø mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [ft in]	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-0"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	2'-5 1/2"	4'-0 1/16"
shear force bars VS [qty ø mm]	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1 [qty ø mm]	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2 [qty ø mm]	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3 [qty ø mm]	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4 [qty ø mm]	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5 [qty ø mm]	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [ft in]	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	44'-3 1/2"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	38'-4 5/8"	33'-1 5/8"

Rotation spring stiffness Egcoibox[®] type MM± - per ft

Egcoibox type		MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±				
length of element [ft in]		3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"	1'-7 1/16"				
concrete cover [mm]		concrete cover [in]		Rotation spring stiffness [kip-ft/rad/ft]																
C38	C51	C64	1 1/2"	2"	2 1/2"															
171	197	222	6 3/4"	7 3/4"	8 3/4"	141	176	211	246	281	316	351	337	386	434	482	578	675	771	874
178	203	229	7"	8"	9"	163	203	244	285	325	366	407	392	448	504	560	672	784	896	1,019
184	210	235	7 1/4"	8 1/4"	9 1/4"	187	233	280	326	373	420	466	451	515	580	644	773	902	1,030	1,175
191	216	241	7 1/2"	8 1/2"	9 1/2"	212	265	318	371	424	477	530	514	587	660	734	880	1,027	1,174	1,343
197	222	248	7 3/4"	8 3/4"	9 3/4"	239	299	359	418	478	538	598	581	663	746	829	995	1,161	1,327	1,522
203	229	254	8"	9"	10"	268	335	402	469	536	603	669	652	745	838	931	1,117	1,303	1,489	1,712
210	235	260	8 1/4"	9 1/4"	10 1/4"	298	373	447	522	596	671	745	727	831	934	1,038	1,246	1,454	1,661	1,913
216	241	267	8 1/2"	9 1/2"	10 1/2"	330	413	495	578	660	743	825	806	921	1,036	1,151	1,382	1,612	1,842	2,125
222	248	273	8 3/4"	9 3/4"	10 3/4"	364	455	546	636	727	818	909	889	1,016	1,143	1,271	1,525	1,779	2,033	2,348
229	254	279	9"	10"	11"	399	499	598	698	798	898	997	977	1,116	1,256	1,395	1,675	1,954	2,233	2,583
235	260	286	9 1/4"	10 1/4"	11 1/4"	436	545	654	763	871	980	1,089	1,068	1,221	1,374	1,526	1,832	2,137	2,442	2,829
241	267	292	9 1/2"	10 1/2"	11 1/2"	474	593	711	830	948	1,067	1,186	1,164	1,330	1,497	1,663	1,996	2,328	2,661	3,086
248	273	298	9 3/4"	10 3/4"	11 3/4"	514	643	771	900	1,029	1,157	1,286	1,264	1,444	1,625	1,805	2,167	2,528	2,889	3,354
254	279	305	10"	11"	12"	556	695	834	973	1,112	1,251	1,390	1,368	1,563	1,758	1,954	2,345	2,735	3,126	3,633
260	286		10 1/4"	11 1/4"		599	749	899	1,049	1,199	1,349	1,499	1,476	1,686	1,897	2,108	2,530	2,951	3,373	3,923
267	292		10 1/2"	11 1/2"		644	805	967	1,128	1,289	1,450	1,611	1,588	1,815	2,041	2,268	2,722	3,175	3,629	4,225
273	298		10 3/4"	11 3/4"		691	864	1,036	1,209	1,382	1,555	1,727	1,704	1,947	2,191	2,434	2,921	3,408	3,895	4,537
279	305		11"	12"		739	924	1,109	1,294	1,478	1,663	1,848	1,824	2,085	2,345	2,606	3,127	3,648	4,169	4,861
286			11 1/4"			789	986	1,184	1,381	1,578	1,775	1,973	1,948	2,227	2,505	2,784	3,340	3,897	4,454	5,196
292			11 1/2"			841	1,051	1,261	1,471	1,681	1,891	2,101	2,077	2,374	2,670	2,967	3,561	4,154	4,747	5,543
298			11 3/4"			894	1,117	1,341	1,564	1,787	2,011	2,234	2,210	2,525	2,841	3,156	3,788	4,419	5,050	5,900
305			12"			948	1,186	1,423	1,660	1,897	2,134	2,371	2,346	2,681	3,017	3,352	4,022	4,692	5,363	6,268

Calculation of rotation in the area of the insulation joint [in] = $M_{available} [kip-ft/ft] \times 1 / \text{rotation spring stiffness} [kip-ft/rad/ft] \times \text{cantilever length } l_{cb} [ft]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 5,000 psi / 34.5 MPa (Imperial); - per ft

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"	1'-7 11/16"
Egcoibox® tensile bars [qty ø mm]	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l _p [ft in]	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	1'-9 15/16"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	2'-3 3/8"	3'-10 3/16"
item ① - lapping reinforcement / ft - option 1															
≥ a _s [in²]	0.45	0.28	0.34	0.40	0.45	0.51	0.57	0.58	0.66	0.74	0.82	0.49	0.58	1.32	1.33
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / ft - option 2															
≥ a _s [in²]	0.57	0.35	0.42	0.49	0.57	0.64	0.71	0.69	0.79	0.89	0.99	0.59	0.69	1.58	1.33
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / ft															
shear force level VS ≥ a _s [in²]	0.09	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.09	0.09
shear force level V1 ≥ a _s [in²]	0.17	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.17	0.17
shear force level V2 ≥ a _s [in²]	0.25	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.25	0.25
shear force level V3 ≥ a _s [in²]	0.34	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	-	-	-	-
shear force level V4 ≥ a _s [in²]	-	-	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20	-	-	-	-
shear force level V5 ≥ a _s [in²]	-	-	-	-	0.26	0.26	0.26	0.26	0.26	0.26	0.26	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φVa / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ #3) must generally be planned.
 On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.
 In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

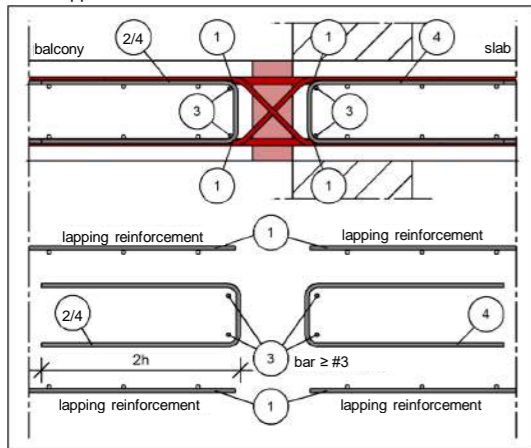
The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.
 Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.
 In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_n / φM_n.
 The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_n / f_{yd}.

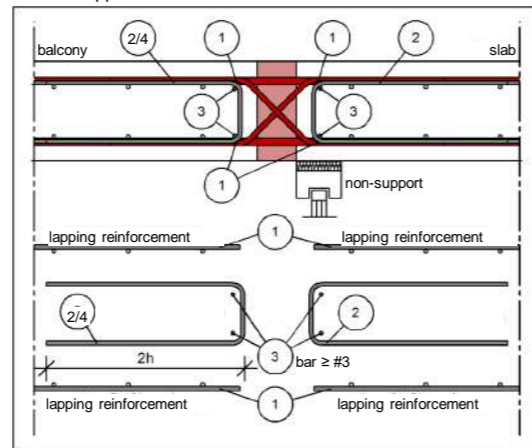
The specifications apply to good bonding conditions.

design proposal

direct support



indirect support



Egcobox[®] M

design SI

values in kN / kNm

per Egcobox[®] element (unit)

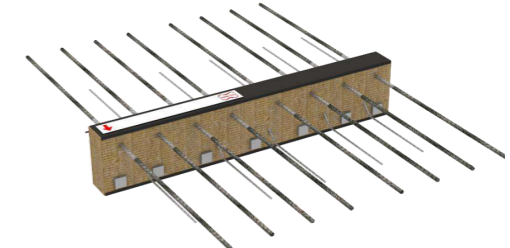
Concrete quality

- 2,900 psi / 20.0 MPa
- 3,630 psi / 25.0 MPa
- 4,000 psi / 27.6 MPa
- 4,350 psi / 30.0 MPa
- 5,000 psi / 34.5 MPa

Design table Egcoibox® type MM - concrete strength ≥ 2,900 psi / 20.0 MPa (SI)

for cantilever slabs for transmission of moment and shear force, insulation 80 mm

Egcoibox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500			
concrete cover top [mm]			ϕM_n [kNm/element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	-6.5	-11.4	-14.2	-17.0	-17.0	-19.9	-22.7	-25.6	-28.4	-31.2	-34.1	-36.9	-39.7	-19.9		
	170	185	200	-6.9	-12.0	-15.0	-18.0	-18.0	-21.1	-24.1	-27.1	-30.1	-33.1	-36.1	-39.1	-42.1	-21.1		
	175	190	205	-7.3	-12.7	-15.9	-19.1	-19.1	-22.2	-25.4	-28.6	-31.8	-34.9	-38.1	-41.3	-44.5	-22.2		
	180	195	210	-7.7	-13.4	-16.7	-20.1	-20.1	-23.4	-26.8	-30.1	-33.5	-36.8	-40.2	-43.5	-46.8	-23.4		
	185	200	215	-8.0	-14.1	-17.6	-21.1	-21.1	-24.6	-28.1	-31.6	-35.2	-38.7	-42.2	-45.7	-49.2	-24.6		
	190	205	220	-8.4	-14.7	-18.4	-22.1	-22.1	-25.8	-29.5	-33.2	-36.8	-40.5	-44.2	-47.9	-51.6	-25.8		
	195	210	225	-8.8	-15.4	-19.3	-23.1	-23.1	-27.0	-30.8	-34.7	-38.5	-42.4	-46.2	-50.1	-53.9	-27.0		
	200	215	230	-9.2	-16.1	-20.1	-24.1	-24.1	-28.2	-32.2	-36.2	-40.2	-44.2	-48.3	-52.3	-56.3	-28.2		
	205	220	235	-9.6	-16.8	-21.0	-25.1	-25.1	-29.3	-33.5	-37.7	-41.9	-46.1	-50.3	-54.5	-58.7	-29.3		
	210	225	240	-9.9	-17.4	-21.8	-26.2	-26.2	-30.5	-34.9	-39.2	-43.6	-48.0	-52.3	-56.7	-61.0	-30.5		
	215	230	245	-10.3	-18.1	-22.6	-27.2	-27.2	-31.7	-36.2	-40.8	-45.3	-49.8	-54.4	-58.9	-63.4	-31.7		
	220	235	250	-10.7	-18.8	-23.5	-28.2	-28.2	-32.9	-37.6	-42.3	-47.0	-51.7	-56.4	-61.1	-65.8	-32.9		
	225	240	255	-11.1	-19.5	-24.3	-29.2	-29.2	-34.1	-38.9	-43.8	-48.7	-53.5	-58.4	-63.3	-68.1	-34.1		
	230	245	260	-11.5	-20.1	-25.2	-30.2	-30.2	-35.3	-40.3	-45.3	-50.4	-55.4	-60.4	-65.5	-70.5	-35.3		
	235	250	265	-11.8	-20.8	-26.0	-31.2	-31.2	-36.4	-41.6	-46.8	-52.1	-57.3	-62.5	-67.7	-72.9	-36.4		
	240	255	270	-12.2	-21.5	-26.9	-32.2	-32.2	-37.6	-43.0	-48.4	-53.7	-59.1	-64.5	-69.9	-75.2	-37.6		
	245	260	275	-12.6	-22.2	-27.7	-33.3	-33.3	-38.8	-44.3	-49.9	-55.4	-61.0	-66.5	-72.1	-77.6	-38.8		
	250	265	280	-13.0	-22.8	-28.6	-34.3	-34.3	-40.0	-45.7	-51.4	-57.1	-62.8	-68.5	-74.3	-80.0	-40.0		
	255	270	285	-13.4	-23.5	-29.4	-35.3	-35.3	-41.2	-47.0	-52.9	-58.8	-64.7	-70.6	-76.5	-82.3	-41.2		
	260	275	290	-13.7	-24.2	-30.3	-36.3	-36.3	-42.4	-48.4	-54.5	-60.5	-66.6	-72.6	-78.7	-84.7	-42.4		
	265	280	295	-14.1	-24.9	-31.1	-37.3	-37.3	-43.5	-49.8	-56.0	-62.2	-68.4	-74.6	-80.8	-87.1	-43.5		
	270	285	300	-14.5	-25.6	-31.9	-38.3	-38.3	-44.7	-51.1	-57.5	-63.9	-70.3	-76.7	-83.0	-89.4	-44.7		
	275	290		-14.9	-26.2	-32.8	-39.3	-39.3	-45.9	-52.5	-59.0	-65.6	-72.1	-78.7	-85.2	-91.8	-45.9		
	280	295		-15.3	-26.9	-33.6	-40.4	-40.4	-47.1	-53.8	-60.5	-67.3	-74.0	-80.7	-87.4	-94.2	-47.1		
	285	300		-15.6	-27.6	-34.5	-41.4	-41.4	-48.3	-55.2	-62.1	-69.0	-75.8	-82.7	-89.6	-96.5	-48.3		
	290			-16.0	-28.3	-35.3	-42.4	-42.4	-49.4	-56.5	-63.6	-70.6	-77.7	-84.8	-91.8	-98.9	-49.4		
	295			-16.4	-28.9	-36.2	-43.4	-43.4	-50.6	-57.9	-65.1	-72.3	-79.6	-86.8	-94.0	-101.3	-50.6		
	300			-16.8	-29.6	-37.0	-44.4	-44.4	-51.8	-59.2	-66.6	-74.0	-81.4	-88.8	-96.2	-103.6	-51.8		



Shear force level		concrete cover top [mm]			ϕV_n [kN/element]													
		C40	C55	C70														
height of connection [mm]	VS	≥165	≥180	≥195	13.2	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	26.4	
	V1	≥165	≥180	≥195	23.5	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9	46.9	
	V2	≥165	≥180	≥195	35.2	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	70.4	
	V3	≥165	≥180	≥195	46.9	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	93.8	
	V4	≥185	≥200	≥215	-	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	147.0	
	V6±	≥165	≥180	≥195	+13.2 / -13.2	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+26.4 / -26.4	+13.2 / -13.2	
	V7±	≥165	≥180	≥195	+26.4 / -19.8	+52.8 / -39.6	+52.8 / -39.6	+52.8 / -39.6	+52.8 / -39.6	+52.8 / -39.6	+52.8 / -39.6	+52.8 / -39.6	+70.4 / -46.9	+70.4 / -46.9	+70.4 / -46.9	+70.4 / -46.9	+35.2 / -23.5	
	V8±	≥185	≥200	≥215	+55.1 / -55.1	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+110.2 / -110.2	+55.1 / -55.1	

Shear force level VS to V4 also possible with lifting shear force (-13.2 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥180 mm (C40), ≥195 mm (C55), ≥210 mm (C70)

The Egcoibox® is also available as semi-prefab version in variant "FO" (height ≥190 mm) or "F" (height ≥165 mm); e.g. MM50-FO-V1-C40-h200

Reinforcement Egccobox® type MM

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
tensile bars	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars from insulation [mm]	505	610	610	610	610	610	610	610	610	610	610	610	610	610
compression bearings	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS±	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1±	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2±	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3±	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4±	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6±	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7±	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	3 ø 8 / 2 ø 8
shear force bars V8±	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 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	11.7	11.7

Rotation spring stiffness Egccobox® type MM

Egccobox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500			
concrete cover top [mm]			Rotation spring stiffness [kNm/rad/Element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	765	1,057	1,269	1,464	1,535	1,735	2,003	2,271	2,537	2,804	3,069	3,335	3,600	1,800		
	170	185	200	856	1,187	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,446	3,744	4,041	2,021		
	175	190	205	953	1,324	1,589	1,834	1,922	2,172	2,509	2,844	3,178	3,511	3,844	4,176	4,508	2,254		
	180	195	210	1,055	1,468	1,762	2,034	2,132	2,410	2,783	3,154	3,525	3,894	4,263	4,632	5,001	2,500		
	185	200	215	1,162	1,620	1,945	2,245	2,352	2,659	3,071	3,481	3,890	4,297	4,705	5,112	5,518	2,759		
	190	205	220	1,274	1,780	2,136	2,466	2,584	2,921	3,373	3,824	4,273	4,721	5,168	5,615	6,062	3,031		
	195	210	225	1,391	1,947	2,337	2,697	2,827	3,195	3,690	4,182	4,673	5,164	5,653	6,142	6,631	3,315		
	200	215	230	1,514	2,121	2,546	2,939	3,080	3,482	4,021	4,557	5,092	5,627	6,160	6,693	7,225	3,613		
	205	220	235	1,642	2,303	2,765	3,191	3,344	3,780	4,366	4,948	5,529	6,109	6,688	7,267	7,845	3,923		
	210	225	240	1,775	2,493	2,992	3,453	3,619	4,091	4,725	5,355	5,984	6,612	7,239	7,865	8,490	4,245		
	215	230	245	1,913	2,690	3,229	3,726	3,905	4,415	5,098	5,779	6,457	7,134	7,811	8,486	9,161	4,581		
	220	235	250	2,056	2,894	3,474	4,009	4,202	4,750	5,486	6,218	6,948	7,677	8,404	9,131	9,858	4,929		
	225	240	255	2,204	3,106	3,728	4,303	4,510	5,098	5,887	6,673	7,457	8,239	9,020	9,800	10,580	5,290		
	230	245	260	2,358	3,326	3,992	4,607	4,829	5,458	6,303	7,145	7,984	8,821	9,657	10,493	11,327	5,664		
	235	250	265	2,516	3,553	4,264	4,921	5,158	5,831	6,734	7,632	8,529	9,423	10,316	11,209	12,100	6,050		
	240	255	270	2,680	3,787	4,546	5,246	5,498	6,216	7,178	8,136	9,091	10,045	10,997	11,948	12,899	6,449		
	245	260	275	2,849	4,029	4,836	5,581	5,850	6,613	7,636	8,656	9,672	10,686	11,699	12,711	13,723	6,861		
	250	265	280	3,024	4,278	5,135	5,927	6,212	7,022	8,109	9,192	10,271	11,348	12,424	13,498	14,572	7,286		
	255	270	285	3,203	4,535	5,444	6,283	6,585	7,444	8,596	9,743	10,888	12,029	13,170	14,309	15,447	7,724		
	260	275	290	3,388	4,800	5,761	6,649	6,969	7,878	9,097	10,311	11,522	12,731	13,938	15,143	16,348	8,174		
	265	280	295	3,577	5,072	6,087	7,026	7,364	8,324	9,613	10,896	12,175	13,452	14,727	16,001	17,274	8,637		
	270	285	300	3,772	5,351	6,423	7,413	7,769	8,782	10,142	11,496	12,846	14,193	15,538	16,882	18,225	9,113		
	275	290		3,972	5,638	6,767	7,810	8,186	9,253	10,686	12,112	13,534	14,954	16,371	17,787	19,202	9,601		
	280	295		4,178	5,932	7,120	8,218	8,613	9,736	11,244	12,744	14,241	15,734	17,226	18,716	20,205	10,102		
	285	300		4,388	6,234	7,483	8,636	9,051	10,232	11,816	13,393	14,966	16,535	18,103	19,668	21,233	10,617		
	290			4,604	6,543	7,854	9,065	9,500	10,740	12,402	14,057	15,708	17,356	19,001	20,644	22,287	11,143		
	295			4,824	6,860	8,234	9,503	9,960	11,260	13,003	14,738	16,469	18,196	19,921	21,644	23,366	11,683		
	300			5,050	7,184	8,624	9,953	10,431	11,792	13,617	15,435	17,247	19,056	20,863	22,667	24,470	12,235		

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / \text{rotation spring stiffness [kNm/rad/Egccobox® element]} \times 1,000 \times \text{cantilever length } l_b [m]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 2,900$ psi / 20.0 MPa (SI)

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
Egccobox® tensile bars	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [mm]	470	558	558	558	558	558	558	558	558	558	558	558	558	558
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [mm ²]	239	479	598	718	718	838	958	1077	1197	1317	1436	1556	1676	838
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [mm ²]	319	598	748	898	898	1047	1197	1347	1496	1646	1795	1945	2095	1047
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [mm ²] B500	29	59	59	59	59	59	59	59	59	59	59	59	59	59
shear force level V1 $\geq a_g$ [mm ²] B500	52	104	104	104	104	104	104	104	104	104	104	104	104	104
shear force level V2 $\geq a_g$ [mm ²] B500	78	156	156	156	156	156	156	156	156	156	156	156	156	163
shear force level V3 $\geq a_g$ [mm ²] B500	104	208	208	208	208	208	208	208	208	208	208	208	208	-
shear force level V4 $\geq a_g$ [mm ²] B500	-	327	327	327	327	327	327	327	327	327	327	327	327	204
shear force level VS± $\geq a_g$ [mm ²] B500	-	59	59	59	59	59	59	59	59	59	59	59	59	59
shear force level V1± $\geq a_g$ [mm ²] B500	-	104	104	104	104	104	104	104	104	104	104	104	104	104
shear force level V2± $\geq a_g$ [mm ²] B500	-	156	156	156	156	156	156	156	156	156	156	156	156	163
shear force level V3± $\geq a_g$ [mm ²] B500	-	208	208	208	208	208	208	208	208	208	208	208	208	-
shear force level V4± $\geq a_g$ [mm ²] B500	-	327	327	327	327	327	327	327	327	327	327	327	327	204
shear force level V6± $\geq a_g$ [mm ²] B500	29	58	58	58	58	58	58	58	58	58	58	58	58	29
shear force level V7± $\geq a_g$ [mm ²] B500	58	116	116	116	116	116	116	156	156	156	156	156	156	78
shear force level V8± $\geq a_g$ [mm ²] B500	122	244	244	244	244	244	244	244	244	244	244	244	244	122

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_s / \phi M_n$.

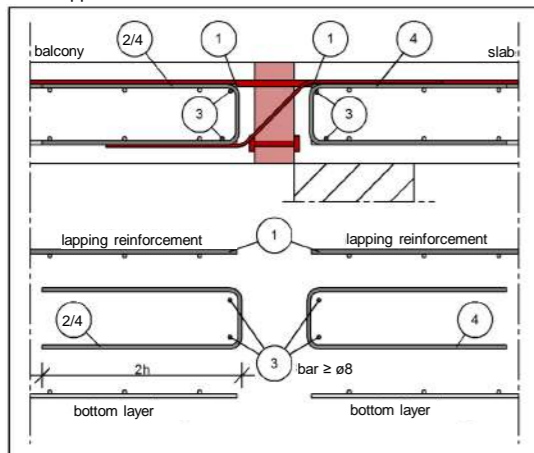
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_a / f_{yd}$.

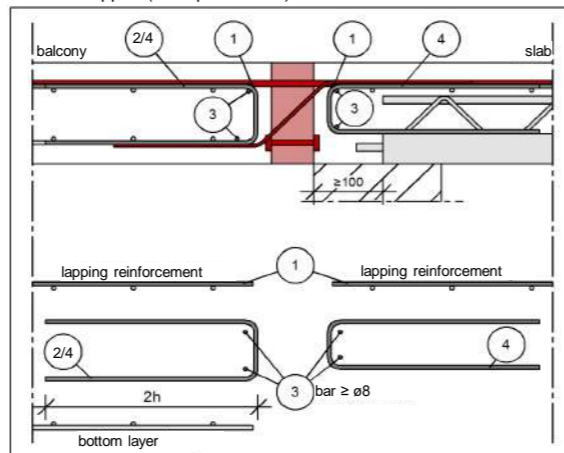
The specifications apply to good bonding conditions.

design proposal

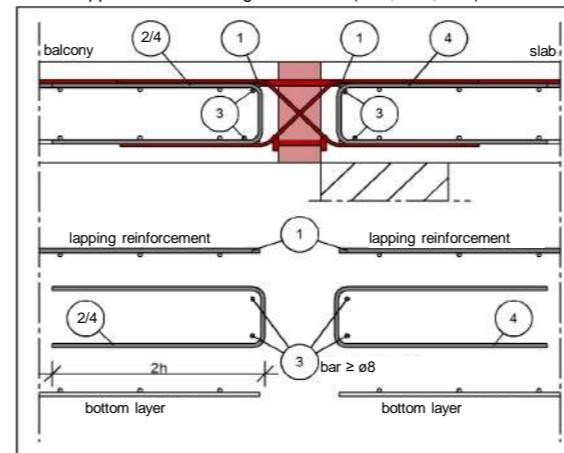
direct support



direct support (semi-prefab slab)



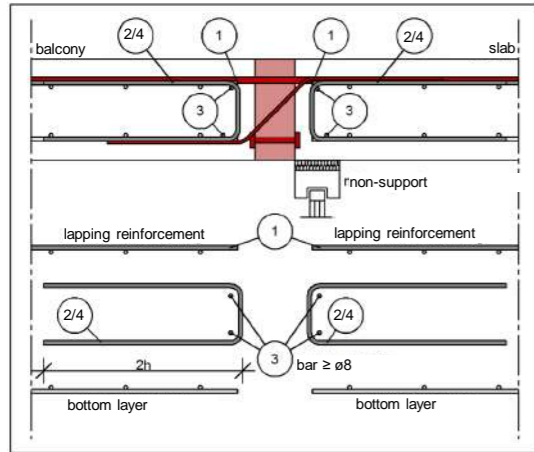
direct support with alternating shear force (V6±, V7±, V8±)



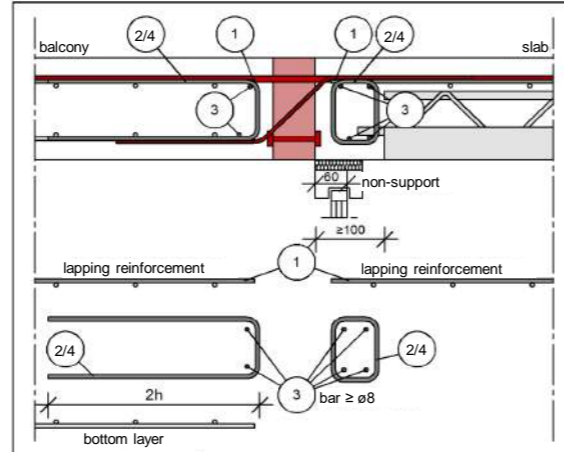
For the Egccobox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



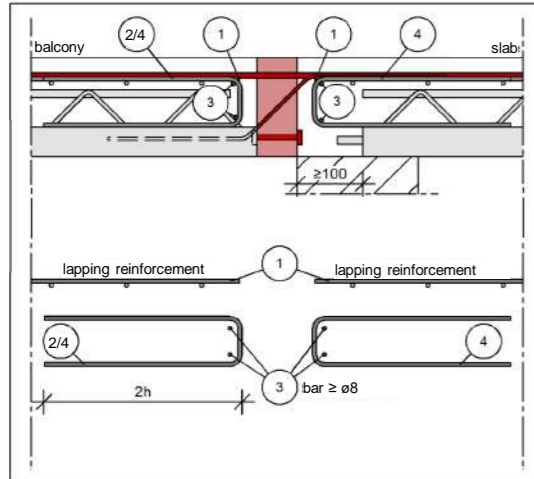
indirect support (semi-prefab slab)



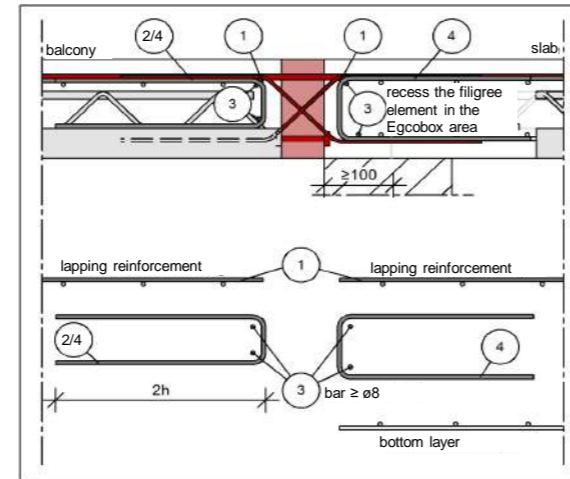
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

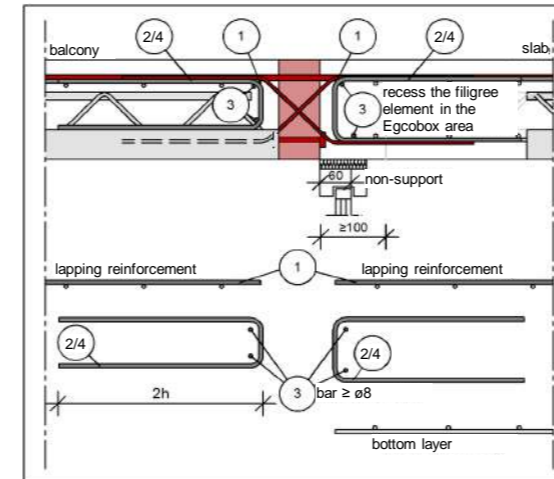
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_{\pm} in semi-prefab balcony



indirect support: Egccobox with V_{\pm} in semi-prefab balcony



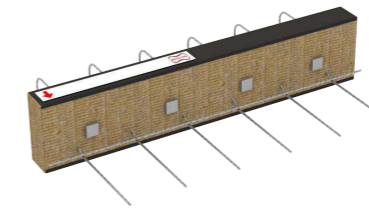
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels $V_{S\pm}$ to $V_{4\pm}$, a constructive edging on the balcony side is generally sufficient.

Design table Egcobox® type VM - concrete strength $\geq 2,900$ psi / 20.0 MPa (SI)

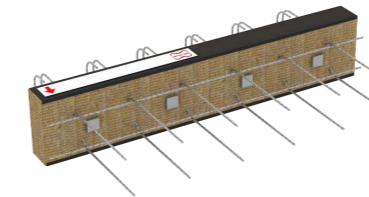
for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399		
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000		
concrete cover top [mm]			ϕV_n [kN/element]									
C40	C55	C70										
height of connection [mm]												
165-300	180-300	195-300	26.4	33.0	46.9	58.6	70.4	93.8	117.3	140.7	-	-
185-300	200-300	215-300	26.4	33.0	46.9	58.6	70.4	93.8	117.3	140.7	183.7	220.5

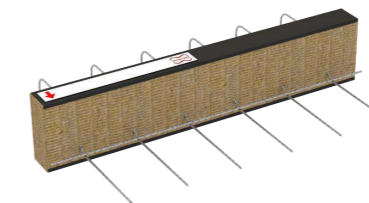
Reinforcement											
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10	
minimum wall / beam width [mm]	180	180	200	200	200	200	200	200	220	220	
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12	
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcobox® type VM-K - concrete strength $\geq 2,900$ psi / 20.0 MPa (SI)

for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K		
length of element [mm]	200	250	250	300	400	400	500	500		
concrete cover top [mm]			ϕV_n [kN/element]							
C40	C55	C70								
height of connection [mm]										
165-300	180-300	195-300	13.2	23.5	35.2	46.9	58.6	-	82.1	-
185-300	200-300	215-300	13.2	23.5	35.2	46.9	58.6	73.5	82.1	110.2

Reinforcement									
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10	
minimum wall / beam width [mm]	180	200	200	200	200	220	200	220	
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12	
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	

All Egcobox types can also be produced in the following variants:

- VM_± / VM-K_± - Egcobox® to transfer positive and negative shear forces (shear bars \pm)
- VM Z₋ / VM Z₋-K - Egcobox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM / VM-K
- VM Z_± / VM Z_±-K_± - Egcobox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars \pm); in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM_± / VM-K_±

Egcobox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egcoibox® type VM / VM-K - concrete strength $\geq 2,900$ psi / 20.0 MPa (SI)

Egcoibox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [mm ²]	59	73	104	130	156	208	261	313	408	490
x = shear force bar embedment depth (slab) [mm]	155	155	175	175	175	175	175	175	195	195

Egcoibox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]	200	250	250	300	400	400	500	500
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [mm ²]	29	52	78	104	130	163	182	245
x = shear force bar embedment depth (slab) [mm]	155	175	175	175	175	195	175	195

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

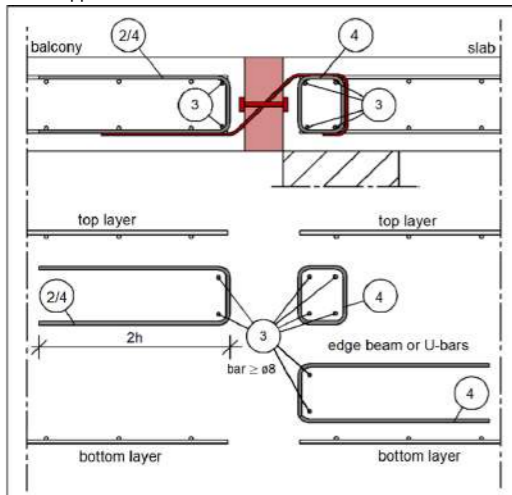
In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

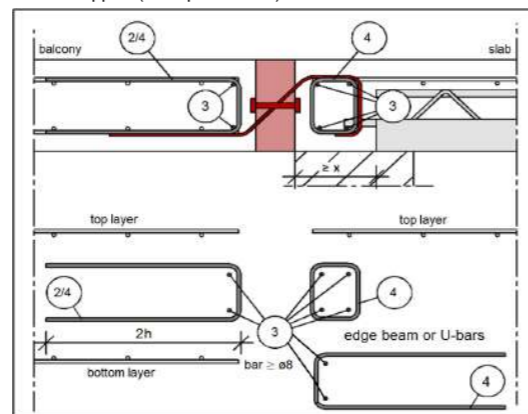
The specifications apply to good bonding conditions.

design proposal

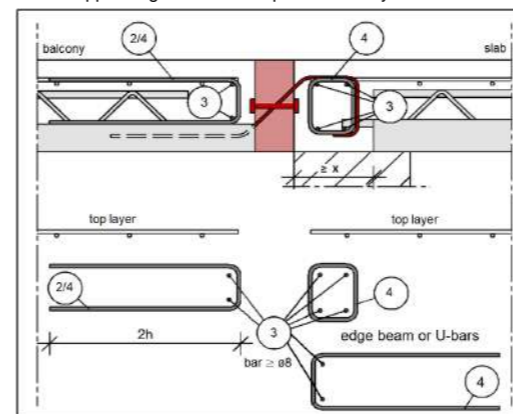
direct support



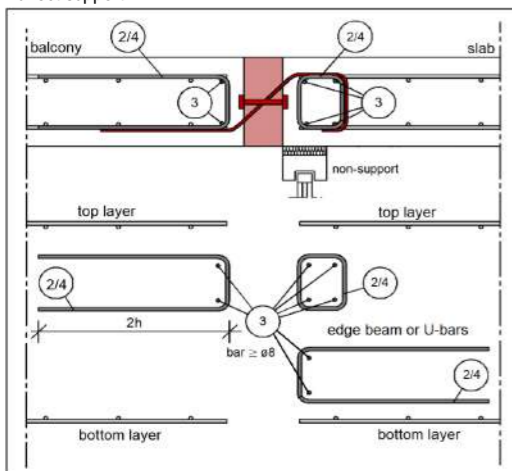
direct support (semi-prefab slab)



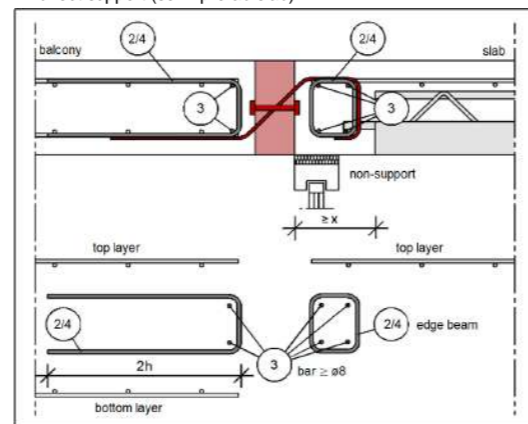
direct support: Egcoibox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egcoibox in semi-prefab balcony:

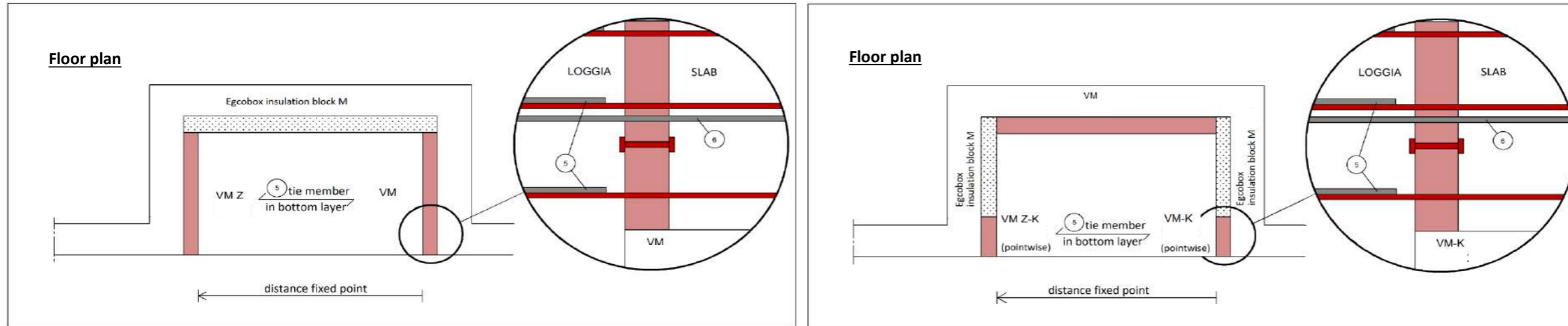
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

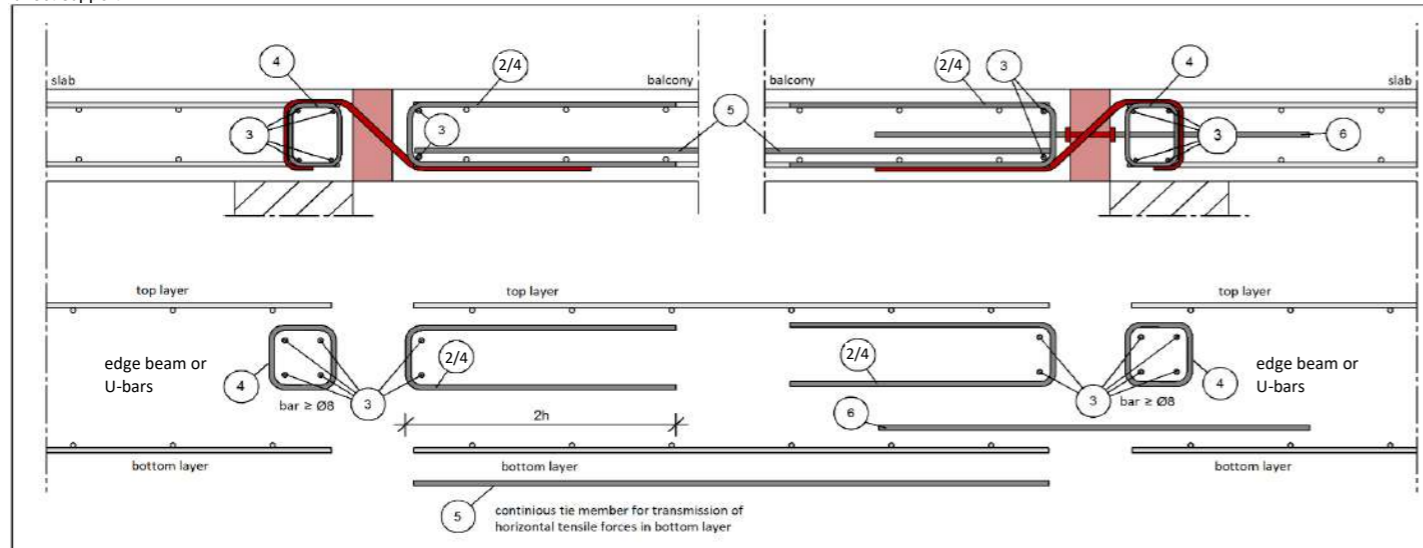
The information on the minimum required connection reinforcement of the Egcoibox of the ceiling-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egcoibox® VM_± / VM_{-K±}. VM_Z / VM_{-K}, VM_{Z±} / VM_{-K±} is similar.

additional information design proposal Egcoibox® VM Z_ / VM Z_-K



direct support

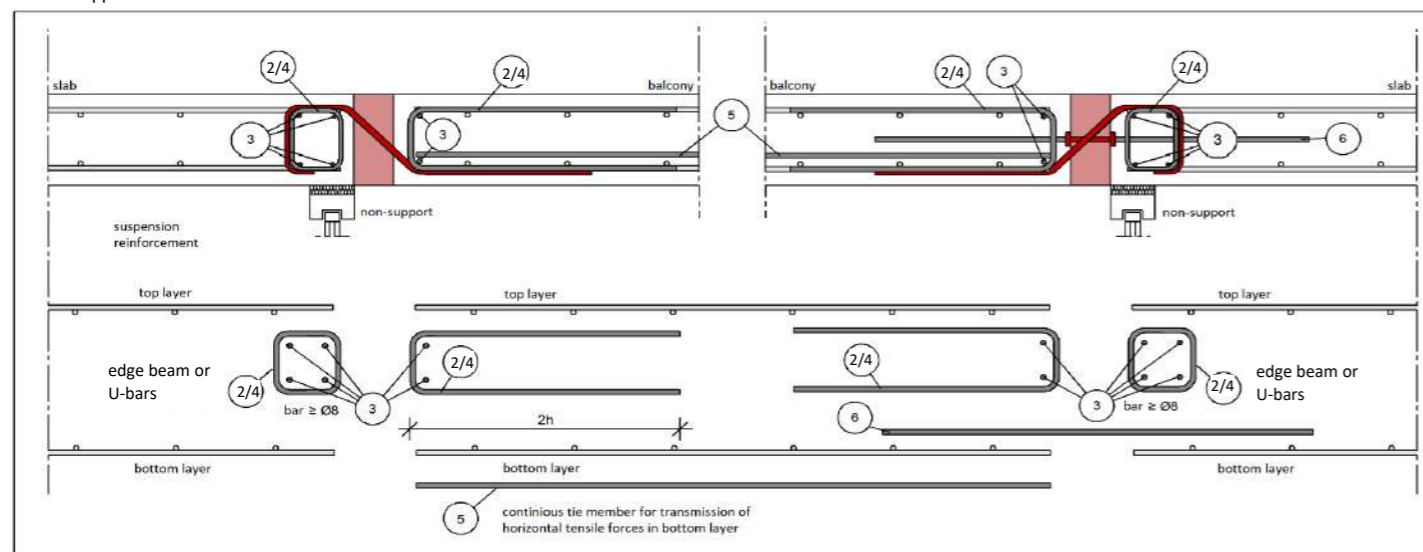


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_y as the bars of the Egcoibox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the Egcoibox VM_ or VM_-K.

indirect support



Design table Egcoibox® type MM± - concrete strength ≥ 2,900 psi / 20.0 MPa (SI)

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 80 mm

Egcoibox type			MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±			
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500			
concrete cover [mm]			ϕM_n [kNm/element]																	
			C40	C55	C70															
height of connection [mm]	175	205	235	±11.2	±14.0	±16.8	±19.6	±22.4	±25.2	±28.1	±28.1	±32.1	±36.1	±40.1	±24.1	±28.1	±32.1	±49.6		
	180	210	240	±11.9	±14.9	±17.8	±20.8	±23.8	±26.8	±29.7	±29.8	±34.1	±38.3	±42.6	±25.6	±29.8	±34.1	±52.8		
	185	215	245	±12.6	±15.7	±18.9	±22.0	±25.1	±28.3	±31.4	±31.6	±36.1	±40.6	±45.1	±27.0	±31.6	±36.1	±55.9		
	190	220	250	±13.2	±16.6	±19.9	±23.2	±26.5	±29.8	±33.1	±33.3	±38.0	±42.8	±47.6	±28.5	±33.3	±38.0	±59.0		
	195	225	255	±13.9	±17.4	±20.9	±24.4	±27.9	±31.3	±34.8	±35.0	±40.0	±45.0	±50.0	±30.0	±35.0	±40.0	±62.2		
	200	230	260	±14.6	±18.3	±21.9	±25.6	±29.2	±32.9	±36.5	±36.8	±42.0	±47.3	±52.5	±31.5	±36.8	±42.0	±65.3		
	205	235	265	±15.3	±19.1	±22.9	±26.7	±30.6	±34.4	±38.2	±38.5	±44.0	±49.5	±55.0	±33.0	±38.5	±44.0	±68.5		
	210	240	270	±16.0	±19.9	±23.9	±27.9	±31.9	±35.9	±39.9	±40.2	±46.0	±51.7	±57.5	±34.5	±40.2	±46.0	±71.6		
	215	245	275	±16.6	±20.8	±24.9	±29.1	±33.3	±37.4	±41.6	±42.0	±48.0	±53.9	±59.9	±36.0	±42.0	±48.0	±74.7		
	220	250	280	±17.3	±21.6	±26.0	±30.3	±34.6	±38.9	±43.3	±43.7	±49.9	±56.2	±62.4	±37.5	±43.7	±49.9	±77.9		
	225	255	285	±18.0	±22.5	±27.0	±31.5	±36.0	±40.5	±45.0	±45.4	±51.9	±58.4	±64.9	±38.9	±45.4	±51.9	±81.0		
	230	260	290	±18.7	±23.3	±28.0	±32.7	±37.3	±42.0	±46.6	±47.2	±53.9	±60.6	±67.4	±40.4	±47.2	±53.9	±84.2		
	235	265	295	±19.3	±24.2	±29.0	±33.8	±38.7	±43.5	±48.3	±48.9	±55.9	±62.9	±69.8	±41.9	±48.9	±55.9	±87.3		
	240	270	300	±20.0	±25.0	±30.0	±35.0	±40.0	±45.0	±50.0	±50.6	±57.9	±65.1	±72.3	±43.4	±50.6	±57.9	±90.4		
	245	275		±20.7	±25.9	±31.0	±36.2	±41.4	±46.5	±51.7	±52.4	±59.8	±67.3	±74.8	±44.9	±52.4	±59.8	±93.6		
	250	280		±21.4	±26.7	±32.0	±37.4	±42.7	±48.1	±53.4	±54.1	±61.8	±69.6	±77.3	±46.4	±54.1	±61.8	±96.7		
	255	285		±22.0	±27.5	±33.1	±38.6	±44.1	±49.6	±55.1	±55.8	±63.8	±71.8	±79.8	±47.9	±55.8	±63.8	±99.9		
	260	290		±22.7	±28.4	±34.1	±39.7	±45.4	±51.1	±56.8	±57.6	±65.8	±74.0	±82.2	±49.3	±57.6	±65.8	±103.0		
	265	295		±23.4	±29.2	±35.1	±40.9	±46.8	±52.6	±58.5	±59.3	±67.8	±76.2	±84.7	±50.8	±59.3	±67.8	±106.1		
	270	300		±24.1	±30.1	±36.1	±42.1	±48.1	±54.1	±60.2	±61.0	±69.8	±78.5	±87.2	±52.3	±61.0	±69.8	±109.3		
	275			±24.7	±30.9	±37.1	±43.3	±49.5	±55.7	±61.9	±62.8	±71.7	±80.7	±89.7	±53.8	±62.8	±71.7	±112.4		
	280			±25.4	±31.8	±38.1	±44.5	±50.8	±57.2	±63.5	±64.5	±73.7	±82.9	±92.1	±55.3	±64.5	±73.7	±115.6		
	285			±26.1	±32.6	±39.1	±45.7	±52.2	±58.7	±65.2	±66.2	±75.7	±85.2	±94.6	±56.8	±66.2	±75.7	±118.7		
	290			±26.8	±33.5	±40.2	±46.8	±53.5	±60.2	±66.9	±68.0	±77.7	±87.4	±97.1	±58.3	±68.0	±77.7	±121.8		
	295			±27.4	±34.3	±41.2	±48.0	±54.9	±61.8	±68.6	±69.7	±79.7	±89.6	±99.6	±59.7	±69.7	±79.7	±125.0		
	300			±28.1	±35.2	±42.2	±49.2	±56.2	±63.3	±70.3	±71.4	±81.6	±91.8	±102.0	±61.2	±71.4	±81.6	±128.1		

Shear force level		concrete cover [mm]			ϕV_n [kN/element]														
		C40	C55	C70															
height of connection [mm]	VS	≥175	≥205	≥235	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	±34.4	
	V1	≥175	≥205	≥235	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0	±61.0
	V2	≥175	≥205	≥235	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5	±91.5
	V3	≥175	≥205	≥235	±122.0	±122.0	±122.0	±122.0	±122.0	±122.0	±122.0	±122.0	±122.0	±122.0	±122.0	-	-	-	-
	V4	≥195	≥225	≥255	-	-	±143.0	±143.0	±143.0	±143.0	±143.0	±143.0	±143.0	±143.0	±143.0	-	-	-	-
V5	≥195	≥225	≥255	-	-	-	-	±190.7	±190.7	±190.7	±190.7	±190.7	±190.7	±190.7	-	-	-	-	

concrete cover for top and bottom reinforcement Egcoibox® [mm]
other heights on request



Reinforcement Egccobox® type MM±

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars from insulation [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
compression bearings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
shear force bars VS	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [m]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	11.7	11.7	11.7	11.7	11.7	11.7	11.7	10.1

Rotation spring stiffness Egccobox® type MM±

Egccobox type			MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±	
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500	
concrete cover [mm]			Rotation spring stiffness [kNm/rad/Element]															
C40	C55	C70																
height of connection [mm]	175	205	235	618	773	928	1,082	1,237	1,391	1,546	1,484	1,696	1,908	2,120	1,272	1,484	1,696	1,921
	180	210	240	695	869	1,043	1,216	1,390	1,564	1,738	1,673	1,912	2,151	2,390	1,434	1,673	1,912	2,172
	185	215	245	776	970	1,164	1,359	1,553	1,747	1,941	1,873	2,141	2,408	2,676	1,606	1,873	2,141	2,439
	190	220	250	862	1,078	1,293	1,509	1,724	1,940	2,155	2,085	2,382	2,680	2,978	1,787	2,085	2,382	2,720
	195	225	255	952	1,190	1,428	1,666	1,905	2,143	2,381	2,307	2,637	2,967	3,296	1,978	2,307	2,637	3,017
	200	230	260	1,047	1,309	1,570	1,832	2,094	2,356	2,617	2,542	2,905	3,268	3,631	2,178	2,542	2,905	3,330
	205	235	265	1,146	1,433	1,719	2,006	2,292	2,579	2,865	2,787	3,185	3,583	3,981	2,389	2,787	3,185	3,658
	210	240	270	1,250	1,562	1,875	2,187	2,500	2,812	3,125	3,044	3,478	3,913	4,348	2,609	3,044	3,478	4,001
	215	245	275	1,358	1,697	2,037	2,376	2,716	3,055	3,395	3,312	3,785	4,258	4,731	2,839	3,312	3,785	4,360
	220	250	280	1,471	1,838	2,206	2,574	2,941	3,309	3,677	3,591	4,104	4,617	5,130	3,078	3,591	4,104	4,734
	225	255	285	1,588	1,985	2,382	2,779	3,176	3,572	3,969	3,882	4,436	4,991	5,545	3,327	3,882	4,436	5,123
	230	260	290	1,709	2,137	2,564	2,991	3,419	3,846	4,273	4,184	4,781	5,379	5,977	3,586	4,184	4,781	5,528
	235	265	295	1,835	2,294	2,753	3,212	3,671	4,130	4,589	4,497	5,139	5,782	6,424	3,855	4,497	5,139	5,948
	240	270	300	1,966	2,458	2,949	3,441	3,932	4,424	4,915	4,822	5,510	6,199	6,888	4,133	4,822	5,510	6,384
	245	275		2,101	2,626	3,152	3,677	4,202	4,728	5,253	5,157	5,894	6,631	7,368	4,421	5,157	5,894	6,835
	250	280		2,241	2,801	3,361	3,921	4,482	5,042	5,602	5,505	6,291	7,077	7,864	4,718	5,505	6,291	7,302
	255	285		2,385	2,981	3,577	4,173	4,770	5,366	5,962	5,863	6,701	7,538	8,376	5,026	5,863	6,701	7,783
	260	290		2,533	3,167	3,800	4,433	5,067	5,700	6,333	6,233	7,123	8,014	8,904	5,343	6,233	7,123	8,281
	265	295		2,686	3,358	4,030	4,701	5,373	6,044	6,716	6,614	7,559	8,504	9,449	5,669	6,614	7,559	8,793
	270	300		2,844	3,555	4,266	4,977	5,688	6,399	7,110	7,007	8,008	9,008	10,009	6,006	7,007	8,008	9,321
	275			3,006	3,757	4,509	5,260	6,012	6,763	7,515	7,410	8,469	9,528	10,586	6,352	7,410	8,469	9,865
	280			3,172	3,966	4,759	5,552	6,345	7,138	7,931	7,825	8,943	10,061	11,179	6,708	7,825	8,943	10,423
	285			3,343	4,179	5,015	5,851	6,687	7,523	8,359	8,252	9,431	10,609	11,788	7,073	8,252	9,431	10,998
	290			3,519	4,399	5,278	6,158	7,038	7,918	8,797	8,689	9,931	11,172	12,414	7,448	8,689	9,931	11,587
	295			3,699	4,624	5,548	6,473	7,398	8,323	9,247	9,138	10,444	11,749	13,055	7,833	9,138	10,444	12,192
	300			3,883	4,854	5,825	6,796	7,767	8,738	9,708	9,599	10,970	12,341	13,713	8,228	9,599	10,970	12,813

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / rotation\ spring\ stiffness [kNm/rad/Egccobox®\ element] \times 1,000 \times cantilever\ length\ l_b [m]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 2,900 psi / 20.0 MPa (SI)

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
Egcoibox® tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [mm]	558	558	558	558	558	558	558	701	701	701	701	701	701	701	1173
item ① - lapping reinforcement / element - option 1															
≥ a _s [mm²]	479	598	718	838	958	1077	1197	1222	1396	1571	1746	1047	1222	1396	1407
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [mm²]	598	748	898	1047	1197	1347	1496	1466	1676	1885	2095	1257	1466	1676	1600
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [mm²] B500	76	76	76	76	76	76	76	76	76	76	76	76	76	76	76
shear force level V1 ≥ a _s [mm²] B500	136	136	136	136	136	136	136	136	136	136	136	136	136	136	136
shear force level V2 ≥ a _s [mm²] B500	203	203	203	203	203	203	203	203	203	203	203	203	203	203	203
shear force level V3 ≥ a _s [mm²] B500	271	271	271	271	271	271	271	271	271	271	271	-	-	-	-
shear force level V4 ≥ a _s [mm²] B500	-	-	318	318	318	318	318	318	318	318	318	-	-	-	-
shear force level V5 ≥ a _s [mm²] B500	-	-	-	-	424	424	424	424	424	424	424	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φV_a / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ ø8) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_l / φM_n.

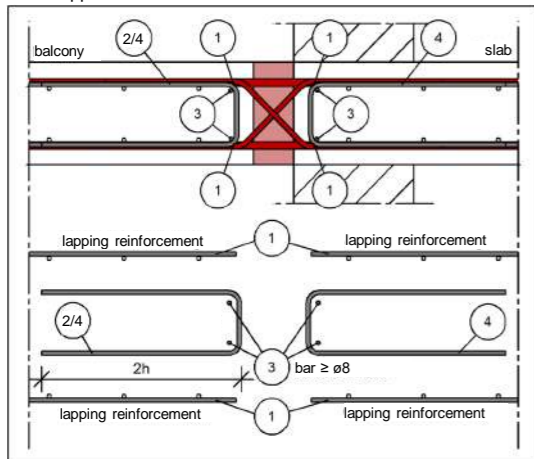
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_a / f_{yd}.

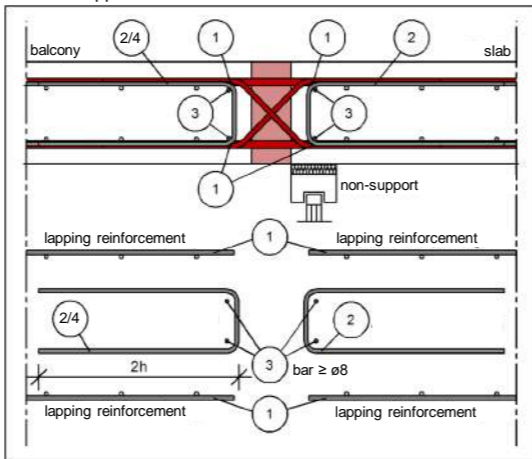
The specifications apply to good bonding conditions.

design proposal

direct support



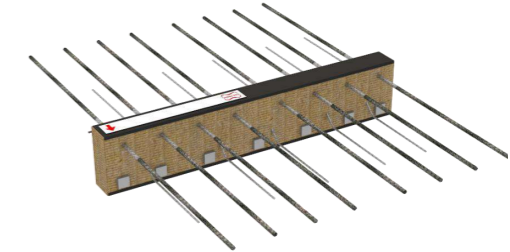
indirect support



Design table Egccobox® type MM - concrete strength ≥ 3,630 psi / 25.0 MPa (SI)

for cantilever slabs for transmission of moment and shear force, insulation 80 mm

Egccobox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500		
concrete cover top [mm]			ϕM_n [kNm/element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	-7.3	-12.7	-15.9	-19.0	-19.0	-22.2	-25.4	-28.6	-31.7	-34.9	-38.1	-41.3	-44.4	-22.2		
	170	185	200	-7.7	-13.5	-16.8	-20.2	-20.2	-23.5	-26.9	-30.3	-33.6	-37.0	-40.4	-43.7	-47.1	-23.5		
	175	190	205	-8.1	-14.2	-17.8	-21.3	-21.3	-24.9	-28.4	-32.0	-35.5	-39.1	-42.6	-46.2	-49.7	-24.9		
	180	195	210	-8.6	-15.0	-18.7	-22.4	-22.4	-26.2	-29.9	-33.7	-37.4	-41.2	-44.9	-48.6	-52.4	-26.2		
	185	200	215	-9.0	-15.7	-19.7	-23.6	-23.6	-27.5	-31.4	-35.4	-39.3	-43.2	-47.2	-51.1	-55.0	-27.5		
	190	205	220	-9.4	-16.5	-20.6	-24.7	-24.7	-28.8	-33.0	-37.1	-41.2	-45.3	-49.4	-53.5	-57.7	-28.8		
	195	210	225	-9.8	-17.2	-21.5	-25.8	-25.8	-30.2	-34.5	-38.8	-43.1	-47.4	-51.7	-56.0	-60.3	-30.2		
	200	215	230	-10.3	-18.0	-22.5	-27.0	-27.0	-31.5	-36.0	-40.5	-45.0	-49.5	-54.0	-58.5	-63.0	-31.5		
	205	220	235	-10.7	-18.7	-23.4	-28.1	-28.1	-32.8	-37.5	-42.2	-46.9	-51.5	-56.2	-60.9	-65.6	-32.8		
	210	225	240	-11.1	-19.5	-24.4	-29.2	-29.2	-34.1	-39.0	-43.9	-48.7	-53.6	-58.5	-63.4	-68.2	-34.1		
	215	230	245	-11.5	-20.3	-25.3	-30.4	-30.4	-35.4	-40.5	-45.6	-50.6	-55.7	-60.8	-65.8	-70.9	-35.4		
	220	235	250	-12.0	-21.0	-26.3	-31.5	-31.5	-36.8	-42.0	-47.3	-52.5	-57.8	-63.0	-68.3	-73.5	-36.8		
	225	240	255	-12.4	-21.8	-27.2	-32.7	-32.7	-38.1	-43.5	-49.0	-54.4	-59.9	-65.3	-70.7	-76.2	-38.1		
	230	245	260	-12.8	-22.5	-28.2	-33.8	-33.8	-39.4	-45.0	-50.7	-56.3	-61.9	-67.6	-73.2	-78.8	-39.4		
	235	250	265	-13.2	-23.3	-29.1	-34.9	-34.9	-40.7	-46.6	-52.4	-58.2	-64.0	-69.8	-75.7	-81.5	-40.7		
	240	255	270	-13.7	-24.0	-30.0	-36.1	-36.1	-42.1	-48.1	-54.1	-60.1	-66.1	-72.1	-78.1	-84.1	-42.1		
	245	260	275	-14.1	-24.8	-31.0	-37.2	-37.2	-43.4	-49.6	-55.8	-62.0	-68.2	-74.4	-80.6	-86.8	-43.4		
	250	265	280	-14.5	-25.5	-31.9	-38.3	-38.3	-44.7	-51.1	-57.5	-63.9	-70.3	-76.6	-83.0	-89.4	-44.7		
	255	270	285	-14.9	-26.3	-32.9	-39.5	-39.5	-46.0	-52.6	-59.2	-65.8	-72.3	-78.9	-85.5	-92.1	-46.0		
	260	275	290	-15.4	-27.1	-33.8	-40.6	-40.6	-47.4	-54.1	-60.9	-67.6	-74.4	-81.2	-87.9	-94.7	-47.4		
	265	280	295	-15.8	-27.8	-34.8	-41.7	-41.7	-48.7	-55.6	-62.6	-69.5	-76.5	-83.4	-90.4	-97.3	-48.7		
	270	285	300	-16.2	-28.6	-35.7	-42.9	-42.9	-50.0	-57.1	-64.3	-71.4	-78.6	-85.7	-92.9	-100.0	-50.0		
	275	290		-16.6	-29.3	-36.7	-44.0	-44.0	-51.3	-58.7	-66.0	-73.3	-80.6	-88.0	-95.3	-102.6	-51.3		
	280	295		-17.1	-30.1	-37.6	-45.1	-45.1	-52.6	-60.2	-67.7	-75.2	-82.7	-90.2	-97.7	-105.3	-52.6		
	285	300		-17.5	-30.8	-38.5	-46.3	-46.3	-54.0	-61.7	-69.4	-77.1	-84.8	-92.5	-100.2	-107.9	-54.0		
	290			-17.9	-31.6	-39.5	-47.4	-47.4	-55.3	-63.2	-71.1	-79.0	-86.9	-94.8	-102.7	-110.6	-55.3		
	295			-18.3	-32.3	-40.4	-48.5	-48.5	-56.6	-64.7	-72.8	-80.9	-89.0	-97.0	-105.1	-113.2	-56.6		
	300			-18.8	-33.1	-41.4	-49.7	-49.7	-57.9	-66.2	-74.5	-82.8	-91.0	-99.3	-107.6	-115.9	-57.9		



Shear force level		concrete cover top [mm]			ϕV_n [kN/element]														
		C40	C55	C70															
height of connection [mm]	VS	≥165	≥180	≥195	14.8	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	
	V1	≥165	≥180	≥195	26.2	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4	52.4
	V2	≥165	≥180	≥195	39.3	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	78.7	82.2*
	V3	≥165	≥180	≥195	52.4	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	104.9	-
	V4	≥185	≥200	≥215	-	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	164.3	102.7
	V6±	≥165	≥180	≥195	+14.8 /-14.8	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+29.5 /-29.5	+14.8 /-14.8
	V7±	≥165	≥180	≥195	+29.5 /-22.1	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+59.0 /-44.3	+39.3 /-26.2
	V8±	≥185	≥200	≥215	+61.6 /-61.6	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+123.2 /-123.2	+61.6 /-61.6

Shear force level VS to V4 also possible with lifting shear force (-14.8 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥180 mm (C40), ≥195 mm (C55), ≥210 mm (C70)

The Egccobox® is also available as semi-prefab version in variant "FO" (height ≥190 mm) or "F" (height ≥165 mm); e.g. MM50-FO-V1-C40-h200

Reinforcement Egccobox® type MM

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
tensile bars	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars from insulation [mm]	505	610	610	610	610	610	610	610	610	610	610	610	610	610
compression bearings	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS±	-	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6
shear force bars V1±	-	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6	4 ø8 / 2 ø6
shear force bars V2±	-	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	6 ø8 / 2 ø6	4 ø10 / 2 ø6
shear force bars V3±	-	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	8 ø8 / 2 ø6	-
shear force bars V4±	-	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	5 ø10 / 2 ø6
shear force bars V6±	2 ø6 / 2 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	2 ø6 / 2 ø6
shear force bars V7±	4 ø6 / 3 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	6 ø8 / 4 ø8	6 ø8 / 4 ø8	6 ø8 / 4 ø8	6 ø8 / 4 ø8	6 ø8 / 4 ø8	3 ø8 / 2 ø8
shear force bars V8±	3 ø10 / 3 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	3 ø10 / 3 ø10
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	11.7	11.7

Rotation spring stiffness Egccobox® type MM

Egccobox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500			
concrete cover top [mm]			Rotation spring stiffness [kNm/rad/Element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	765	1,057	1,269	1,464	1,535	1,735	2,003	2,271	2,537	2,804	3,069	3,335	3,600	1,800		
	170	185	200	856	1,187	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,446	3,744	4,041	2,021		
	175	190	205	953	1,324	1,589	1,834	1,922	2,172	2,509	2,844	3,178	3,511	3,844	4,176	4,508	2,254		
	180	195	210	1,055	1,468	1,762	2,034	2,132	2,410	2,783	3,154	3,525	3,894	4,263	4,632	5,001	2,500		
	185	200	215	1,162	1,620	1,945	2,245	2,352	2,659	3,071	3,481	3,890	4,297	4,705	5,112	5,518	2,759		
	190	205	220	1,274	1,780	2,136	2,466	2,584	2,921	3,373	3,824	4,273	4,721	5,168	5,615	6,062	3,031		
	195	210	225	1,391	1,947	2,337	2,697	2,827	3,195	3,690	4,182	4,673	5,164	5,653	6,142	6,631	3,315		
	200	215	230	1,514	2,121	2,546	2,939	3,080	3,482	4,021	4,557	5,092	5,627	6,160	6,693	7,225	3,613		
	205	220	235	1,642	2,303	2,765	3,191	3,344	3,780	4,366	4,948	5,529	6,109	6,688	7,267	7,845	3,923		
	210	225	240	1,775	2,493	2,992	3,453	3,619	4,091	4,725	5,355	5,984	6,612	7,239	7,865	8,490	4,245		
	215	230	245	1,913	2,690	3,229	3,726	3,905	4,415	5,098	5,779	6,457	7,134	7,811	8,486	9,161	4,581		
	220	235	250	2,056	2,894	3,474	4,009	4,202	4,750	5,486	6,218	6,948	7,677	8,404	9,131	9,858	4,929		
	225	240	255	2,204	3,106	3,728	4,303	4,510	5,098	5,887	6,673	7,457	8,239	9,020	9,800	10,580	5,290		
	230	245	260	2,358	3,326	3,992	4,607	4,829	5,458	6,303	7,145	7,984	8,821	9,657	10,493	11,327	5,664		
	235	250	265	2,516	3,553	4,264	4,921	5,158	5,831	6,734	7,632	8,529	9,423	10,316	11,209	12,100	6,050		
	240	255	270	2,680	3,787	4,546	5,246	5,498	6,216	7,178	8,136	9,091	10,045	10,997	11,948	12,899	6,449		
	245	260	275	2,849	4,029	4,836	5,581	5,850	6,613	7,636	8,656	9,672	10,686	11,699	12,711	13,723	6,861		
	250	265	280	3,024	4,278	5,135	5,927	6,212	7,022	8,109	9,192	10,271	11,348	12,424	13,498	14,572	7,286		
	255	270	285	3,203	4,535	5,444	6,283	6,585	7,444	8,596	9,743	10,888	12,029	13,170	14,309	15,447	7,724		
	260	275	290	3,388	4,800	5,761	6,649	6,969	7,878	9,097	10,311	11,522	12,731	13,938	15,143	16,348	8,174		
	265	280	295	3,577	5,072	6,087	7,026	7,364	8,324	9,613	10,896	12,175	13,452	14,727	16,001	17,274	8,637		
	270	285	300	3,772	5,351	6,423	7,413	7,769	8,782	10,142	11,496	12,846	14,193	15,538	16,882	18,225	9,113		
	275	290		3,972	5,638	6,767	7,810	8,186	9,253	10,686	12,112	13,534	14,954	16,371	17,787	19,202	9,601		
	280	295		4,178	5,932	7,120	8,218	8,613	9,736	11,244	12,744	14,241	15,734	17,226	18,716	20,205	10,102		
	285	300		4,388	6,234	7,483	8,636	9,051	10,232	11,816	13,393	14,966	16,535	18,103	19,668	21,233	10,617		
	290			4,604	6,543	7,854	9,065	9,500	10,740	12,402	14,057	15,708	17,356	19,001	20,644	22,287	11,143		
	295			4,824	6,860	8,234	9,503	9,960	11,260	13,003	14,738	16,469	18,196	19,921	21,644	23,366	11,683		
	300			5,050	7,184	8,624	9,953	10,431	11,792	13,617	15,435	17,247	19,056	20,863	22,667	24,470	12,235		

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / \text{rotation spring stiffness [kNm/rad/Egccobox® element]} \times 1,000 \times \text{cantilever length } l_b [m]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 3,630$ psi / 25.0 MPa (SI)

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
Egccobox® tensile bars	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [mm]	470	558	558	558	558	558	558	558	558	558	558	558	558	558
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [mm ²]	239	479	598	718	718	838	958	1077	1197	1317	1436	1556	1676	838
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [mm ²]	319	598	748	898	898	1047	1197	1347	1496	1646	1795	1945	2095	1047
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [mm ²] B500	33	66	66	66	66	66	66	66	66	66	66	66	66	66
shear force level V1 $\geq a_g$ [mm ²] B500	58	117	117	117	117	117	117	117	117	117	117	117	117	117
shear force level V2 $\geq a_g$ [mm ²] B500	87	175	175	175	175	175	175	175	175	175	175	175	175	183
shear force level V3 $\geq a_g$ [mm ²] B500	117	233	233	233	233	233	233	233	233	233	233	233	233	-
shear force level V4 $\geq a_g$ [mm ²] B500	-	365	365	365	365	365	365	365	365	365	365	365	365	228
shear force level VS± $\geq a_g$ [mm ²] B500	-	66	66	66	66	66	66	66	66	66	66	66	66	66
shear force level V1± $\geq a_g$ [mm ²] B500	-	117	117	117	117	117	117	117	117	117	117	117	117	117
shear force level V2± $\geq a_g$ [mm ²] B500	-	175	175	175	175	175	175	175	175	175	175	175	175	183
shear force level V3± $\geq a_g$ [mm ²] B500	-	233	233	233	233	233	233	233	233	233	233	233	233	-
shear force level V4± $\geq a_g$ [mm ²] B500	-	365	365	365	365	365	365	365	365	365	365	365	365	228
shear force level V6± $\geq a_g$ [mm ²] B500	31	64	64	64	64	64	64	64	64	64	64	64	64	31
shear force level V7± $\geq a_g$ [mm ²] B500	64	131	131	131	131	131	131	173	173	173	173	173	173	87
shear force level V8± $\geq a_g$ [mm ²] B500	136	273	273	273	273	273	273	273	273	273	273	273	273	136

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_s / \phi M_n$.

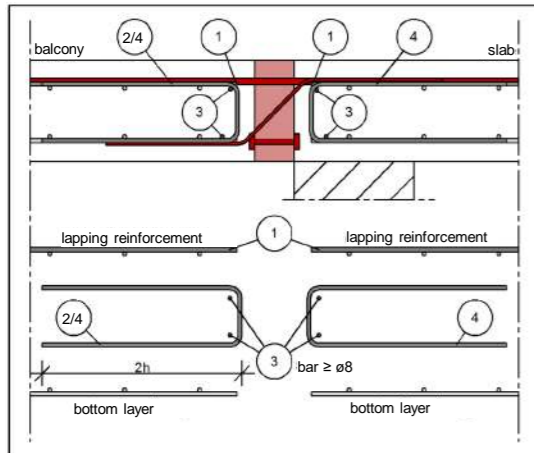
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_a / f_{yd}$.

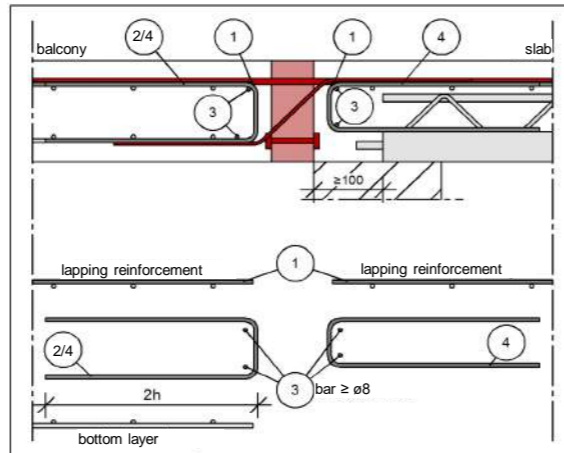
The specifications apply to good bonding conditions.

design proposal

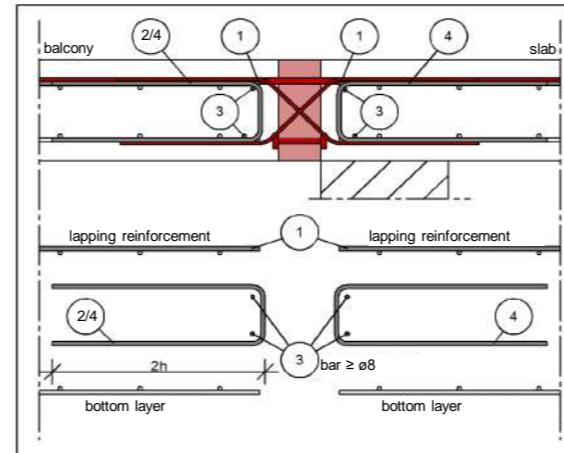
direct support



direct support (semi-prefab slab)



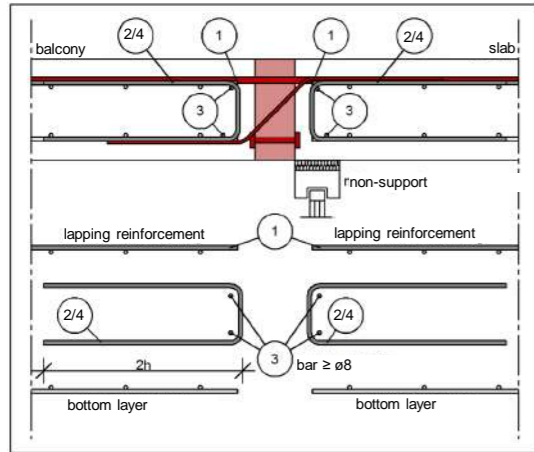
direct support with alternating shear force (V6±, V7±, V8±)



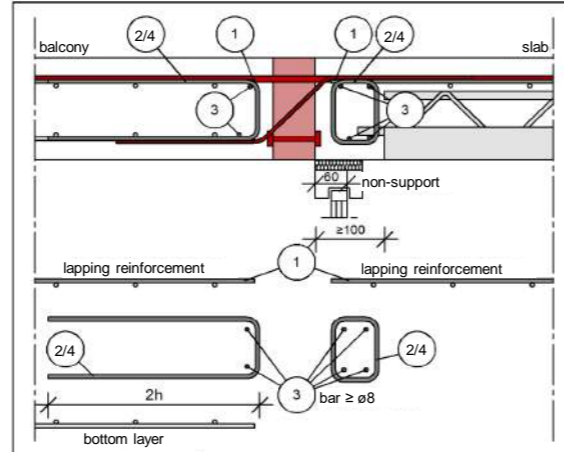
For the Egccobox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



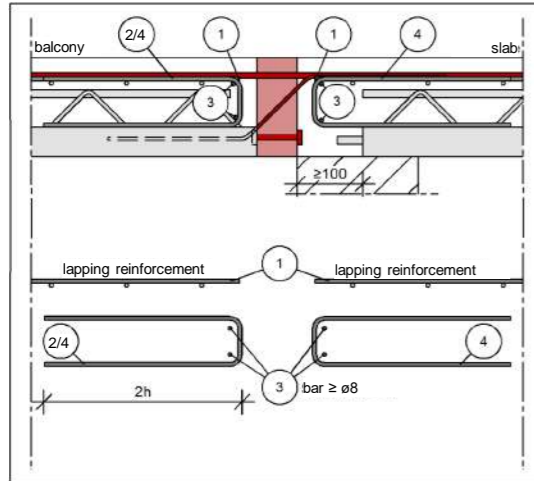
indirect support (semi-prefab slab)



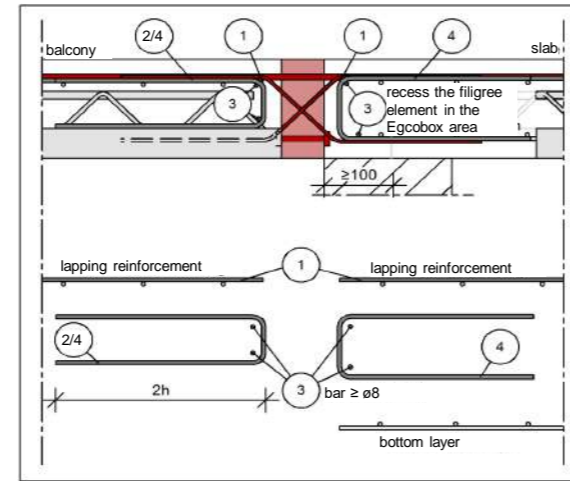
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

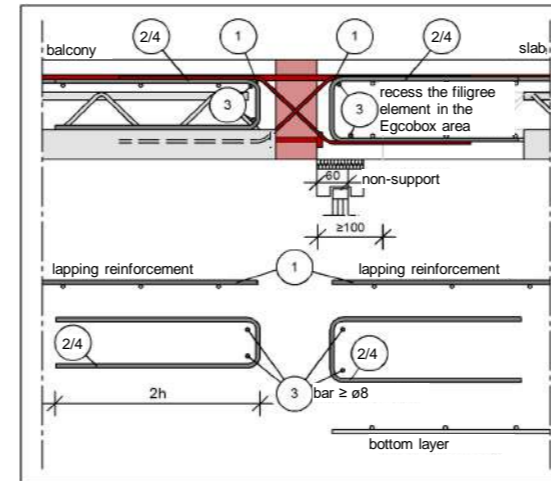
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_{\pm} in semi-prefab balcony



indirect support: Egccobox with V_{\pm} in semi-prefab balcony



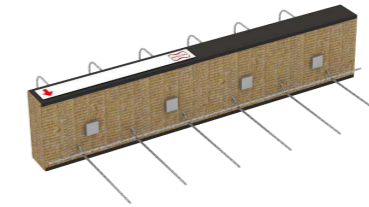
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels $V_{S\pm}$ to $V_{4\pm}$, a constructive edging on the balcony side is generally sufficient.

Design table Egcobox® type VM - concrete strength ≥ 3,630 psi / 25.0 MPa (SI)

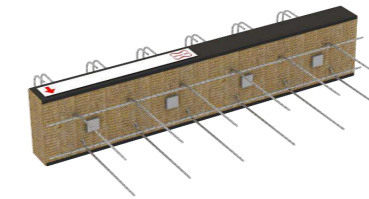
for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
concrete cover top [mm]			ϕV_n [kN/element]									
C40	C55	C70										
height of connection [mm]												
165-300	180-300	195-300	29.5	36.9	52.4	65.6	78.7	104.9	131.1	157.3	-	-
185-300	200-300	215-300	29.5	36.9	52.4	65.6	78.7	104.9	131.1	157.3	205.4	246.5

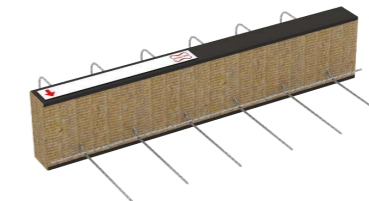
Reinforcement												
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10		
minimum wall / beam width [mm]	180	180	200	200	200	200	200	200	220	220		
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcobox® type VM-K - concrete strength ≥ 3,630 psi / 25.0 MPa (SI)

for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]			200	250	250	300	400	400	500	500
concrete cover top [mm]			ϕV_n [kN/element]							
C40	C55	C70								
height of connection [mm]										
165-300	180-300	195-300	14.8	26.2	39.3	52.4	65.6	-	91.8	-
185-300	200-300	215-300	14.8	26.2	39.3	52.4	65.6	82.2	91.8	123.2

Reinforcement										
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10		
minimum wall / beam width [mm]	180	200	200	200	200	220	200	220		
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		

All Egcobox types can also be produced in the following variants:

VM_± / VM-K_± - Egcobox® to transfer positive and negative shear forces (shear bars ±)

VM Z₋ / VM Z₋-K - Egcobox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM / VM-K

VM Z_± / VM Z_±-K± - Egcobox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM± / VM-K±

Egcobox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egccobox® type VM / VM-K - concrete strength $\geq 3,630$ psi / 25.0 MPa (SI)

Egccobox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [mm ²]	66	82	117	146	175	233	291	350	456	548
x = shear force bar embedment depth (slab) [mm]	155	155	175	175	175	175	175	175	195	195

Egccobox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]	200	250	250	300	400	400	500	500
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [mm ²]	33	58	87	117	146	183	204	274
x = shear force bar embedment depth (slab) [mm]	155	175	175	175	175	195	175	195

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

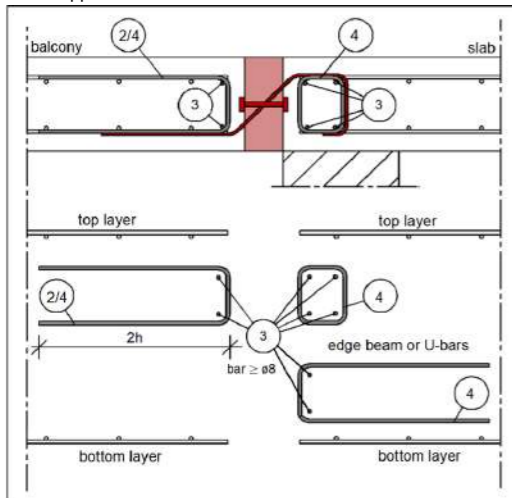
In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

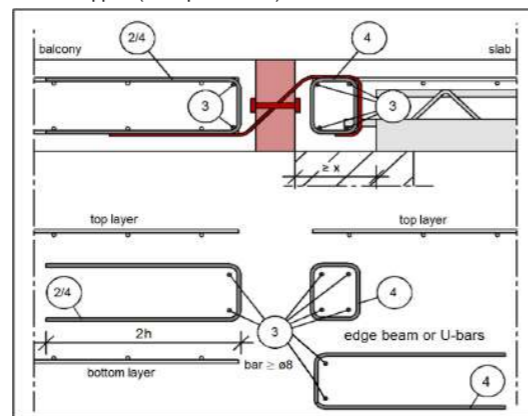
The specifications apply to good bonding conditions.

design proposal

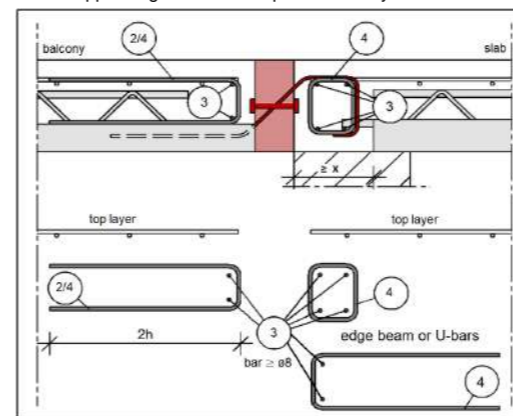
direct support



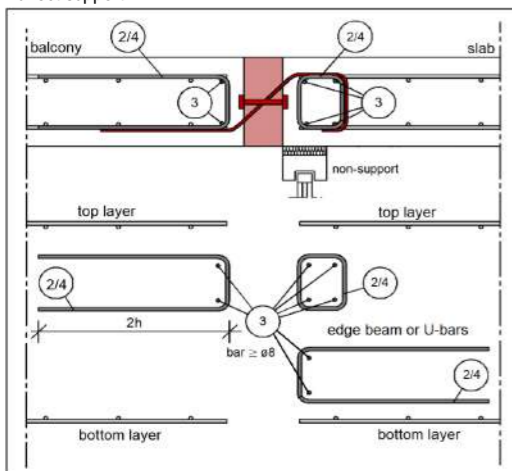
direct support (semi-prefab slab)



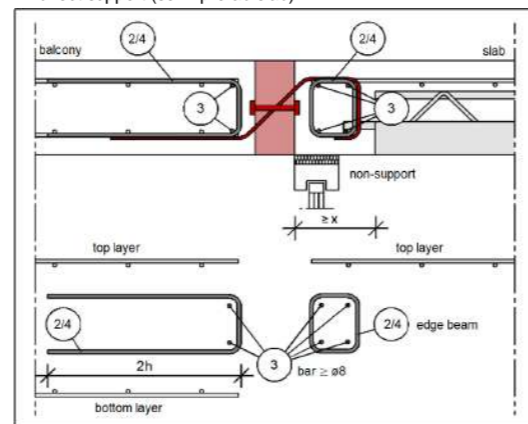
direct support: Egccobox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egccobox in semi-prefab balcony:

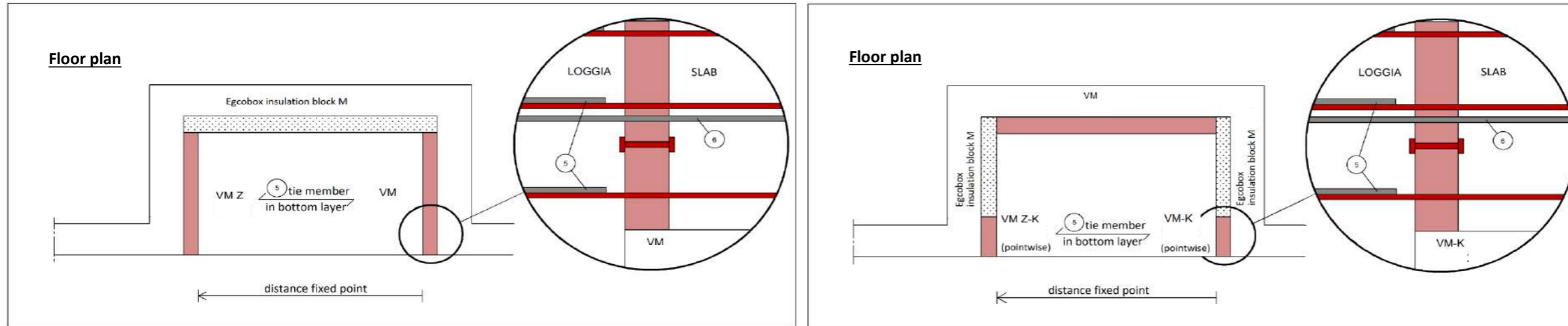
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

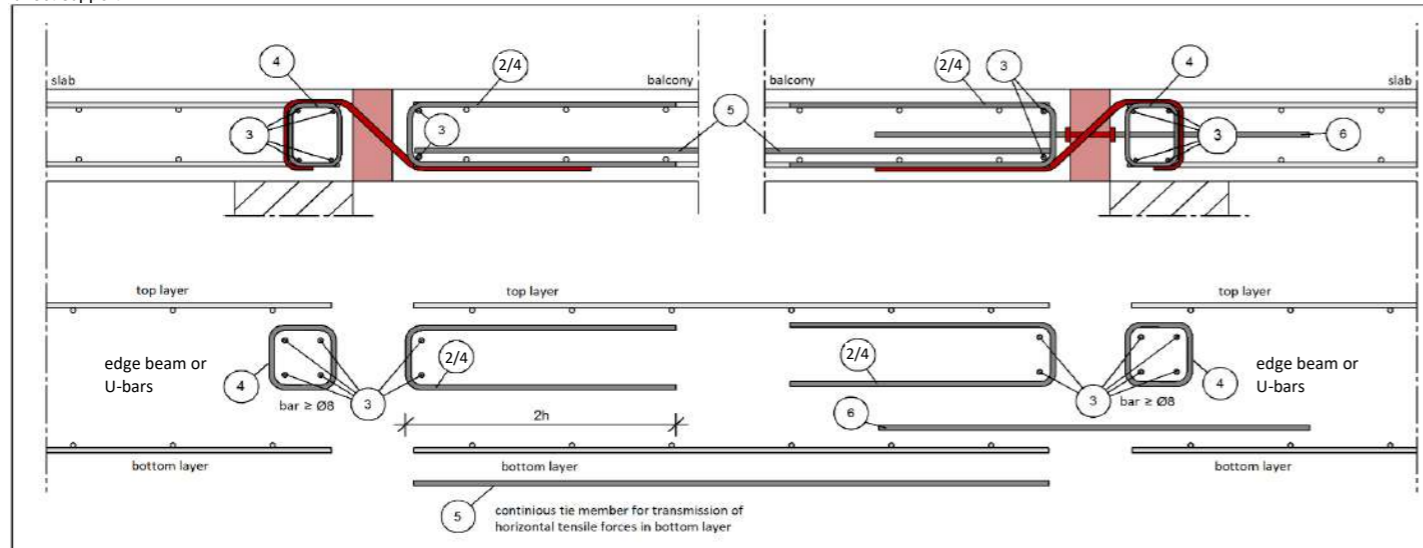
The information on the minimum required connection reinforcement of the Egccobox of the ceiling-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egccobox® VM_± / VM_{-K±}. VM Z₋ / VM Z_{-K}, VM Z_± / VM Z_{-K±} is similar.

additional information design proposal Egcoibox® VM Z_ / VM Z_-K



direct support

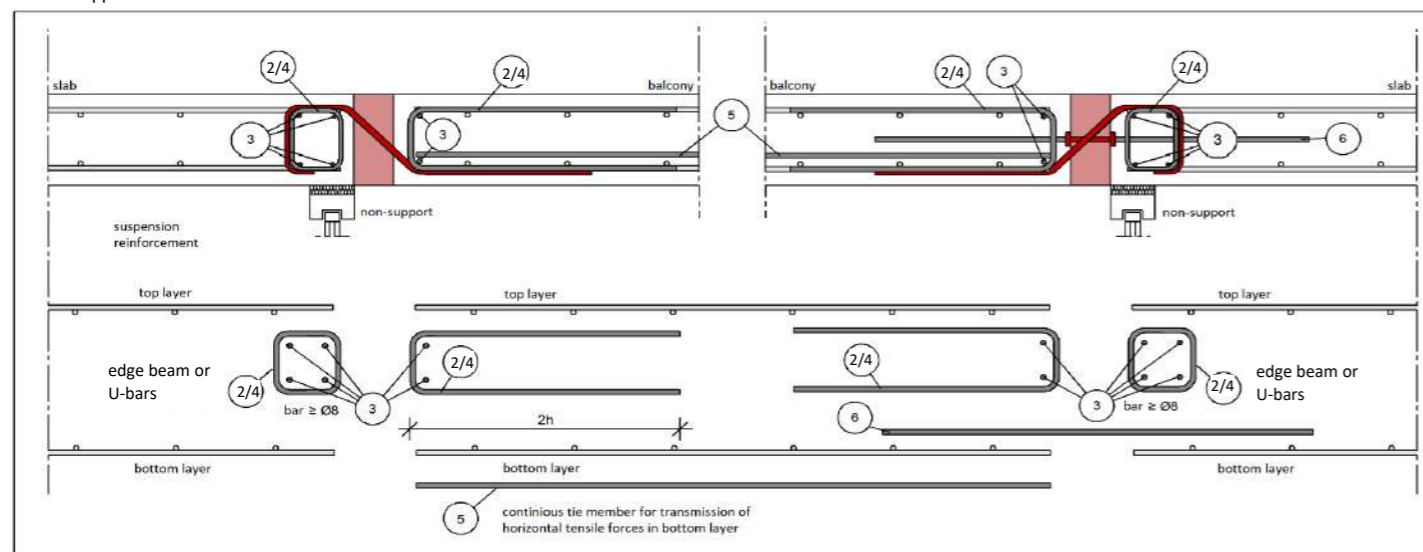


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_y as the bars of the Egcoibox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the Egcoibox VM_ or VM_-K.

indirect support



Design table Egcoibox® type MM± - concrete strength ≥ 3,630 psi / 25.0 MPa (SI)

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 80 mm

Egcoibox type			MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±			
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500			
concrete cover [mm]			ϕM_n [kNm/element]																	
			C40	C55	C70															
height of connection [mm]	175	205	235	±12.5	±15.7	±18.8	±22.0	±25.1	±28.2	±31.4	±31.4	±35.9	±40.4	±44.9	±26.9	±31.4	±35.9	±49.6		
	180	210	240	±13.3	±16.6	±20.0	±23.3	±26.6	±29.9	±33.3	±33.3	±38.1	±42.9	±47.6	±28.6	±33.3	±38.1	±52.8		
	185	215	245	±14.1	±17.6	±21.1	±24.6	±28.1	±31.6	±35.1	±35.3	±40.3	±45.4	±50.4	±30.2	±35.3	±40.3	±55.9		
	190	220	250	±14.8	±18.5	±22.2	±25.9	±29.6	±33.3	±37.0	±37.2	±42.5	±47.9	±53.2	±31.9	±37.2	±42.5	±59.0		
	195	225	255	±15.6	±19.5	±23.4	±27.2	±31.1	±35.0	±38.9	±39.2	±44.8	±50.3	±55.9	±33.6	±39.2	±44.8	±62.2		
	200	230	260	±16.3	±20.4	±24.5	±28.6	±32.7	±36.7	±40.8	±41.1	±47.0	±52.8	±58.7	±35.2	±41.1	±47.0	±65.3		
	205	235	265	±17.1	±21.4	±25.6	±29.9	±34.2	±38.4	±42.7	±43.0	±49.2	±55.3	±61.5	±36.9	±43.0	±49.2	±68.5		
	210	240	270	±17.8	±22.3	±26.8	±31.2	±35.7	±40.1	±44.6	±45.0	±51.4	±57.8	±64.2	±38.5	±45.0	±51.4	±71.6		
	215	245	275	±18.6	±23.2	±27.9	±32.5	±37.2	±41.8	±46.5	±46.9	±53.6	±60.3	±67.0	±40.2	±46.9	±53.6	±74.7		
	220	250	280	±19.3	±24.2	±29.0	±33.9	±38.7	±43.5	±48.4	±48.9	±55.8	±62.8	±69.8	±41.9	±48.9	±55.8	±77.9		
	225	255	285	±20.1	±25.1	±30.2	±35.2	±40.2	±45.2	±50.3	±50.8	±58.0	±65.3	±72.6	±43.5	±50.8	±58.0	±81.0		
	230	260	290	±20.9	±26.1	±31.3	±36.5	±41.7	±46.9	±52.2	±52.7	±60.3	±67.8	±75.3	±45.2	±52.7	±60.3	±84.2		
	235	265	295	±21.6	±27.0	±32.4	±37.8	±43.2	±48.6	±54.0	±54.7	±62.5	±70.3	±78.1	±46.9	±54.7	±62.5	±87.3		
	240	270	300	±22.4	±28.0	±33.6	±39.2	±44.7	±50.3	±55.9	±56.6	±64.7	±72.8	±80.9	±48.5	±56.6	±64.7	±90.4		
	245	275		±23.1	±28.9	±34.7	±40.5	±46.3	±52.0	±57.8	±58.5	±66.9	±75.3	±83.6	±50.2	±58.5	±66.9	±93.6		
	250	280		±23.9	±29.9	±35.8	±41.8	±47.8	±53.7	±59.7	±60.5	±69.1	±77.8	±86.4	±51.8	±60.5	±69.1	±96.7		
	255	285		±24.6	±30.8	±37.0	±43.1	±49.3	±55.4	±61.6	±62.4	±71.3	±80.3	±89.2	±53.5	±62.4	±71.3	±99.9		
	260	290		±25.4	±31.7	±38.1	±44.4	±50.8	±57.1	±63.5	±64.4	±73.6	±82.7	±91.9	±55.2	±64.4	±73.6	±103.0		
	265	295		±26.2	±32.7	±39.2	±45.8	±52.3	±58.8	±65.4	±66.3	±75.8	±85.2	±94.7	±56.8	±66.3	±75.8	±106.1		
	270	300		±26.9	±33.6	±40.4	±47.1	±53.8	±60.5	±67.3	±68.2	±78.0	±87.7	±97.5	±58.5	±68.2	±78.0	±109.3		
	275			±27.7	±34.6	±41.5	±48.4	±55.3	±62.2	±69.2	±70.2	±80.2	±90.2	±100.3	±60.2	±70.2	±80.2	±112.4		
	280			±28.4	±35.5	±42.6	±49.7	±56.8	±63.9	±71.0	±72.1	±82.4	±92.7	±103.0	±61.8	±72.1	±82.4	±115.6		
	285			±29.2	±36.5	±43.8	±51.1	±58.3	±65.6	±72.9	±74.1	±84.6	±95.2	±105.8	±63.5	±74.1	±84.6	±118.7		
	290			±29.9	±37.4	±44.9	±52.4	±59.9	±67.3	±74.8	±76.0	±86.8	±97.7	±108.6	±65.1	±76.0	±86.8	±121.8		
	295			±30.7	±38.4	±46.0	±53.7	±61.4	±69.0	±76.7	±77.9	±89.1	±100.2	±111.3	±66.8	±77.9	±89.1	±125.0		
	300			±31.4	±39.3	±47.2	±55.0	±62.9	±70.7	±78.6	±79.9	±91.3	±102.7	±114.1	±68.5	±79.9	±91.3	±128.1		

Shear force level		concrete cover [mm]			ϕV_n [kN/element]														
		C40	C55	C70															
height of connection [mm]	VS	≥175	≥205	≥235	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	±38.5	
	V1	≥175	≥205	≥235	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2	±68.2
	V2	≥175	≥205	≥235	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3	±102.3
	V3	≥175	≥205	≥235	±136.4	±136.4	±136.4	±136.4	±136.4	±136.4	±136.4	±136.4	±136.4	±136.4	±136.4	-	-	-	-
	V4	≥195	≥225	≥255	-	-	±159.9	±159.9	±159.9	±159.9	±159.9	±159.9	±159.9	±159.9	±159.9	-	-	-	-
V5	≥195	≥225	≥255	-	-	-	-	±213.2	±213.2	±213.2	±213.2	±213.2	±213.2	±213.2	-	-	-	-	

concrete cover for top and bottom reinforcement Egcoibox® [mm]
other heights on request



Reinforcement Egccobox® type MM±

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars from insulation [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
compression bearings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
shear force bars VS	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [m]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	11.7	11.7	11.7	11.7	11.7	11.7	11.7	10.1

Rotation spring stiffness Egccobox® type MM±

Egccobox type				MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]				1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
concrete cover [mm]				Rotation spring stiffness [kNm/rad/Element]														
C40	C55	C70																
height of connection [mm]	175	205	235	618	773	928	1,082	1,237	1,391	1,546	1,484	1,696	1,908	2,120	1,272	1,484	1,696	1,921
	180	210	240	695	869	1,043	1,216	1,390	1,564	1,738	1,673	1,912	2,151	2,390	1,434	1,673	1,912	2,172
	185	215	245	776	970	1,164	1,359	1,553	1,747	1,941	1,873	2,141	2,408	2,676	1,606	1,873	2,141	2,439
	190	220	250	862	1,078	1,293	1,509	1,724	1,940	2,155	2,085	2,382	2,680	2,978	1,787	2,085	2,382	2,720
	195	225	255	952	1,190	1,428	1,666	1,905	2,143	2,381	2,307	2,637	2,967	3,296	1,978	2,307	2,637	3,017
	200	230	260	1,047	1,309	1,570	1,832	2,094	2,356	2,617	2,542	2,905	3,268	3,631	2,178	2,542	2,905	3,330
	205	235	265	1,146	1,433	1,719	2,006	2,292	2,579	2,865	2,787	3,185	3,583	3,981	2,389	2,787	3,185	3,658
	210	240	270	1,250	1,562	1,875	2,187	2,500	2,812	3,125	3,044	3,478	3,913	4,348	2,609	3,044	3,478	4,001
	215	245	275	1,358	1,697	2,037	2,376	2,716	3,055	3,395	3,312	3,785	4,258	4,731	2,839	3,312	3,785	4,360
	220	250	280	1,471	1,838	2,206	2,574	2,941	3,309	3,677	3,591	4,104	4,617	5,130	3,078	3,591	4,104	4,734
	225	255	285	1,588	1,985	2,382	2,779	3,176	3,572	3,969	3,882	4,436	4,991	5,545	3,327	3,882	4,436	5,123
	230	260	290	1,709	2,137	2,564	2,991	3,419	3,846	4,273	4,184	4,781	5,379	5,977	3,586	4,184	4,781	5,528
	235	265	295	1,835	2,294	2,753	3,212	3,671	4,130	4,589	4,497	5,139	5,782	6,424	3,855	4,497	5,139	5,948
	240	270	300	1,966	2,458	2,949	3,441	3,932	4,424	4,915	4,822	5,510	6,199	6,888	4,133	4,822	5,510	6,384
	245	275		2,101	2,626	3,152	3,677	4,202	4,728	5,253	5,157	5,894	6,631	7,368	4,421	5,157	5,894	6,835
	250	280		2,241	2,801	3,361	3,921	4,482	5,042	5,602	5,505	6,291	7,077	7,864	4,718	5,505	6,291	7,302
	255	285		2,385	2,981	3,577	4,173	4,770	5,366	5,962	5,863	6,701	7,538	8,376	5,026	5,863	6,701	7,783
	260	290		2,533	3,167	3,800	4,433	5,067	5,700	6,333	6,233	7,123	8,014	8,904	5,343	6,233	7,123	8,281
	265	295		2,686	3,358	4,030	4,701	5,373	6,044	6,716	6,614	7,559	8,504	9,449	5,669	6,614	7,559	8,793
	270	300		2,844	3,555	4,266	4,977	5,688	6,399	7,110	7,007	8,008	9,008	10,009	6,006	7,007	8,008	9,321
275			3,006	3,757	4,509	5,260	6,012	6,763	7,515	7,410	8,469	9,528	10,586	6,352	7,410	8,469	9,865	
280			3,172	3,966	4,759	5,552	6,345	7,138	7,931	7,825	8,943	10,061	11,179	6,708	7,825	8,943	10,423	
285			3,343	4,179	5,015	5,851	6,687	7,523	8,359	8,252	9,431	10,609	11,788	7,073	8,252	9,431	10,998	
290			3,519	4,399	5,278	6,158	7,038	7,918	8,797	8,689	9,931	11,172	12,414	7,448	8,689	9,931	11,587	
295			3,699	4,624	5,548	6,473	7,398	8,323	9,247	9,138	10,444	11,749	13,055	7,833	9,138	10,444	12,192	
300			3,883	4,854	5,825	6,796	7,767	8,738	9,708	9,599	10,970	12,341	13,713	8,228	9,599	10,970	12,813	

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / rotation\ spring\ stiffness [kNm/rad/Egccobox®\ element] \times 1,000 \times cantilever\ length\ l_b [m]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 3,630 psi / 25.0 MPa (SI)

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
Egcoibox® tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [mm]	558	558	558	558	558	558	558	701	701	701	701	701	701	701	1173
item ① - lapping reinforcement / element - option 1															
≥ a _s [mm ²]	479	598	718	838	958	1077	1197	1222	1396	1571	1746	1047	1222	1396	1407
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [mm ²]	598	748	898	1047	1197	1347	1496	1466	1676	1885	2095	1257	1466	1676	1431
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [mm ²] B500	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86
shear force level V1 ≥ a _s [mm ²] B500	152	152	152	152	152	152	152	152	152	152	152	152	152	152	152
shear force level V2 ≥ a _s [mm ²] B500	227	227	227	227	227	227	227	227	227	227	227	227	227	227	227
shear force level V3 ≥ a _s [mm ²] B500	303	303	303	303	303	303	303	303	303	303	303	-	-	-	-
shear force level V4 ≥ a _s [mm ²] B500	-	-	355	355	355	355	355	355	355	355	355	-	-	-	-
shear force level V5 ≥ a _s [mm ²] B500	-	-	-	-	474	474	474	474	474	474	474	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φV_a / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ ø8) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_l / φM_n.

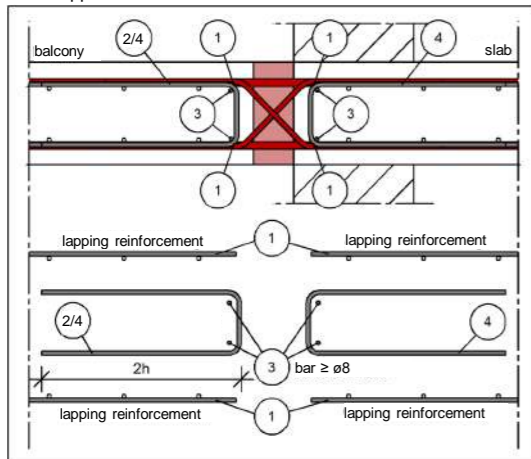
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_a / f_{yd}.

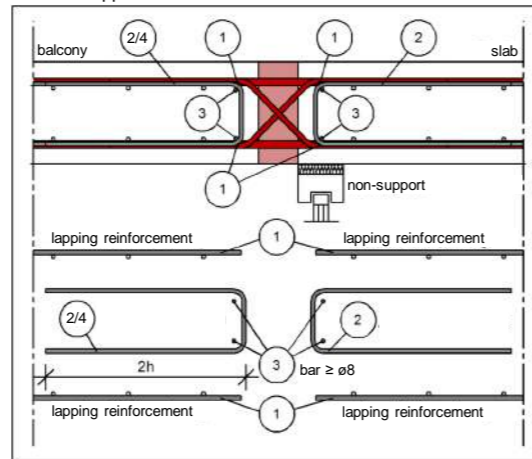
The specifications apply to good bonding conditions.

design proposal

direct support



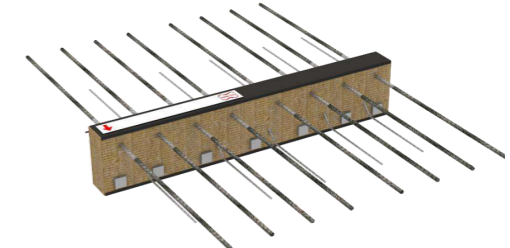
indirect support



Design table Egcoibox® type MM - concrete strength ≥ 4,000 psi / 27.6 MPa (SI)

for cantilever slabs for transmission of moment and shear force, insulation 80 mm

Egcoibox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500			
concrete cover top [mm]			ϕM_n [kNm/element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	-7.7	-13.3	-16.7	-20.0	-20.0	-23.3	-26.7	-30.0	-33.3	-36.7	-40.0	-43.3	-46.7	-23.3		
	170	185	200	-8.1	-14.1	-17.7	-21.2	-21.2	-24.7	-28.3	-31.8	-35.3	-38.9	-42.4	-45.9	-49.5	-24.7		
	175	190	205	-8.6	-14.9	-18.7	-22.4	-22.4	-26.1	-29.8	-33.6	-37.3	-41.0	-44.8	-48.5	-52.2	-26.1		
	180	195	210	-9.0	-15.7	-19.6	-23.6	-23.6	-27.5	-31.4	-35.4	-39.3	-43.2	-47.2	-51.1	-55.0	-27.5		
	185	200	215	-9.4	-16.5	-20.6	-24.8	-24.8	-28.9	-33.0	-37.2	-41.3	-45.4	-49.5	-53.7	-57.8	-28.9		
	190	205	220	-9.9	-17.3	-21.6	-26.0	-26.0	-30.3	-34.6	-38.9	-43.3	-47.6	-51.9	-56.2	-60.6	-30.3		
	195	210	225	-10.3	-18.1	-22.6	-27.1	-27.1	-31.7	-36.2	-40.7	-45.2	-49.8	-54.3	-58.8	-63.3	-31.7		
	200	215	230	-10.8	-18.9	-23.6	-28.3	-28.3	-33.1	-37.8	-42.5	-47.2	-52.0	-56.7	-61.4	-66.1	-33.1		
	205	220	235	-11.2	-19.7	-24.6	-29.5	-29.5	-34.5	-39.4	-44.3	-49.2	-54.1	-59.1	-64.0	-68.9	-34.5		
	210	225	240	-11.7	-20.5	-25.6	-30.7	-30.7	-35.8	-41.0	-46.1	-51.2	-56.3	-61.4	-66.6	-71.7	-35.8		
	215	230	245	-12.1	-21.3	-26.6	-31.9	-31.9	-37.2	-42.5	-47.9	-53.2	-58.5	-63.8	-69.1	-74.5	-37.2		
	220	235	250	-12.6	-22.1	-27.6	-33.1	-33.1	-38.6	-44.1	-49.7	-55.2	-60.7	-66.2	-71.7	-77.2	-38.6		
	225	240	255	-13.0	-22.9	-28.6	-34.3	-34.3	-40.0	-45.7	-51.4	-57.2	-62.9	-68.6	-74.3	-80.0	-40.0		
	230	245	260	-13.5	-23.7	-29.6	-35.5	-35.5	-41.4	-47.3	-53.2	-59.1	-65.1	-71.0	-76.9	-82.8	-41.4		
	235	250	265	-13.9	-24.4	-30.6	-36.7	-36.7	-42.8	-48.9	-55.0	-61.1	-67.2	-73.3	-79.5	-85.6	-42.8		
	240	255	270	-14.4	-25.2	-31.6	-37.9	-37.9	-44.2	-50.5	-56.8	-63.1	-69.4	-75.7	-82.0	-88.4	-44.2		
	245	260	275	-14.8	-26.0	-32.5	-39.1	-39.1	-45.6	-52.1	-58.6	-65.1	-71.6	-78.1	-84.6	-91.1	-45.6		
	250	265	280	-15.2	-26.8	-33.5	-40.2	-40.2	-47.0	-53.7	-60.4	-67.1	-73.8	-80.5	-87.2	-93.9	-47.0		
	255	270	285	-15.7	-27.6	-34.5	-41.4	-41.4	-48.3	-55.3	-62.2	-69.1	-76.0	-82.9	-89.8	-96.7	-48.3		
	260	275	290	-16.1	-28.4	-35.5	-42.6	-42.6	-49.7	-56.8	-63.9	-71.0	-78.2	-85.3	-92.4	-99.5	-49.7		
	265	280	295	-16.6	-29.2	-36.5	-43.8	-43.8	-51.1	-58.4	-65.7	-73.0	-80.3	-87.6	-94.9	-102.2	-51.1		
	270	285	300	-17.0	-30.0	-37.5	-45.0	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0	-97.5	-105.0	-52.5		
	275	290		-17.5	-30.8	-38.5	-46.2	-46.2	-53.9	-61.6	-69.3	-77.0	-84.7	-92.4	-100.1	-107.8	-53.9		
	280	295		-17.9	-31.6	-39.5	-47.4	-47.4	-55.3	-63.2	-71.1	-79.0	-86.9	-94.8	-102.7	-110.6	-55.3		
	285	300		-18.4	-32.4	-40.5	-48.6	-48.6	-56.7	-64.8	-72.9	-81.0	-89.1	-97.2	-105.3	-113.4	-56.7		
	290			-18.8	-33.2	-41.5	-49.8	-49.8	-58.1	-66.4	-74.7	-83.0	-91.2	-99.5	-107.8	-116.1	-58.1		
	295			-19.3	-34.0	-42.5	-51.0	-51.0	-59.5	-68.0	-76.4	-84.9	-93.4	-101.9	-110.4	-118.9	-59.5		
	300			-19.7	-34.8	-43.5	-52.2	-52.2	-60.8	-69.5	-78.2	-86.9	-95.6	-104.3	-113.0	-121.7	-60.8		



Shear force level		concrete cover top [mm]			ϕV_n [kN/element]													
		C40	C55	C70														
height of connection [mm]	VS	≥165	≥180	≥195	15.5	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	31.0	
	V1	≥165	≥180	≥195	27.5	55.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	55.1	
	V2	≥165	≥180	≥195	41.3	82.6	82.6	82.6	82.6	82.6	82.6	82.6	82.6	82.6	82.6	82.6	82.6	
	V3	≥165	≥180	≥195	55.1	110.2	110.2	110.2	110.2	110.2	110.2	110.2	110.2	110.2	110.2	110.2	-	
	V4	≥185	≥200	≥215	-	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	107.9	
	V6±	≥165	≥180	≥195	+15.5 / -15.5	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+31.0 / -31.0	+15.5 / -15.5	
	V7±	≥165	≥180	≥195	+31.0 / -23.2	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+62.0 / -46.5	+41.3 / -27.5	
	V8±	≥185	≥200	≥215	+64.7 / -64.7	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+129.4 / -129.4	+64.7 / -64.7	

Shear force level VS to V4 also possible with lifting shear force (-15.5 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥180 mm (C40), ≥195 mm (C55), ≥210 mm (C70)

The Egcoibox® is also available as semi-prefab version in variant "FO" (height ≥190 mm) or "F" (height ≥165 mm); e.g. MM50-FO-V1-C40-h200

Reinforcement Egccobox® type MM

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
tensile bars	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars from insulation [mm]	505	610	610	610	610	610	610	610	610	610	610	610	610	610
compression bearings	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS±	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1±	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2±	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3±	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4±	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6±	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7±	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	3 ø 8 / 2 ø 8
shear force bars V8±	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 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	11.7	11.7

Rotation spring stiffness Egccobox® type MM

Egccobox type				MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]				500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500		
concrete cover top [mm]				Rotation spring stiffness [kNm/rad/Element]																
				C40	C55	C70														
height of connection [mm]	165	180	195	765	1,057	1,269	1,464	1,535	1,735	2,003	2,271	2,537	2,804	3,069	3,335	3,600	1,800			
	170	185	200	856	1,187	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,446	3,744	4,041	2,021			
	175	190	205	953	1,324	1,589	1,834	1,922	2,172	2,509	2,844	3,178	3,511	3,844	4,176	4,508	2,254			
	180	195	210	1,055	1,468	1,762	2,034	2,132	2,410	2,783	3,154	3,525	3,894	4,263	4,632	5,001	2,500			
	185	200	215	1,162	1,620	1,945	2,245	2,352	2,659	3,071	3,481	3,890	4,297	4,705	5,112	5,518	2,759			
	190	205	220	1,274	1,780	2,136	2,466	2,584	2,921	3,373	3,824	4,273	4,721	5,168	5,615	6,062	3,031			
	195	210	225	1,391	1,947	2,337	2,697	2,827	3,195	3,690	4,182	4,673	5,164	5,653	6,142	6,631	3,315			
	200	215	230	1,514	2,121	2,546	2,939	3,080	3,482	4,021	4,557	5,092	5,627	6,160	6,693	7,225	3,613			
	205	220	235	1,642	2,303	2,765	3,191	3,344	3,780	4,366	4,948	5,529	6,109	6,688	7,267	7,845	3,923			
	210	225	240	1,775	2,493	2,992	3,453	3,619	4,091	4,725	5,355	5,984	6,612	7,239	7,865	8,490	4,245			
	215	230	245	1,913	2,690	3,229	3,726	3,905	4,415	5,098	5,779	6,457	7,134	7,811	8,486	9,161	4,581			
	220	235	250	2,056	2,894	3,474	4,009	4,202	4,750	5,486	6,218	6,948	7,677	8,404	9,131	9,858	4,929			
	225	240	255	2,204	3,106	3,728	4,303	4,510	5,098	5,887	6,673	7,457	8,239	9,020	9,800	10,580	5,290			
	230	245	260	2,358	3,326	3,992	4,607	4,829	5,458	6,303	7,145	7,984	8,821	9,657	10,493	11,327	5,664			
	235	250	265	2,516	3,553	4,264	4,921	5,158	5,831	6,734	7,632	8,529	9,423	10,316	11,209	12,100	6,050			
	240	255	270	2,680	3,787	4,546	5,246	5,498	6,216	7,178	8,136	9,091	10,045	10,997	11,948	12,899	6,449			
	245	260	275	2,849	4,029	4,836	5,581	5,850	6,613	7,636	8,656	9,672	10,686	11,699	12,711	13,723	6,861			
	250	265	280	3,024	4,278	5,135	5,927	6,212	7,022	8,109	9,192	10,271	11,348	12,424	13,498	14,572	7,286			
	255	270	285	3,203	4,535	5,444	6,283	6,585	7,444	8,596	9,743	10,888	12,029	13,170	14,309	15,447	7,724			
	260	275	290	3,388	4,800	5,761	6,649	6,969	7,878	9,097	10,311	11,522	12,731	13,938	15,143	16,348	8,174			
	265	280	295	3,577	5,072	6,087	7,026	7,364	8,324	9,613	10,896	12,175	13,452	14,727	16,001	17,274	8,637			
	270	285	300	3,772	5,351	6,423	7,413	7,769	8,782	10,142	11,496	12,846	14,193	15,538	16,882	18,225	9,113			
	275	290		3,972	5,638	6,767	7,810	8,186	9,253	10,686	12,112	13,534	14,954	16,371	17,787	19,202	9,601			
	280	295		4,178	5,932	7,120	8,218	8,613	9,736	11,244	12,744	14,241	15,734	17,226	18,716	20,205	10,102			
	285	300		4,388	6,234	7,483	8,636	9,051	10,232	11,816	13,393	14,966	16,535	18,103	19,668	21,233	10,617			
	290			4,604	6,543	7,854	9,065	9,500	10,740	12,402	14,057	15,708	17,356	19,001	20,644	22,287	11,143			
	295			4,824	6,860	8,234	9,503	9,960	11,260	13,003	14,738	16,469	18,196	19,921	21,644	23,366	11,683			
	300			5,050	7,184	8,624	9,953	10,431	11,792	13,617	15,435	17,247	19,056	20,863	22,667	24,470	12,235			

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / \text{rotation spring stiffness [kNm/rad/Egccobox® element]} \times 1,000 \times \text{cantilever length } l_b [m]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 4,000$ psi / 27.6 MPa (SI)

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
Egccobox® tensile bars	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [mm]	470	558	558	558	558	558	558	558	558	558	558	558	558	558
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [mm ²]	239	479	598	718	718	838	958	1077	1197	1317	1436	1556	1676	838
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [mm ²]	319	598	748	898	898	1047	1197	1347	1496	1646	1795	1945	2095	1047
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [mm ²] B500	34	69	69	69	69	69	69	69	69	69	69	69	69	69
shear force level V1 $\geq a_g$ [mm ²] B500	61	122	122	122	122	122	122	122	122	122	122	122	122	122
shear force level V2 $\geq a_g$ [mm ²] B500	92	184	184	184	184	184	184	184	184	184	184	184	184	192
shear force level V3 $\geq a_g$ [mm ²] B500	122	245	245	245	245	245	245	245	245	245	245	245	245	-
shear force level V4 $\geq a_g$ [mm ²] B500	-	384	384	384	384	384	384	384	384	384	384	384	384	240
shear force level VS \pm $\geq a_g$ [mm ²] B500	-	69	69	69	69	69	69	69	69	69	69	69	69	69
shear force level V1 \pm $\geq a_g$ [mm ²] B500	-	122	122	122	122	122	122	122	122	122	122	122	122	122
shear force level V2 \pm $\geq a_g$ [mm ²] B500	-	184	184	184	184	184	184	184	184	184	184	184	184	192
shear force level V3 \pm $\geq a_g$ [mm ²] B500	-	245	245	245	245	245	245	245	245	245	245	245	245	-
shear force level V4 \pm $\geq a_g$ [mm ²] B500	-	384	384	384	384	384	384	384	384	384	384	384	384	240
shear force level V6 \pm $\geq a_g$ [mm ²] B500	33	69	69	69	69	69	69	69	69	69	69	69	69	33
shear force level V7 \pm $\geq a_g$ [mm ²] B500	69	138	138	138	138	138	138	182	182	182	182	182	182	91
shear force level V8 \pm $\geq a_g$ [mm ²] B500	142	287	287	287	287	287	287	287	287	287	287	287	287	142

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_n / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

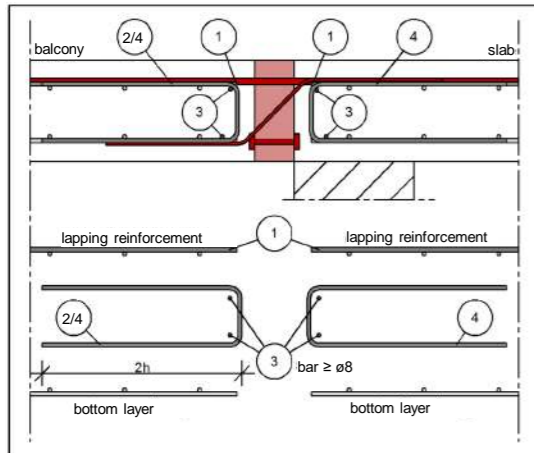
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

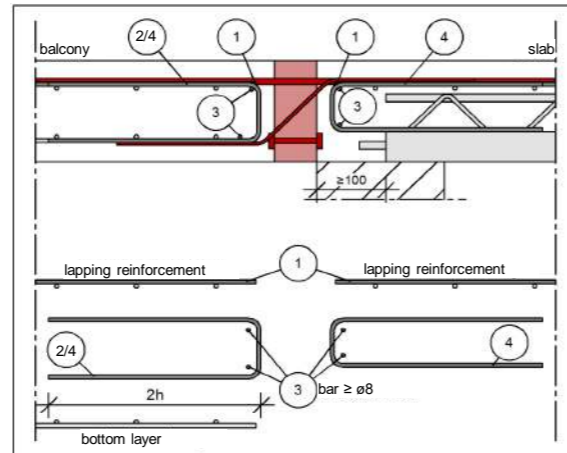
The specifications apply to good bonding conditions.

design proposal

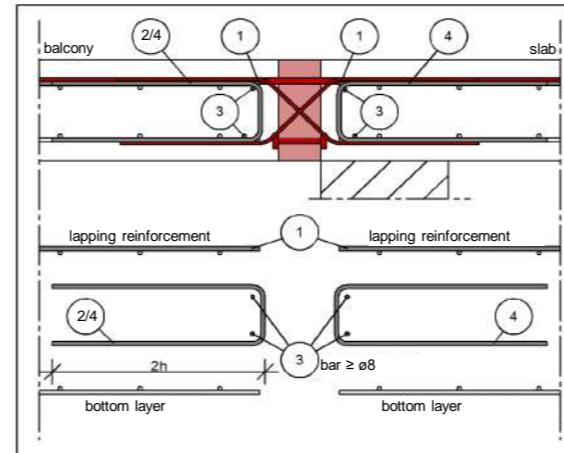
direct support



direct support (semi-prefab slab)



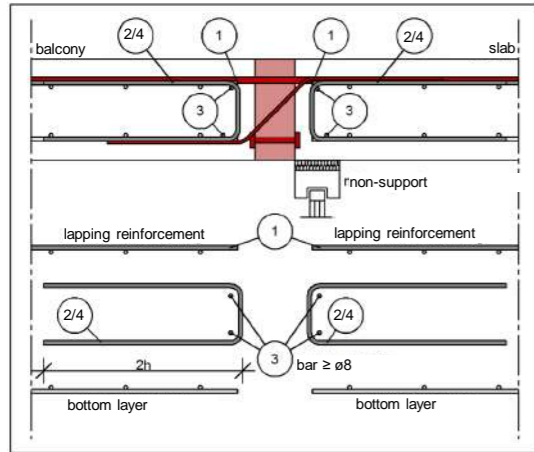
direct support with alternating shear force (V6 \pm , V7 \pm , V8 \pm)



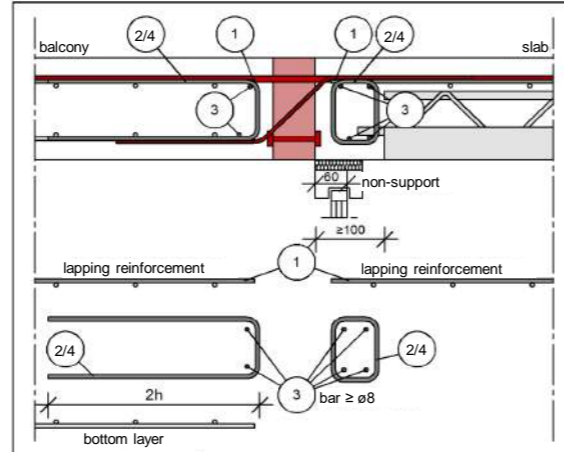
For the Egccobox shear force levels VS \pm to V4 \pm , a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



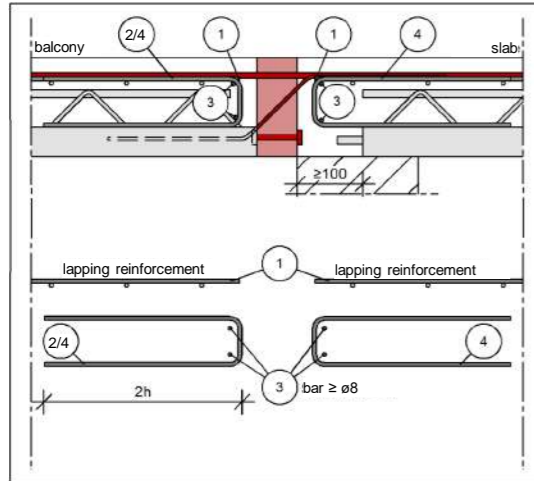
indirect support (semi-prefab slab)



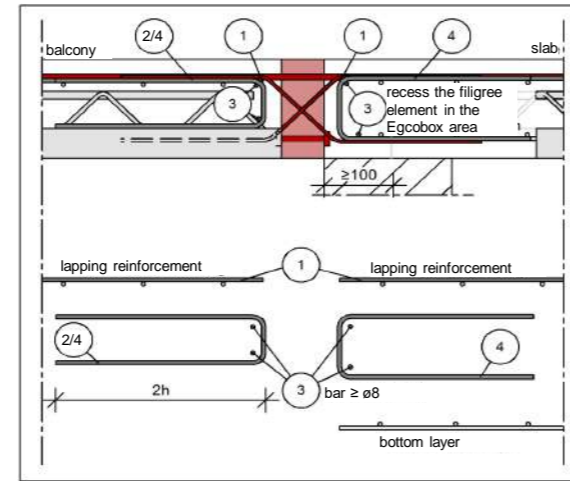
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

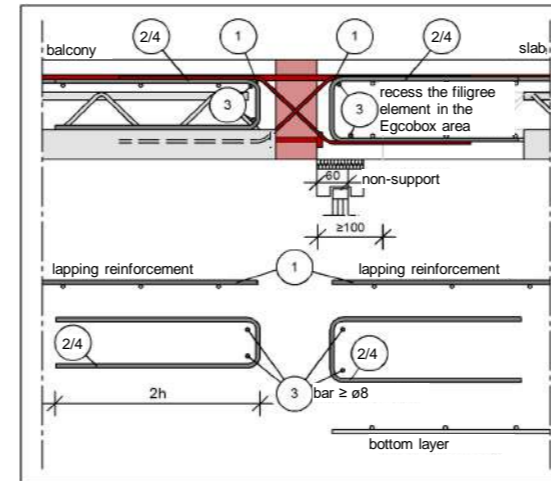
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_{\pm} in semi-prefab balcony



indirect support: Egccobox with V_{\pm} in semi-prefab balcony



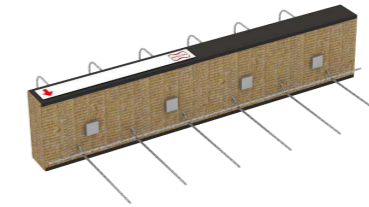
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels VS_{\pm} to $V4_{\pm}$, a constructive edging on the balcony side is generally sufficient.

Design table Egcobox® type VM - concrete strength ≥ 4,000 psi / 27.6 MPa (SI)

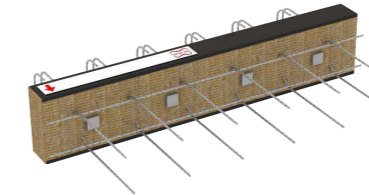
for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
concrete cover top [mm]			ϕV_n [kN/element]									
C40	C55	C70										
height of connection [mm]												
165-300	180-300	195-300	31.0	38.7	55.1	68.9	82.6	110.2	137.7	165.3	-	-
185-300	200-300	215-300	31.0	38.7	55.1	68.9	82.6	110.2	137.7	165.3	215.7	258.9

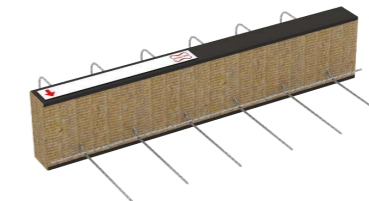
Reinforcement												
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10		
minimum wall / beam width [mm]	180	180	200	200	200	200	200	200	220	220		
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcobox® type VM-K - concrete strength ≥ 4,000 psi / 27.6 MPa (SI)

for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]			200	250	250	300	400	400	500	500
concrete cover top [mm]			ϕV_n [kN/element]							
C40	C55	C70								
height of connection [mm]										
165-300	180-300	195-300	15.5	27.5	41.3	55.1	68.9	-	96.4	-
185-300	200-300	215-300	15.5	27.5	41.3	55.1	68.9	86.3	96.4	129.4

Reinforcement										
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10		
minimum wall / beam width [mm]	180	200	200	200	200	220	200	220		
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		

All Egcobox types can also be produced in the following variants:

- VM_± / VM-K_± - Egcobox® to transfer positive and negative shear forces (shear bars ±)
- VM Z₋ / VM Z₋-K - Egcobox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM / VM-K
- VM Z_± / VM Z_±-K± - Egcobox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars ±); in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM_± / VM-K_±

Egcobox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egcoibox® type VM / VM-K - concrete strength $\geq 4,000$ psi / 27.6 MPa (SI)

Egcoibox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [mm ²]	69	86	122	153	184	245	306	367	479	575
x = shear force bar embedment depth (slab) [mm]	155	155	175	175	175	175	175	175	195	195

Egcoibox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]	200	250	250	300	400	400	500	500
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [mm ²]	34	61	92	122	153	192	214	288
x = shear force bar embedment depth (slab) [mm]	155	175	175	175	175	195	175	195

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

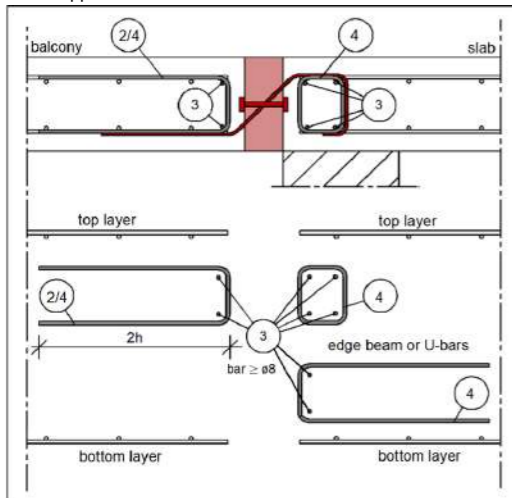
In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

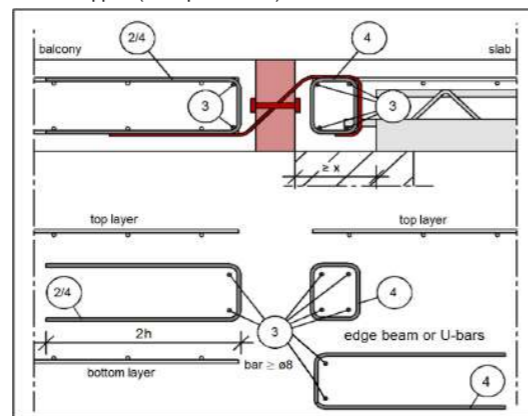
The specifications apply to good bonding conditions.

design proposal

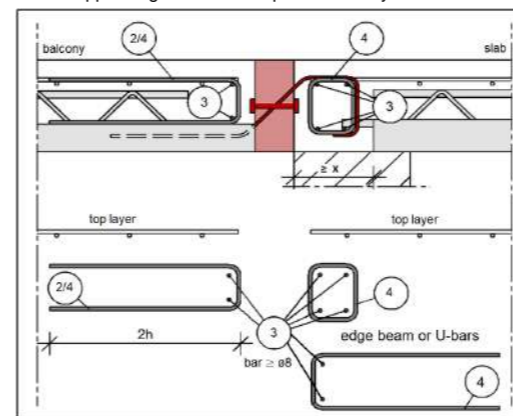
direct support



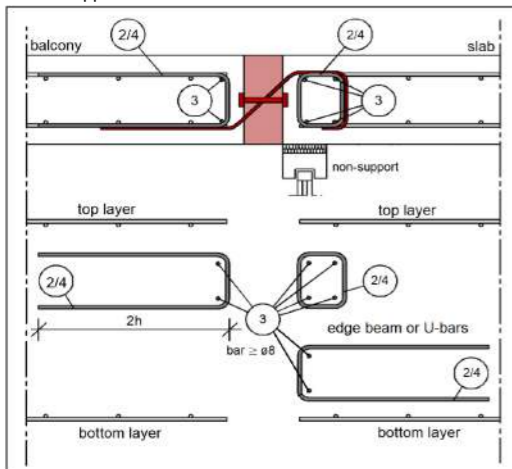
direct support (semi-prefab slab)



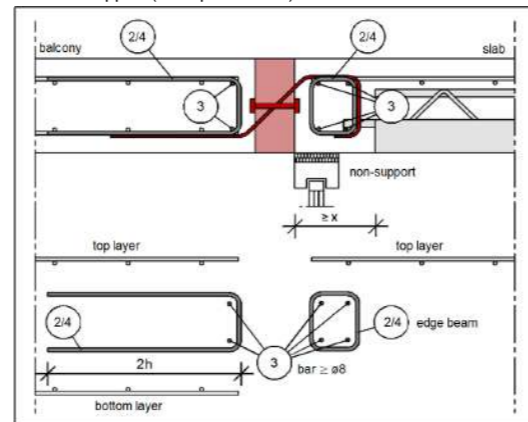
direct support: Egcoibox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egcoibox in semi-prefab balcony:

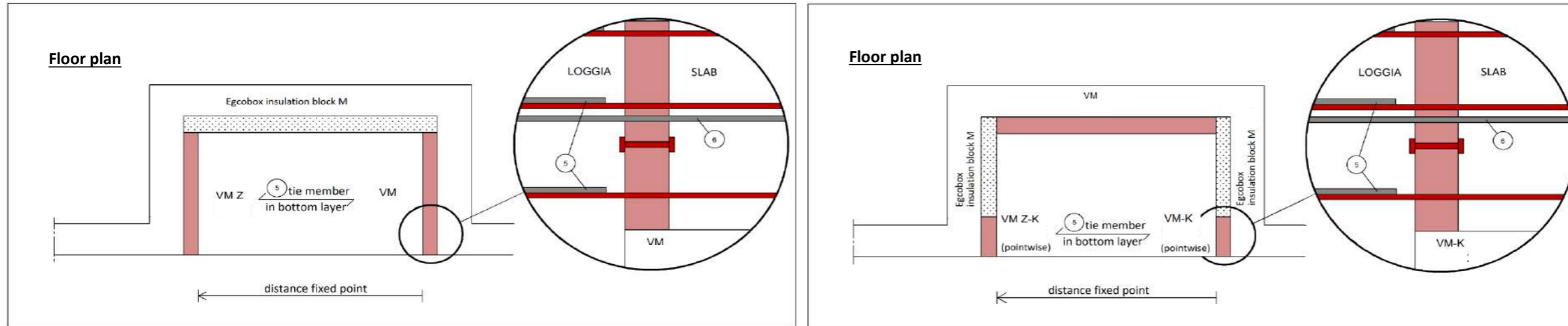
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

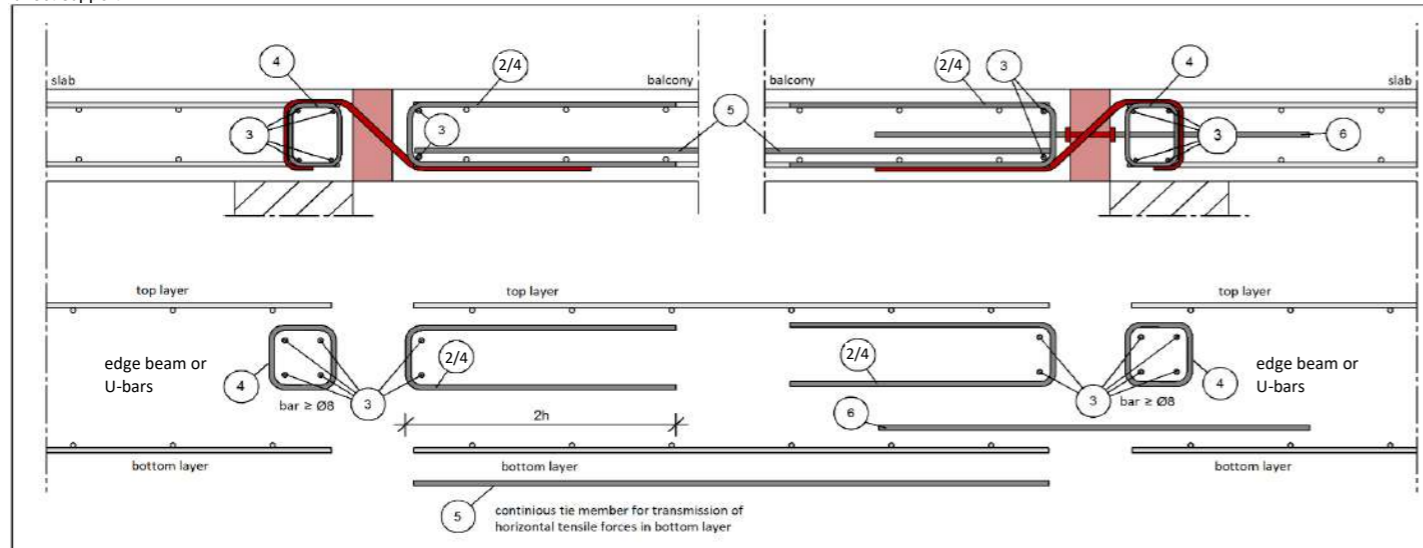
The information on the minimum required connection reinforcement of the Egcoibox of the ceiling-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egcoibox® VM_± / VM_{-K±}. VM_Z / VM_{-K}, VM_{Z±} / VM_{-K±} is similar.

additional information design proposal Egcoibox® VM Z_ / VM Z_-K



direct support

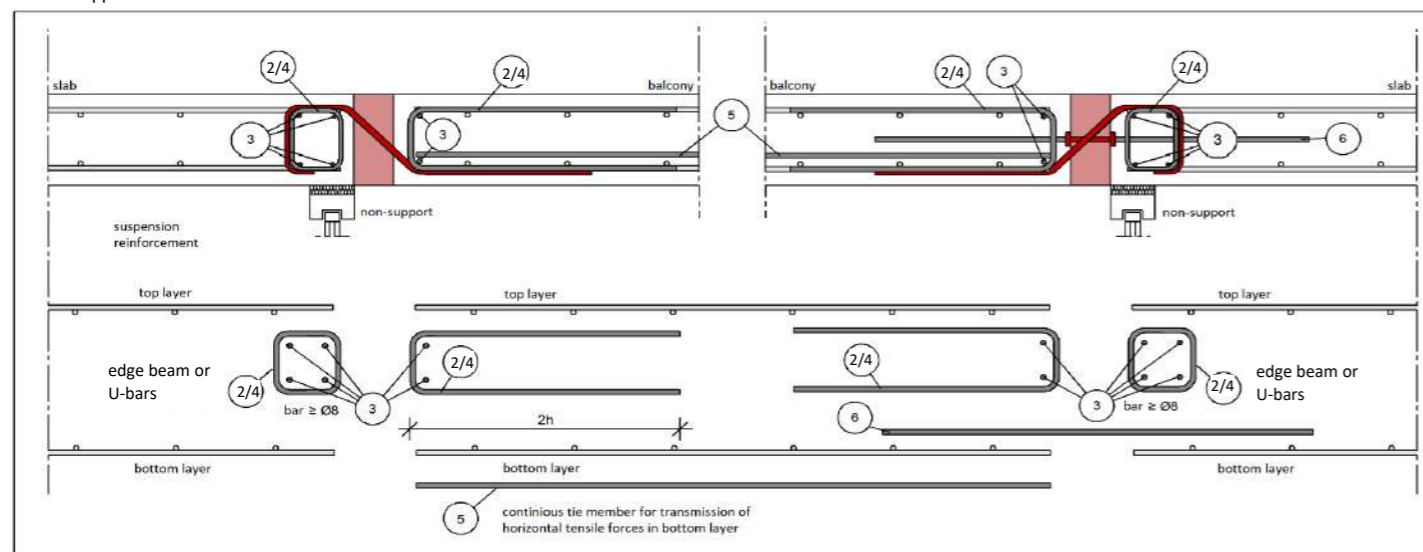


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_y as the bars of the Egcoibox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the Egcoibox VM_ or VM_-K.

indirect support



Design table Egcoibox® type MM± - concrete strength ≥ 4,000 psi / 27.6 MPa (SI)

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 80 mm

Egcoibox type			MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±			
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500			
concrete cover [mm]			ϕM_n [kNm/element]																	
			C40	C55	C70															
height of connection [mm]	175	205	235	±13.2	±16.5	±19.8	±23.1	±26.4	±29.6	±32.9	±33.0	±37.7	±42.4	±47.1	±28.3	±33.0	±37.7	±49.6		
	180	210	240	±14.0	±17.5	±21.0	±24.4	±27.9	±31.4	±34.9	±35.0	±40.0	±45.0	±50.0	±30.0	±35.0	±40.0	±52.8		
	185	215	245	±14.8	±18.5	±22.1	±25.8	±29.5	±33.2	±36.9	±37.1	±42.4	±47.6	±52.9	±31.8	±37.1	±42.4	±55.9		
	190	220	250	±15.6	±19.4	±23.3	±27.2	±31.1	±35.0	±38.9	±39.1	±44.7	±50.3	±55.8	±33.5	±39.1	±44.7	±59.0		
	195	225	255	±16.4	±20.4	±24.5	±28.6	±32.7	±36.8	±40.9	±41.1	±47.0	±52.9	±58.8	±35.3	±41.1	±47.0	±62.2		
	200	230	260	±17.1	±21.4	±25.7	±30.0	±34.3	±38.6	±42.9	±43.2	±49.3	±55.5	±61.7	±37.0	±43.2	±49.3	±65.3		
	205	235	265	±17.9	±22.4	±26.9	±31.4	±35.9	±40.4	±44.9	±45.2	±51.7	±58.1	±64.6	±38.7	±45.2	±51.7	±68.5		
	210	240	270	±18.7	±23.4	±28.1	±32.8	±37.5	±42.2	±46.8	±47.2	±54.0	±60.7	±67.5	±40.5	±47.2	±54.0	±71.6		
	215	245	275	±19.5	±24.4	±29.3	±34.2	±39.1	±43.9	±48.8	±49.3	±56.3	±63.4	±70.4	±42.2	±49.3	±56.3	±74.7		
	220	250	280	±20.3	±25.4	±30.5	±35.6	±40.6	±45.7	±50.8	±51.3	±58.6	±66.0	±73.3	±44.0	±51.3	±58.6	±77.9		
	225	255	285	±21.1	±26.4	±31.7	±37.0	±42.2	±47.5	±52.8	±53.3	±61.0	±68.6	±76.2	±45.7	±53.3	±61.0	±81.0		
	230	260	290	±21.9	±27.4	±32.9	±38.3	±43.8	±49.3	±54.8	±55.4	±63.3	±71.2	±79.1	±47.5	±55.4	±63.3	±84.2		
	235	265	295	±22.7	±28.4	±34.1	±39.7	±45.4	±51.1	±56.8	±57.4	±65.6	±73.8	±82.0	±49.2	±57.4	±65.6	±87.3		
	240	270	300	±23.5	±29.4	±35.2	±41.1	±47.0	±52.9	±58.7	±59.5	±67.9	±76.4	±84.9	±51.0	±59.5	±67.9	±90.4		
	245	275		±24.3	±30.4	±36.4	±42.5	±48.6	±54.7	±60.7	±61.5	±70.3	±79.1	±87.8	±52.7	±61.5	±70.3	±93.6		
	250	280		±25.1	±31.4	±37.6	±43.9	±50.2	±56.4	±62.7	±63.5	±72.6	±81.7	±90.8	±54.5	±63.5	±72.6	±96.7		
	255	285		±25.9	±32.3	±38.8	±45.3	±51.8	±58.2	±64.7	±65.6	±74.9	±84.3	±93.7	±56.2	±65.6	±74.9	±99.9		
	260	290		±26.7	±33.3	±40.0	±46.7	±53.3	±60.0	±66.7	±67.6	±77.3	±86.9	±96.6	±57.9	±67.6	±77.3	±103.0		
	265	295		±27.5	±34.3	±41.2	±48.1	±54.9	±61.8	±68.7	±69.6	±79.6	±89.5	±99.5	±59.7	±69.6	±79.6	±106.1		
	270	300		±28.3	±35.3	±42.4	±49.5	±56.5	±63.6	±70.7	±71.7	±81.9	±92.1	±102.4	±61.4	±71.7	±81.9	±109.3		
	275			±29.1	±36.3	±43.6	±50.8	±58.1	±65.4	±72.6	±73.7	±84.2	±94.8	±105.3	±63.2	±73.7	±84.2	±112.4		
	280			±29.8	±37.3	±44.8	±52.2	±59.7	±67.2	±74.6	±75.7	±86.6	±97.4	±108.2	±64.9	±75.7	±86.6	±115.6		
	285			±30.6	±38.3	±46.0	±53.6	±61.3	±68.9	±76.6	±77.8	±88.9	±100.0	±111.1	±66.7	±77.8	±88.9	±118.7		
	290			±31.4	±39.3	±47.2	±55.0	±62.9	±70.7	±78.6	±79.8	±91.2	±102.6	±114.0	±68.4	±79.8	±91.2	±121.8		
	295			±32.2	±40.3	±48.3	±56.4	±64.5	±72.5	±80.6	±81.8	±93.5	±105.2	±116.9	±70.2	±81.8	±93.5	±125.0		
	300			±33.0	±41.3	±49.5	±57.8	±66.0	±74.3	±82.6	±83.9	±95.9	±107.9	±119.8	±71.9	±83.9	±95.9	±128.1		

Shear force level		concrete cover [mm]			ϕV_n [kN/element]														
		C40	C55	C70															
height of connection [mm]	VS	≥175	≥205	≥235	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	±40.4	
	V1	≥175	≥205	≥235	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6	±71.6
	V2	≥175	≥205	≥235	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5	±107.5
	V3	≥175	≥205	≥235	±143.3	±143.3	±143.3	±143.3	±143.3	±143.3	±143.3	±143.3	±143.3	±143.3	±143.3	-	-	-	-
	V4	≥195	≥225	≥255	-	-	±168.0	±168.0	±168.0	±168.0	±168.0	±168.0	±168.0	±168.0	±168.0	-	-	-	-
V5	≥195	≥225	≥255	-	-	-	-	±224.0	±224.0	±224.0	±224.0	±224.0	±224.0	±224.0	-	-	-	-	

concrete cover for top and bottom reinforcement Egcoibox® [mm]
other heights on request



Reinforcement Egccobox® type MM±

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars from insulation [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
compression bearings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
shear force bars VS	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [m]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	11.7	11.7	11.7	11.7	11.7	11.7	11.7	10.1

Rotation spring stiffness Egccobox® type MM±

Egccobox type				MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]				1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
concrete cover [mm]				Rotation spring stiffness [kNm/rad/Element]														
C40	C55	C70																
height of connection [mm]	175	205	235	618	773	928	1,082	1,237	1,391	1,546	1,484	1,696	1,908	2,120	1,272	1,484	1,696	1,921
	180	210	240	695	869	1,043	1,216	1,390	1,564	1,738	1,673	1,912	2,151	2,390	1,434	1,673	1,912	2,172
	185	215	245	776	970	1,164	1,359	1,553	1,747	1,941	1,873	2,141	2,408	2,676	1,606	1,873	2,141	2,439
	190	220	250	862	1,078	1,293	1,509	1,724	1,940	2,155	2,085	2,382	2,680	2,978	1,787	2,085	2,382	2,720
	195	225	255	952	1,190	1,428	1,666	1,905	2,143	2,381	2,307	2,637	2,967	3,296	1,978	2,307	2,637	3,017
	200	230	260	1,047	1,309	1,570	1,832	2,094	2,356	2,617	2,542	2,905	3,268	3,631	2,178	2,542	2,905	3,330
	205	235	265	1,146	1,433	1,719	2,006	2,292	2,579	2,865	2,787	3,185	3,583	3,981	2,389	2,787	3,185	3,658
	210	240	270	1,250	1,562	1,875	2,187	2,500	2,812	3,125	3,044	3,478	3,913	4,348	2,609	3,044	3,478	4,001
	215	245	275	1,358	1,697	2,037	2,376	2,716	3,055	3,395	3,312	3,785	4,258	4,731	2,839	3,312	3,785	4,360
	220	250	280	1,471	1,838	2,206	2,574	2,941	3,309	3,677	3,591	4,104	4,617	5,130	3,078	3,591	4,104	4,734
	225	255	285	1,588	1,985	2,382	2,779	3,176	3,572	3,969	3,882	4,436	4,991	5,545	3,327	3,882	4,436	5,123
	230	260	290	1,709	2,137	2,564	2,991	3,419	3,846	4,273	4,184	4,781	5,379	5,977	3,586	4,184	4,781	5,528
	235	265	295	1,835	2,294	2,753	3,212	3,671	4,130	4,589	4,497	5,139	5,782	6,424	3,855	4,497	5,139	5,948
	240	270	300	1,966	2,458	2,949	3,441	3,932	4,424	4,915	4,822	5,510	6,199	6,888	4,133	4,822	5,510	6,384
	245	275		2,101	2,626	3,152	3,677	4,202	4,728	5,253	5,157	5,894	6,631	7,368	4,421	5,157	5,894	6,835
	250	280		2,241	2,801	3,361	3,921	4,482	5,042	5,602	5,505	6,291	7,077	7,864	4,718	5,505	6,291	7,302
	255	285		2,385	2,981	3,577	4,173	4,770	5,366	5,962	5,863	6,701	7,538	8,376	5,026	5,863	6,701	7,783
	260	290		2,533	3,167	3,800	4,433	5,067	5,700	6,333	6,233	7,123	8,014	8,904	5,343	6,233	7,123	8,281
	265	295		2,686	3,358	4,030	4,701	5,373	6,044	6,716	6,614	7,559	8,504	9,449	5,669	6,614	7,559	8,793
	270	300		2,844	3,555	4,266	4,977	5,688	6,399	7,110	7,007	8,008	9,008	10,009	6,006	7,007	8,008	9,321
	275			3,006	3,757	4,509	5,260	6,012	6,763	7,515	7,410	8,469	9,528	10,586	6,352	7,410	8,469	9,865
	280			3,172	3,966	4,759	5,552	6,345	7,138	7,931	7,825	8,943	10,061	11,179	6,708	7,825	8,943	10,423
	285			3,343	4,179	5,015	5,851	6,687	7,523	8,359	8,252	9,431	10,609	11,788	7,073	8,252	9,431	10,998
	290			3,519	4,399	5,278	6,158	7,038	7,918	8,797	8,689	9,931	11,172	12,414	7,448	8,689	9,931	11,587
	295			3,699	4,624	5,548	6,473	7,398	8,323	9,247	9,138	10,444	11,749	13,055	7,833	9,138	10,444	12,192
	300			3,883	4,854	5,825	6,796	7,767	8,738	9,708	9,599	10,970	12,341	13,713	8,228	9,599	10,970	12,813

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / \text{rotation spring stiffness [kNm/rad/Egccobox® element]} \times 1,000 \times \text{cantilever length } l_b [m]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 4,000 psi / 27.6 MPa (SI)

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
Egcoibox® tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [mm]	558	558	558	558	558	558	558	701	701	701	701	701	701	701	1173
item ① - lapping reinforcement / element - option 1															
≥ a _s [mm ²]	479	598	718	838	958	1077	1197	1222	1396	1571	1746	1047	1222	1396	1407
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [mm ²]	598	748	898	1047	1197	1347	1496	1466	1676	1885	2095	1257	1466	1676	1407
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [mm ²] B500	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
shear force level V1 ≥ a _s [mm ²] B500	159	159	159	159	159	159	159	159	159	159	159	159	159	159	159
shear force level V2 ≥ a _s [mm ²] B500	239	239	239	239	239	239	239	239	239	239	239	239	239	238	239
shear force level V3 ≥ a _s [mm ²] B500	318	318	318	318	318	318	318	318	318	318	318	-	-	-	-
shear force level V4 ≥ a _s [mm ²] B500	-	-	373	373	373	373	373	373	373	373	373	-	-	-	-
shear force level V5 ≥ a _s [mm ²] B500	-	-	-	-	498	498	498	498	498	498	498	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φV_a / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ ø8) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_l / φM_n.

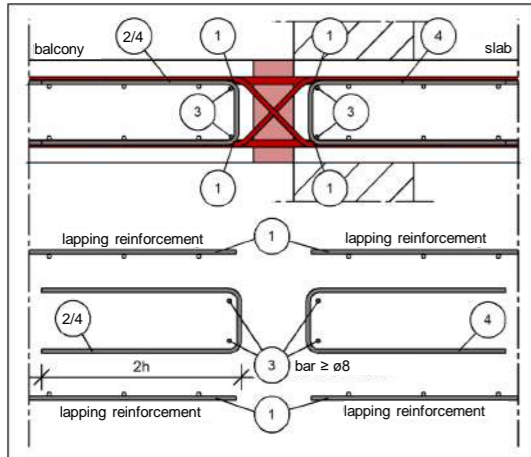
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_a / f_{yd}.

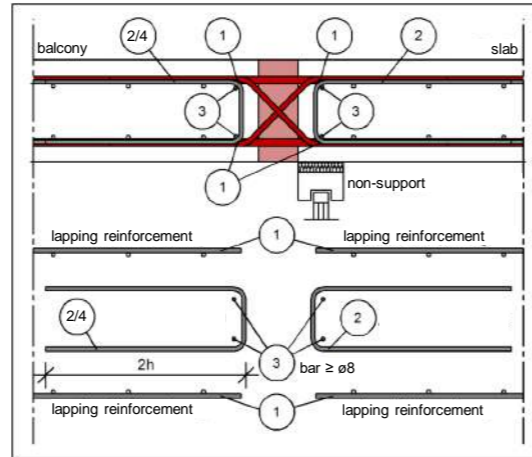
The specifications apply to good bonding conditions.

design proposal

direct support



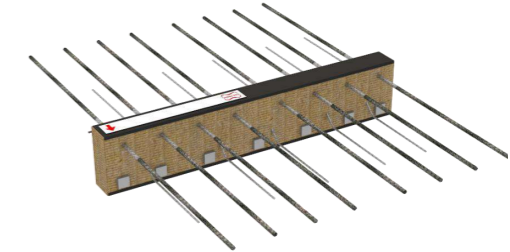
indirect support



Design table Egccobox® type MM - concrete strength ≥ 4,350 psi / 30.0 MPa (SI)

for cantilever slabs for transmission of moment and shear force, insulation 80 mm

Egccobox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500		
concrete cover top [mm]			ϕM_n [kNm/element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	-8.0	-13.9	-17.4	-20.9	-20.9	-24.3	-27.8	-31.3	-34.8	-38.2	-41.7	-45.2	-48.7	-24.3		
	170	185	200	-8.5	-14.7	-18.4	-22.1	-22.1	-25.8	-29.5	-33.2	-36.8	-40.5	-44.2	-47.9	-51.6	-25.8		
	175	190	205	-8.9	-15.6	-19.5	-23.3	-23.3	-27.2	-31.1	-35.0	-38.9	-42.8	-46.7	-50.6	-54.5	-27.2		
	180	195	210	-9.4	-16.4	-20.5	-24.6	-24.6	-28.7	-32.8	-36.9	-41.0	-45.1	-49.2	-53.3	-57.4	-28.7		
	185	200	215	-9.9	-17.2	-21.5	-25.8	-25.8	-30.1	-34.4	-38.7	-43.0	-47.4	-51.7	-56.0	-60.3	-30.1		
	190	205	220	-10.3	-18.0	-22.6	-27.1	-27.1	-31.6	-36.1	-40.6	-45.1	-49.6	-54.1	-58.7	-63.2	-31.6		
	195	210	225	-10.8	-18.9	-23.6	-28.3	-28.3	-33.0	-37.7	-42.5	-47.2	-51.9	-56.6	-61.3	-66.1	-33.0		
	200	215	230	-11.2	-19.7	-24.6	-29.6	-29.6	-34.5	-39.4	-44.3	-49.3	-54.2	-59.1	-64.0	-69.0	-34.5		
	205	220	235	-11.7	-20.5	-25.7	-30.8	-30.8	-35.9	-41.1	-46.2	-51.3	-56.5	-61.6	-66.7	-71.9	-35.9		
	210	225	240	-12.2	-21.4	-26.7	-32.0	-32.0	-37.4	-42.7	-48.1	-53.4	-58.7	-64.1	-69.4	-74.8	-37.4		
	215	230	245	-12.6	-22.2	-27.7	-33.3	-33.3	-38.8	-44.4	-49.9	-55.5	-61.0	-66.6	-72.1	-77.6	-38.8		
	220	235	250	-13.1	-23.0	-28.8	-34.5	-34.5	-40.3	-46.0	-51.8	-57.5	-63.3	-69.0	-74.8	-80.5	-40.3		
	225	240	255	-13.6	-23.8	-29.8	-35.8	-35.8	-41.7	-47.7	-53.6	-59.6	-65.6	-71.5	-77.5	-83.4	-41.7		
	230	245	260	-14.0	-24.7	-30.8	-37.0	-37.0	-43.2	-49.3	-55.5	-61.7	-67.8	-74.0	-80.2	-86.3	-43.2		
	235	250	265	-14.5	-25.5	-31.9	-38.2	-38.2	-44.6	-51.0	-57.4	-63.7	-70.1	-76.5	-82.9	-89.2	-44.6		
	240	255	270	-15.0	-26.3	-32.9	-39.5	-39.5	-46.1	-52.6	-59.2	-65.8	-72.4	-79.0	-85.6	-92.1	-46.1		
	245	260	275	-15.4	-27.2	-33.9	-40.7	-40.7	-47.5	-54.3	-61.1	-67.9	-74.7	-81.5	-88.2	-95.0	-47.5		
	250	265	280	-15.9	-28.0	-35.0	-42.0	-42.0	-49.0	-56.0	-63.0	-70.0	-76.9	-83.9	-90.9	-97.9	-49.0		
	255	270	285	-16.4	-28.8	-36.0	-43.2	-43.2	-50.4	-57.6	-64.8	-72.0	-79.2	-86.4	-93.6	-100.8	-50.4		
	260	275	290	-16.8	-29.6	-37.0	-44.5	-44.5	-51.9	-59.3	-66.7	-74.1	-81.5	-88.9	-96.3	-103.7	-51.9		
	265	280	295	-17.3	-30.5	-38.1	-45.7	-45.7	-53.3	-60.9	-68.5	-76.2	-83.8	-91.4	-99.0	-106.6	-53.3		
	270	285	300	-17.8	-31.3	-39.1	-46.9	-46.9	-54.8	-62.6	-70.4	-78.2	-86.1	-93.9	-101.7	-109.5	-54.8		
	275	290		-18.2	-32.1	-40.1	-48.2	-48.2	-56.2	-64.2	-72.3	-80.3	-88.3	-96.4	-104.4	-112.4	-56.2		
	280	295		-18.7	-32.9	-41.2	-49.4	-49.4	-57.7	-65.9	-74.1	-82.4	-90.6	-98.8	-107.1	-115.3	-57.7		
	285	300		-19.2	-33.8	-42.2	-50.7	-50.7	-59.1	-67.6	-76.0	-84.4	-92.9	-101.3	-109.8	-118.2	-59.1		
	290			-19.6	-34.6	-43.3	-51.9	-51.9	-60.6	-69.2	-77.9	-86.5	-95.2	-103.8	-112.5	-121.1	-60.6		
	295			-20.1	-35.4	-44.3	-53.1	-53.1	-62.0	-70.9	-79.7	-88.6	-97.4	-106.3	-115.2	-124.0	-62.0		
	300			-20.5	-36.3	-45.3	-54.4	-54.4	-63.5	-72.5	-81.6	-90.6	-99.7	-108.8	-117.8	-126.9	-63.5		



Shear force level		concrete cover top [mm]			ϕV_n [kN/element]													
		C40	C55	C70														
height of connection [mm]	VS	≥165	≥180	≥195	16.2	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3	32.3	
	V1	≥165	≥180	≥195	28.7	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	57.4	
	V2	≥165	≥180	≥195	43.1	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	86.2	
	V3	≥165	≥180	≥195	57.4	114.9	114.9	114.9	114.9	114.9	114.9	114.9	114.9	114.9	114.9	114.9	-	
	V4	≥185	≥200	≥215	-	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	180.0	112.5	
	V6±	≥165	≥180	≥195	+16.2 /-16.2	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+32.3 /-32.3	+16.2 /-16.2	
	V7±	≥165	≥180	≥195	+32.3 /-24.2	+64.6 /-48.5	+64.6 /-48.5	+64.6 /-48.5	+64.6 /-48.5	+64.6 /-48.5	+64.6 /-48.5	+64.6 /-48.5	+86.2 /-57.4	+86.2 /-57.4	+86.2 /-57.4	+86.2 /-57.4	+43.1 /-28.7	
	V8±	≥185	≥200	≥215	+67.5 /-67.5	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+135.0 /-135.0	+67.5 /-67.5	

Shear force level VS to V4 also possible with lifting shear force (-16.2 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥180 mm (C40), ≥195 mm (C55), ≥210 mm (C70)

The Egccobox® is also available as semi-prefab version in variant "FO" (height ≥190 mm) or "F" (height ≥165 mm); e.g. MM50-FO-V1-C40-h200

Reinforcement Egccobox® type MM

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
tensile bars	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars from insulation [mm]	505	610	610	610	610	610	610	610	610	610	610	610	610	610
compression bearings	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS±	-	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6	4 ø6 / 2 ø6
shear force bars V1±	-	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8	4 ø8 / 2 ø8
shear force bars V2±	-	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	6 ø8 / 2 ø8	4 ø10 / 2 ø6
shear force bars V3±	-	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	8 ø8 / 2 ø8	-
shear force bars V4±	-	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	8 ø10 / 2 ø6	5 ø10 / 2 ø6
shear force bars V6±	2 ø6 / 2 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	4 ø6 / 4 ø6	2 ø6 / 2 ø6
shear force bars V7±	4 ø6 / 3 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	8 ø6 / 6 ø6	6 ø8 / 4 ø8	6 ø8 / 4 ø8	6 ø8 / 4 ø8	6 ø8 / 4 ø8	6 ø8 / 4 ø8	3 ø8 / 2 ø8
shear force bars V8±	3 ø10 / 3 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	6 ø10 / 6 ø10	3 ø10 / 3 ø10
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	11.7	11.7

Rotation spring stiffness Egccobox® type MM

Egccobox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500		
concrete cover top [mm]			Rotation spring stiffness [kNm/rad/Element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	765	1,057	1,269	1,464	1,535	1,735	2,003	2,271	2,537	2,804	3,069	3,335	3,600	1,800		
	170	185	200	856	1,187	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,446	3,744	4,041	2,021		
	175	190	205	953	1,324	1,589	1,834	1,922	2,172	2,509	2,844	3,178	3,511	3,844	4,176	4,508	2,254		
	180	195	210	1,055	1,468	1,762	2,034	2,132	2,410	2,783	3,154	3,525	3,894	4,263	4,632	5,001	2,500		
	185	200	215	1,162	1,620	1,945	2,245	2,352	2,659	3,071	3,481	3,890	4,297	4,705	5,112	5,518	2,759		
	190	205	220	1,274	1,780	2,136	2,466	2,584	2,921	3,373	3,824	4,273	4,721	5,168	5,615	6,062	3,031		
	195	210	225	1,391	1,947	2,337	2,697	2,827	3,195	3,690	4,182	4,673	5,164	5,653	6,142	6,631	3,315		
	200	215	230	1,514	2,121	2,546	2,939	3,080	3,482	4,021	4,557	5,092	5,627	6,160	6,693	7,225	3,613		
	205	220	235	1,642	2,303	2,765	3,191	3,344	3,780	4,366	4,948	5,529	6,109	6,688	7,267	7,845	3,923		
	210	225	240	1,775	2,493	2,992	3,453	3,619	4,091	4,725	5,355	5,984	6,612	7,239	7,865	8,490	4,245		
	215	230	245	1,913	2,690	3,229	3,726	3,905	4,415	5,098	5,779	6,457	7,134	7,811	8,486	9,161	4,581		
	220	235	250	2,056	2,894	3,474	4,009	4,202	4,750	5,486	6,218	6,948	7,677	8,404	9,131	9,858	4,929		
	225	240	255	2,204	3,106	3,728	4,303	4,510	5,098	5,887	6,673	7,457	8,239	9,020	9,800	10,580	5,290		
	230	245	260	2,358	3,326	3,992	4,607	4,829	5,458	6,303	7,145	7,984	8,821	9,657	10,493	11,327	5,664		
	235	250	265	2,516	3,553	4,264	4,921	5,158	5,831	6,734	7,632	8,529	9,423	10,316	11,209	12,100	6,050		
	240	255	270	2,680	3,787	4,546	5,246	5,498	6,216	7,178	8,136	9,091	10,045	10,997	11,948	12,899	6,449		
	245	260	275	2,849	4,029	4,836	5,581	5,850	6,613	7,636	8,656	9,672	10,686	11,699	12,711	13,723	6,861		
	250	265	280	3,024	4,278	5,135	5,927	6,212	7,022	8,109	9,192	10,271	11,348	12,424	13,498	14,572	7,286		
	255	270	285	3,203	4,535	5,444	6,283	6,585	7,444	8,596	9,743	10,888	12,029	13,170	14,309	15,447	7,724		
	260	275	290	3,388	4,800	5,761	6,649	6,969	7,878	9,097	10,311	11,522	12,731	13,938	15,143	16,348	8,174		
	265	280	295	3,577	5,072	6,087	7,026	7,364	8,324	9,613	10,896	12,175	13,452	14,727	16,001	17,274	8,637		
	270	285	300	3,772	5,351	6,423	7,413	7,769	8,782	10,142	11,496	12,846	14,193	15,538	16,882	18,225	9,113		
	275	290		3,972	5,638	6,767	7,810	8,186	9,253	10,686	12,112	13,534	14,954	16,371	17,787	19,202	9,601		
	280	295		4,178	5,932	7,120	8,218	8,613	9,736	11,244	12,744	14,241	15,734	17,226	18,716	20,205	10,102		
	285	300		4,388	6,234	7,483	8,636	9,051	10,232	11,816	13,393	14,966	16,535	18,103	19,668	21,233	10,617		
	290			4,604	6,543	7,854	9,065	9,500	10,740	12,402	14,057	15,708	17,356	19,001	20,644	22,287	11,143		
	295			4,824	6,860	8,234	9,503	9,960	11,260	13,003	14,738	16,469	18,196	19,921	21,644	23,366	11,683		
	300			5,050	7,184	8,624	9,953	10,431	11,792	13,617	15,435	17,247	19,056	20,863	22,667	24,470	12,235		

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / \text{rotation spring stiffness [kNm/rad/Egccobox® element]} \times 1,000 \times \text{cantilever length } l_b [m]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 4,350$ psi / 30.0 MPa (SI)

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
Egccobox® tensile bars	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [mm]	470	558	558	558	558	558	558	558	558	558	558	558	558	558
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [mm ²]	239	479	598	718	718	838	958	1077	1197	1317	1436	1556	1676	838
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [mm ²]	319	598	748	898	898	1047	1197	1347	1496	1646	1795	1945	2095	1047
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [mm ²] B500	36	72	72	72	72	72	72	72	72	72	72	72	72	72
shear force level V1 $\geq a_g$ [mm ²] B500	64	128	128	128	128	128	128	128	128	128	128	128	128	128
shear force level V2 $\geq a_g$ [mm ²] B500	96	191	191	191	191	191	191	191	191	191	191	191	191	#WERT!
shear force level V3 $\geq a_g$ [mm ²] B500	128	255	255	255	255	255	255	255	255	255	255	255	255	-
shear force level V4 $\geq a_g$ [mm ²] B500	-	400	400	400	400	400	400	400	400	400	400	400	400	250
shear force level VS± $\geq a_g$ [mm ²] B500	-	72	72	72	72	72	72	72	72	72	72	72	72	72
shear force level V1± $\geq a_g$ [mm ²] B500	-	128	128	128	128	128	128	128	128	128	128	128	128	128
shear force level V2± $\geq a_g$ [mm ²] B500	-	191	191	191	191	191	191	191	191	191	191	191	191	#WERT!
shear force level V3± $\geq a_g$ [mm ²] B500	-	255	255	255	255	255	255	255	255	255	255	255	255	-
shear force level V4± $\geq a_g$ [mm ²] B500	-	400	400	400	400	400	400	400	400	400	400	400	400	250
shear force level V6± $\geq a_g$ [mm ²] B500	36	71	71	71	71	71	71	71	71	71	71	71	71	36
shear force level V7± $\geq a_g$ [mm ²] B500	71	142	142	142	142	142	142	191	191	191	191	191	191	96
shear force level V8± $\geq a_g$ [mm ²] B500	149	300	300	300	300	300	300	300	300	300	300	300	300	149

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_a / f_{y,d}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_s / \phi M_n$.

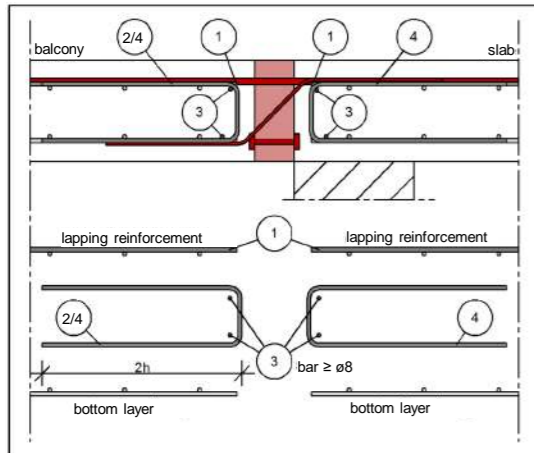
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_a / f_{y,d}$.

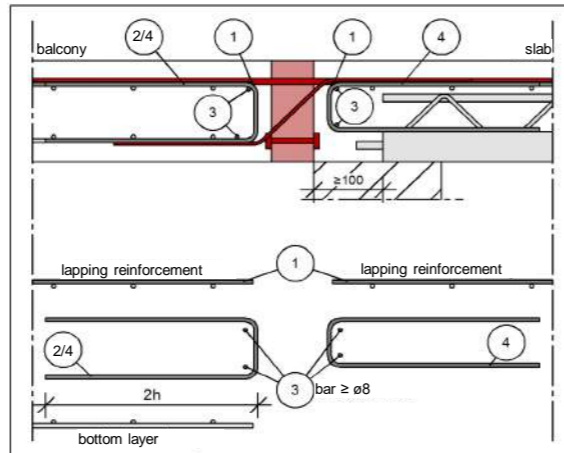
The specifications apply to good bonding conditions.

design proposal

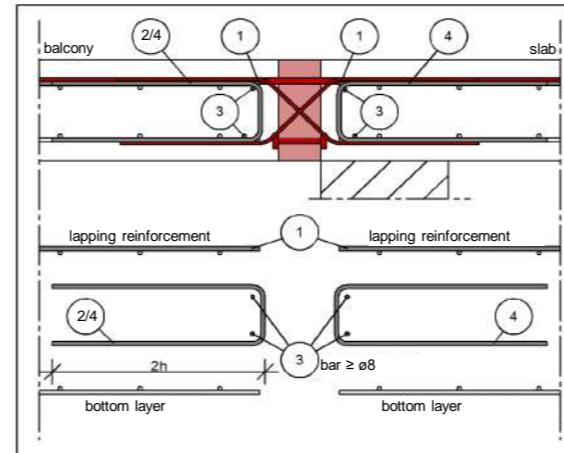
direct support



direct support (semi-prefab slab)



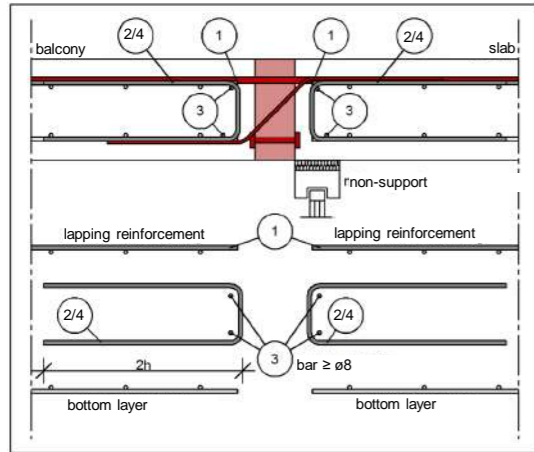
direct support with alternating shear force (V6±, V7±, V8±)



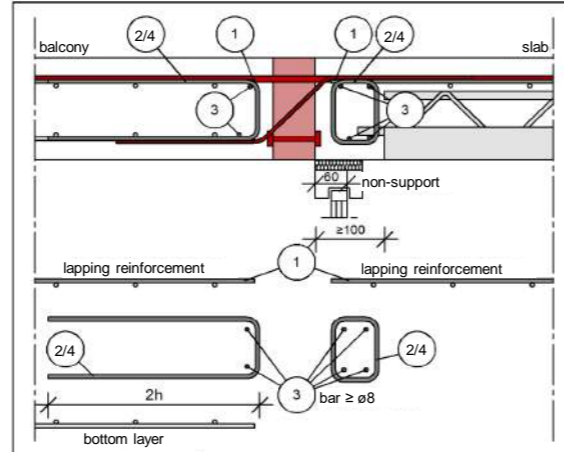
For the Egccobox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



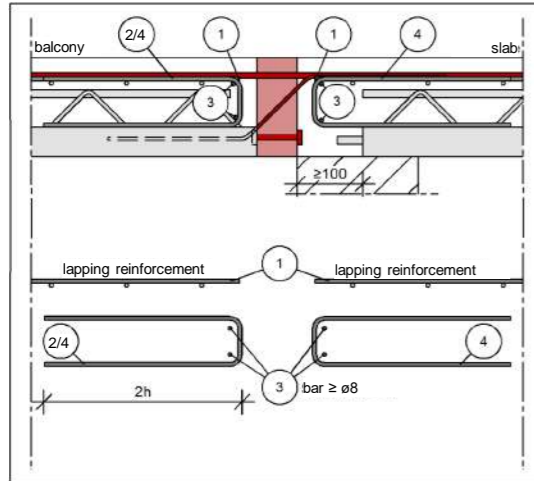
indirect support (semi-prefab slab)



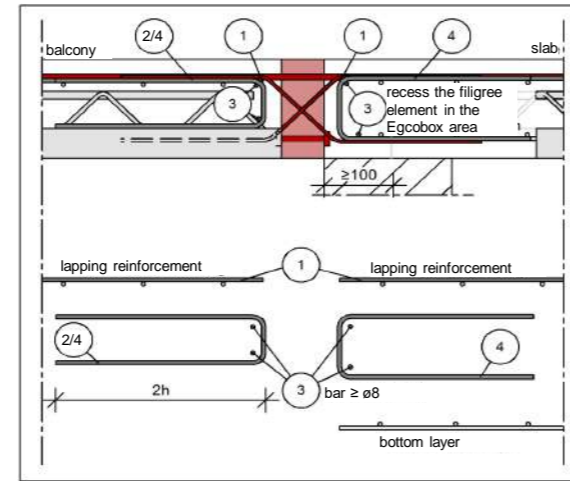
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

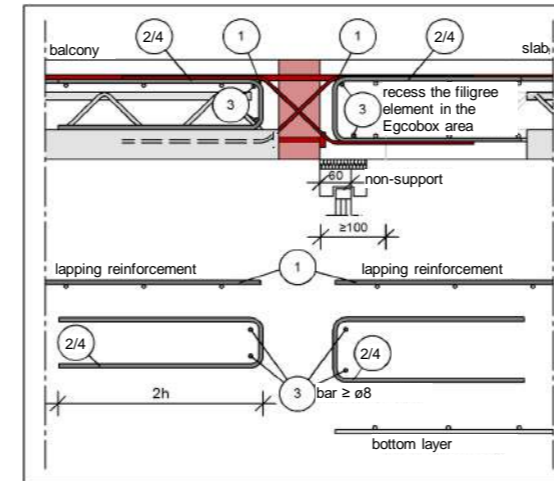
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_± in semi-prefab balcony



indirect support: Egccobox with V_± in semi-prefab balcony



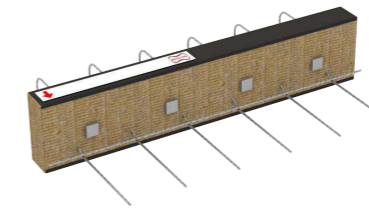
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

Design table Egcobox® type VM - concrete strength $\geq 4,350$ psi / 30.0 MPa (SI)

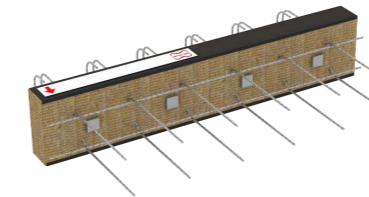
for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
concrete cover top [mm]			ϕV_n [kN/element]									
C40	C55	C70										
height of connection [mm]												
165-300	180-300	195-300	32.3	40.4	57.4	71.8	86.2	114.9	143.6	172.3	-	-
185-300	200-300	215-300	32.3	40.4	57.4	71.8	86.2	114.9	143.6	172.3	225.0	270.0

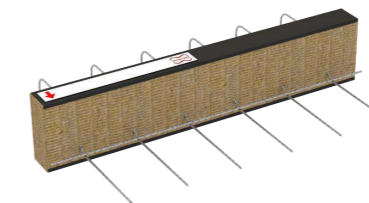
Reinforcement												
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10		
minimum wall / beam width [mm]	180	180	200	200	200	200	200	200	220	220		
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcobox® type VM-K - concrete strength $\geq 4,350$ psi / 30.0 MPa (SI)

for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]			200	250	250	300	400	400	500	500
concrete cover top [mm]			ϕV_n [kN/element]							
C40	C55	C70								
height of connection [mm]										
165-300	180-300	195-300	16.2	28.7	43.1	57.4	71.8	-	100.5	-
185-300	200-300	215-300	16.2	28.7	43.1	57.4	71.8	90.0	100.5	135.0

Reinforcement										
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10		
minimum wall / beam width [mm]	180	200	200	200	200	220	200	220		
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		

All Egcobox types can also be produced in the following variants:

- VM_± / VM-K_± - Egcobox® to transfer positive and negative shear forces (shear bars \pm)
- VM Z₋ / VM Z₋-K - Egcobox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM / VM-K
- VM Z_± / VM Z_±-K_± - Egcobox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars \pm); in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM_± / VM-K_±

Egcobox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egcoibox® type VM / VM-K - concrete strength $\geq 4,350$ psi / 30.0 MPa (SI)

Egcoibox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [mm ²]	72	90	128	160	191	255	319	383	500	600
x = shear force bar embedment depth (slab) [mm]	155	155	175	175	175	175	175	175	195	195

Egcoibox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]	200	250	250	300	400	400	500	500
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [mm ²]	36	64	96	128	160	200	223	300
x = shear force bar embedment depth (slab) [mm]	155	175	175	175	175	195	175	195

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

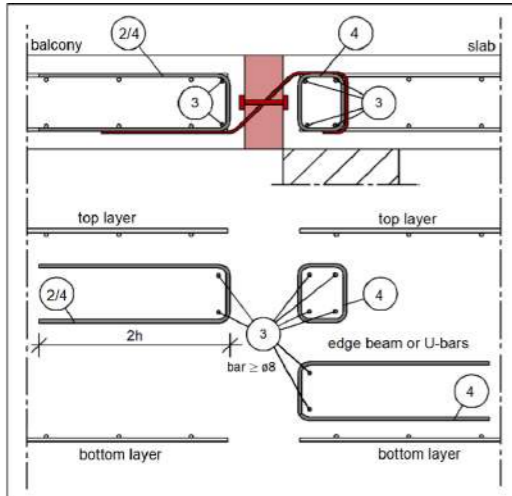
In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

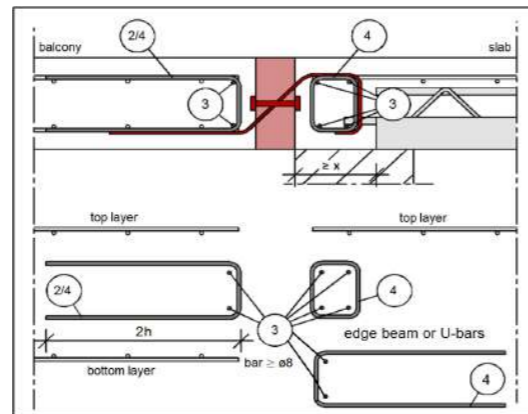
The specifications apply to good bonding conditions.

design proposal

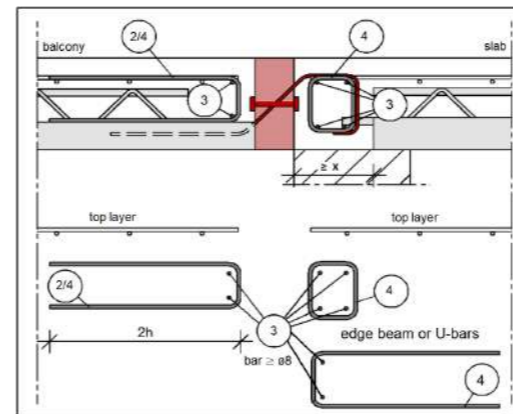
direct support



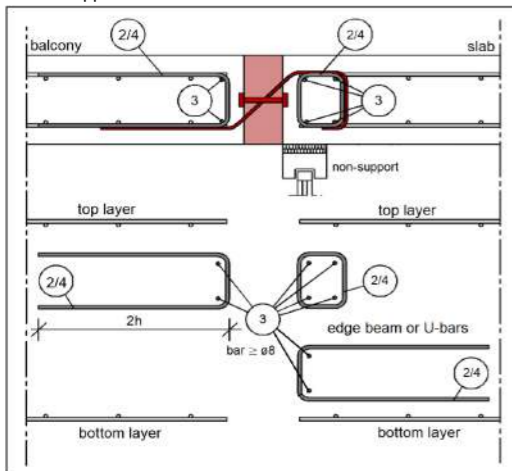
direct support (semi-prefab slab)



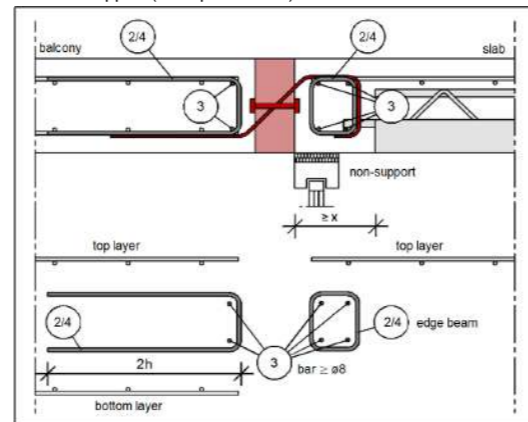
direct support: Egcoibox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egcoibox in semi-prefab balcony:

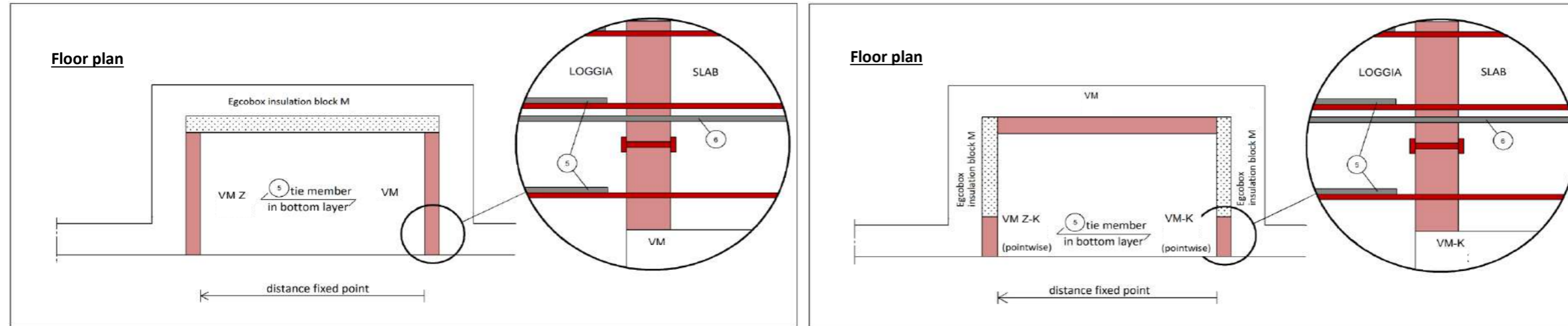
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

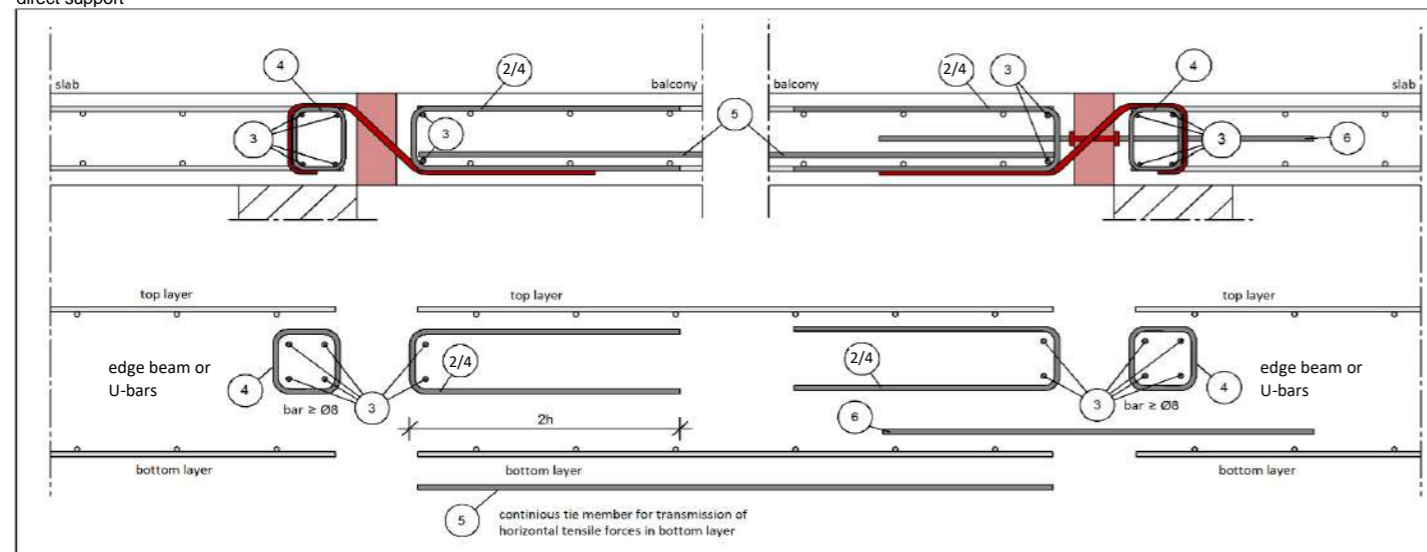
The information on the minimum required connection reinforcement of the Egcoibox of the ceiling-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egcoibox® VM_± / VM_{-K±}. VM_Z / VM_{-K}, VM_{Z±} / VM_{-K±} is similar.

additional information design proposal Egcoibox® VM Z_ / VM Z_-K



direct support

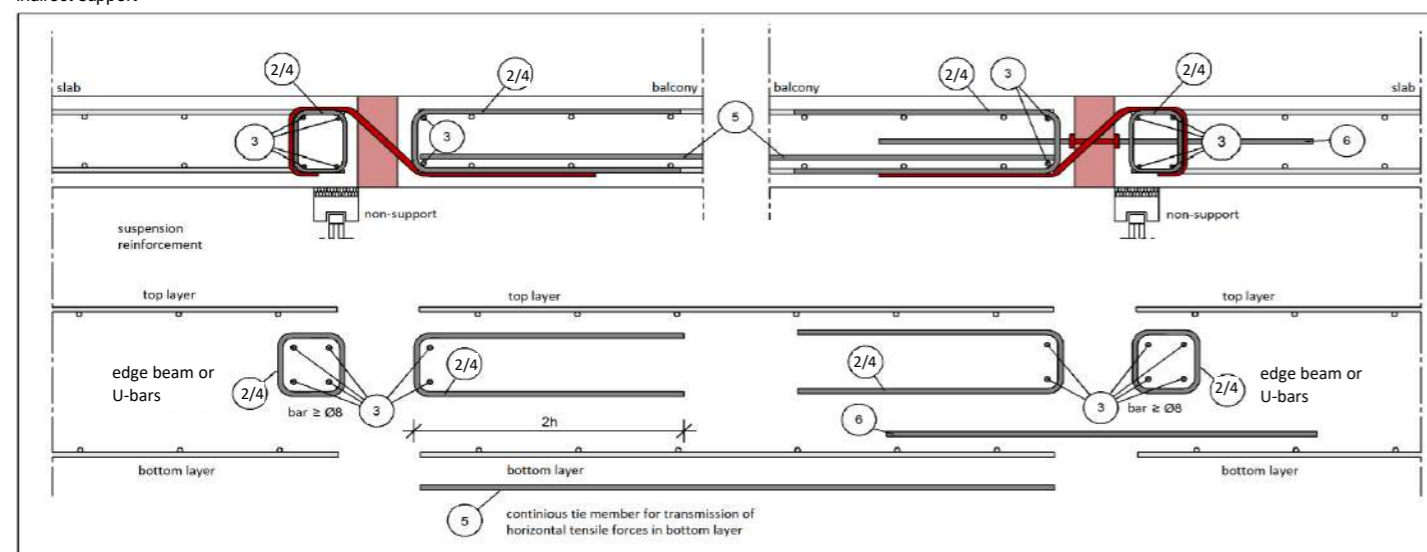


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_y as the bars of the Egcoibox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the Egcoibox VM_ or VM_-K.

indirect support



Design table Egcoibox® type MM± - concrete strength ≥ 4,350 psi / 30.0 MPa (SI)

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 80 mm

Egcoibox type			MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±			
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500			
concrete cover [mm]			ϕM_n [kNm/element]																	
			C40	C55	C70															
height of connection [mm]	175	205	235	±13.7	±17.2	±20.6	±24.0	±27.5	±30.9	±34.4	±34.4	±39.3	±44.2	±49.1	±29.5	±34.4	±39.3	±49.6		
	180	210	240	±14.6	±18.2	±21.9	±25.5	±29.1	±32.8	±36.4	±36.5	±41.7	±47.0	±52.2	±31.3	±36.5	±41.7	±52.8		
	185	215	245	±15.4	±19.2	±23.1	±26.9	±30.8	±34.6	±38.5	±38.6	±44.2	±49.7	±55.2	±33.1	±38.6	±44.2	±55.9		
	190	220	250	±16.2	±20.3	±24.3	±28.4	±32.5	±36.5	±40.6	±40.8	±46.6	±52.4	±58.2	±34.9	±40.8	±46.6	±59.0		
	195	225	255	±17.1	±21.3	±25.6	±29.8	±34.1	±38.4	±42.6	±42.9	±49.0	±55.1	±61.3	±36.8	±42.9	±49.0	±62.2		
	200	230	260	±17.9	±22.4	±26.8	±31.3	±35.8	±40.2	±44.7	±45.0	±51.4	±57.9	±64.3	±38.6	±45.0	±51.4	±65.3		
	205	235	265	±18.7	±23.4	±28.1	±32.7	±37.4	±42.1	±46.8	±47.1	±53.9	±60.6	±67.3	±40.4	±47.1	±53.9	±68.5		
	210	240	270	±19.5	±24.4	±29.3	±34.2	±39.1	±44.0	±48.8	±49.3	±56.3	±63.3	±70.4	±42.2	±49.3	±56.3	±71.6		
	215	245	275	±20.4	±25.5	±30.5	±35.6	±40.7	±45.8	±50.9	±51.4	±58.7	±66.1	±73.4	±44.0	±51.4	±58.7	±74.7		
	220	250	280	±21.2	±26.5	±31.8	±37.1	±42.4	±47.7	±53.0	±53.5	±61.2	±68.8	±76.4	±45.9	±53.5	±61.2	±77.9		
	225	255	285	±22.0	±27.5	±33.0	±38.5	±44.0	±49.5	±55.1	±55.6	±63.6	±71.5	±79.5	±47.7	±55.6	±63.6	±81.0		
	230	260	290	±22.8	±28.6	±34.3	±40.0	±45.7	±51.4	±57.1	±57.8	±66.0	±74.3	±82.5	±49.5	±57.8	±66.0	±84.2		
	235	265	295	±23.7	±29.6	±35.5	±41.4	±47.4	±53.3	±59.2	±59.9	±68.4	±77.0	±85.5	±51.3	±59.9	±68.4	±87.3		
	240	270	300	±24.5	±30.6	±36.8	±42.9	±49.0	±55.1	±61.3	±62.0	±70.9	±79.7	±88.6	±53.1	±62.0	±70.9	±90.4		
	245	275		±25.3	±31.7	±38.0	±44.3	±50.7	±57.0	±63.3	±64.1	±73.3	±82.4	±91.6	±55.0	±64.1	±73.3	±93.6		
	250	280		±26.2	±32.7	±39.2	±45.8	±52.3	±58.9	±65.4	±66.2	±75.7	±85.2	±94.6	±56.8	±66.2	±75.7	±96.7		
	255	285		±27.0	±33.7	±40.5	±47.2	±54.0	±60.7	±67.5	±68.4	±78.1	±87.9	±97.7	±58.6	±68.4	±78.1	±99.9		
	260	290		±27.8	±34.8	±41.7	±48.7	±55.6	±62.6	±69.5	±70.5	±80.6	±90.6	±100.7	±60.4	±70.5	±80.6	±103.0		
	265	295		±28.6	±35.8	±43.0	±50.1	±57.3	±64.4	±71.6	±72.6	±83.0	±93.4	±103.7	±62.2	±72.6	±83.0	±106.1		
	270	300		±29.5	±36.8	±44.2	±51.6	±58.9	±66.3	±73.7	±74.7	±85.4	±96.1	±106.8	±64.1	±74.7	±85.4	±109.3		
	275			±30.3	±37.9	±45.4	±53.0	±60.6	±68.2	±75.7	±76.9	±87.8	±98.8	±109.8	±65.9	±76.9	±87.8	±112.4		
	280			±31.1	±38.9	±46.7	±54.5	±62.3	±70.0	±77.8	±79.0	±90.3	±101.6	±112.8	±67.7	±79.0	±90.3	±115.6		
	285			±32.0	±39.9	±47.9	±55.9	±63.9	±71.9	±79.9	±81.1	±92.7	±104.3	±115.9	±69.5	±81.1	±92.7	±118.7		
	290			±32.8	±41.0	±49.2	±57.4	±65.6	±73.8	±82.0	±83.2	±95.1	±107.0	±118.9	±71.3	±83.2	±95.1	±121.8		
	295			±33.6	±42.0	±50.4	±58.8	±67.2	±75.6	±84.0	±85.4	±97.5	±109.7	±121.9	±73.2	±85.4	±97.5	±125.0		
	300			±34.4	±43.0	±51.7	±60.3	±68.9	±77.5	±86.1	±87.5	±100.0	±112.5	±125.0	±75.0	±87.5	±100.0	±128.1		

Shear force level		concrete cover [mm]			ϕV_n [kN/element]														
		C40	C55	C70															
height of connection [mm]	VS	≥175	≥205	≥235	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	±42.1	
	V1	≥175	≥205	≥235	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7	±74.7
	V2	≥175	≥205	≥235	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1	±112.1
	V3	≥175	≥205	≥235	±149.4	±149.4	±149.4	±149.4	±149.4	±149.4	±149.4	±149.4	±149.4	±149.4	±149.4	-	-	-	-
	V4	≥195	≥225	≥255	-	-	±175.2	±175.2	±175.2	±175.2	±175.2	±175.2	±175.2	±175.2	±175.2	-	-	-	-
V5	≥195	≥225	≥255	-	-	-	-	±233.5	±233.5	±233.5	±233.5	±233.5	±233.5	±233.5	-	-	-	-	

concrete cover for top and bottom reinforcement Egcoibox® [mm]
other heights on request



Reinforcement Egccobox® type MM±

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars from insulation [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
compression bearings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
shear force bars VS	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [m]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	11.7	11.7	11.7	11.7	11.7	11.7	11.7	10.1

Rotation spring stiffness Egccobox® type MM±

Egccobox type				MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]				1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
concrete cover [mm]				Rotation spring stiffness [kNm/rad/Element]														
C40	C55	C70																
height of connection [mm]	175	205	235	618	773	928	1,082	1,237	1,391	1,546	1,484	1,696	1,908	2,120	1,272	1,484	1,696	1,921
	180	210	240	695	869	1,043	1,216	1,390	1,564	1,738	1,673	1,912	2,151	2,390	1,434	1,673	1,912	2,172
	185	215	245	776	970	1,164	1,359	1,553	1,747	1,941	1,873	2,141	2,408	2,676	1,606	1,873	2,141	2,439
	190	220	250	862	1,078	1,293	1,509	1,724	1,940	2,155	2,085	2,382	2,680	2,978	1,787	2,085	2,382	2,720
	195	225	255	952	1,190	1,428	1,666	1,905	2,143	2,381	2,307	2,637	2,967	3,296	1,978	2,307	2,637	3,017
	200	230	260	1,047	1,309	1,570	1,832	2,094	2,356	2,617	2,542	2,905	3,268	3,631	2,178	2,542	2,905	3,330
	205	235	265	1,146	1,433	1,719	2,006	2,292	2,579	2,865	2,787	3,185	3,583	3,981	2,389	2,787	3,185	3,658
	210	240	270	1,250	1,562	1,875	2,187	2,500	2,812	3,125	3,044	3,478	3,913	4,348	2,609	3,044	3,478	4,001
	215	245	275	1,358	1,697	2,037	2,376	2,716	3,055	3,395	3,312	3,785	4,258	4,731	2,839	3,312	3,785	4,360
	220	250	280	1,471	1,838	2,206	2,574	2,941	3,309	3,677	3,591	4,104	4,617	5,130	3,078	3,591	4,104	4,734
	225	255	285	1,588	1,985	2,382	2,779	3,176	3,572	3,969	3,882	4,436	4,991	5,545	3,327	3,882	4,436	5,123
	230	260	290	1,709	2,137	2,564	2,991	3,419	3,846	4,273	4,184	4,781	5,379	5,977	3,586	4,184	4,781	5,528
	235	265	295	1,835	2,294	2,753	3,212	3,671	4,130	4,589	4,497	5,139	5,782	6,424	3,855	4,497	5,139	5,948
	240	270	300	1,966	2,458	2,949	3,441	3,932	4,424	4,915	4,822	5,510	6,199	6,888	4,133	4,822	5,510	6,384
	245	275		2,101	2,626	3,152	3,677	4,202	4,728	5,253	5,157	5,894	6,631	7,368	4,421	5,157	5,894	6,835
	250	280		2,241	2,801	3,361	3,921	4,482	5,042	5,602	5,505	6,291	7,077	7,864	4,718	5,505	6,291	7,302
	255	285		2,385	2,981	3,577	4,173	4,770	5,366	5,962	5,863	6,701	7,538	8,376	5,026	5,863	6,701	7,783
	260	290		2,533	3,167	3,800	4,433	5,067	5,700	6,333	6,233	7,123	8,014	8,904	5,343	6,233	7,123	8,281
	265	295		2,686	3,358	4,030	4,701	5,373	6,044	6,716	6,614	7,559	8,504	9,449	5,669	6,614	7,559	8,793
	270	300		2,844	3,555	4,266	4,977	5,688	6,399	7,110	7,007	8,008	9,008	10,009	6,006	7,007	8,008	9,321
275			3,006	3,757	4,509	5,260	6,012	6,763	7,515	7,410	8,469	9,528	10,586	6,352	7,410	8,469	9,865	
280			3,172	3,966	4,759	5,552	6,345	7,138	7,931	7,825	8,943	10,061	11,179	6,708	7,825	8,943	10,423	
285			3,343	4,179	5,015	5,851	6,687	7,523	8,359	8,252	9,431	10,609	11,788	7,073	8,252	9,431	10,998	
290			3,519	4,399	5,278	6,158	7,038	7,918	8,797	8,689	9,931	11,172	12,414	7,448	8,689	9,931	11,587	
295			3,699	4,624	5,548	6,473	7,398	8,323	9,247	9,138	10,444	11,749	13,055	7,833	9,138	10,444	12,192	
300			3,883	4,854	5,825	6,796	7,767	8,738	9,708	9,599	10,970	12,341	13,713	8,228	9,599	10,970	12,813	

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / rotation\ spring\ stiffness [kNm/rad/Egccobox®\ element] \times 1,000 \times cantilever\ length\ l_b [m]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 4,350 psi / 30.0 MPa (SI)

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
Egcoibox® tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l _p [mm]	558	558	558	558	558	558	558	701	701	701	701	701	701	701	1173
item ① - lapping reinforcement / element - option 1															
≥ a _s [mm²]	479	598	718	838	958	1077	1197	1222	1396	1571	1746	1047	1222	1396	1407
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [mm²]	598	748	898	1047	1197	1347	1496	1466	1676	1885	2095	1257	1466	1676	1407
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [mm²] B500	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
shear force level V1 ≥ a _s [mm²] B500	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166
shear force level V2 ≥ a _s [mm²] B500	249	249	249	249	249	249	249	249	249	249	249	249	249	249	249
shear force level V3 ≥ a _s [mm²] B500	332	332	332	332	332	332	332	332	332	332	332	-	-	-	-
shear force level V4 ≥ a _s [mm²] B500	-	-	389	389	389	389	389	389	389	389	389	-	-	-	-
shear force level V5 ≥ a _s [mm²] B500	-	-	-	-	519	519	519	519	519	519	519	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φV_a / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ ø8) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_l / φM_n.

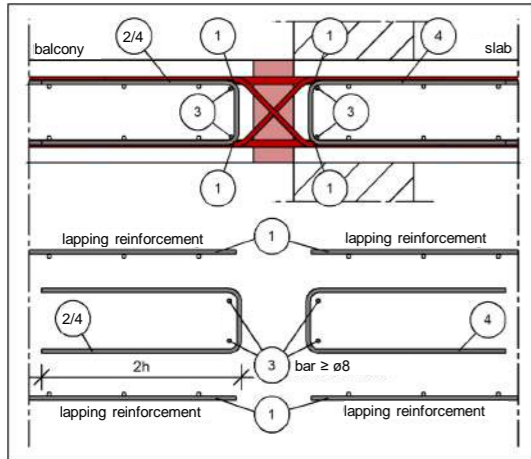
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_a / f_{yd}.

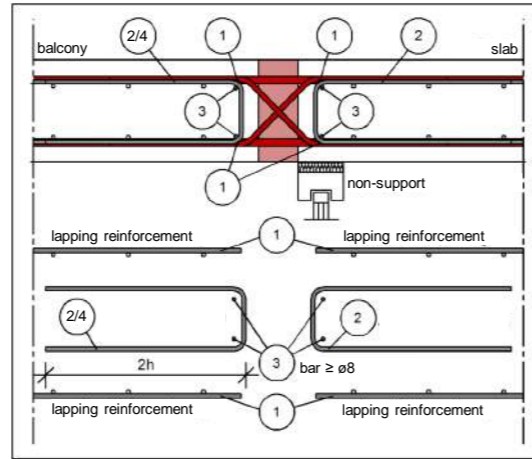
The specifications apply to good bonding conditions.

design proposal

direct support



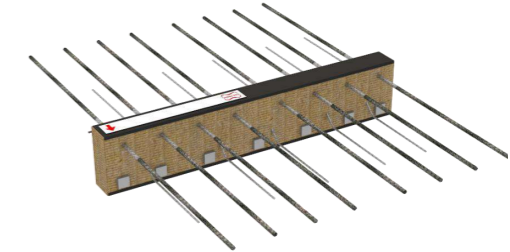
indirect support



Design table Egcoibox® type MM - concrete strength ≥ 5,000 psi / 34.5 MPa (SI)

for cantilever slabs for transmission of moment and shear force, insulation 80 mm

Egcoibox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500			
concrete cover top [mm]			ϕM_n [kNm/element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	-8.6	-14.9	-18.6	-21.5	-22.4	-26.1	-29.8	-33.5	-37.3	-41.0	-44.7	-48.5	-52.2	-26.1		
	170	185	200	-9.1	-15.8	-19.7	-22.8	-23.7	-27.6	-31.6	-35.5	-39.5	-43.4	-47.4	-51.3	-55.3	-27.6		
	175	190	205	-9.6	-16.7	-20.9	-24.1	-25.0	-29.2	-33.4	-37.5	-41.7	-45.9	-50.1	-54.2	-58.4	-29.2		
	180	195	210	-10.1	-17.6	-22.0	-25.4	-26.4	-30.8	-35.1	-39.5	-43.9	-48.3	-52.7	-57.1	-61.5	-30.8		
	185	200	215	-10.6	-18.5	-23.1	-26.7	-27.7	-32.3	-36.9	-41.5	-46.2	-50.8	-55.4	-60.0	-64.6	-32.3		
	190	205	220	-11.1	-19.3	-24.2	-27.9	-29.0	-33.9	-38.7	-43.5	-48.4	-53.2	-58.0	-62.9	-67.7	-33.9		
	195	210	225	-11.6	-20.2	-25.3	-29.2	-30.4	-35.4	-40.5	-45.5	-50.6	-55.6	-60.7	-65.8	-70.8	-35.4		
	200	215	230	-12.1	-21.1	-26.4	-30.5	-31.7	-37.0	-42.2	-47.5	-52.8	-58.1	-63.4	-68.6	-73.9	-37.0		
	205	220	235	-12.6	-22.0	-27.5	-31.8	-33.0	-38.5	-44.0	-49.5	-55.0	-60.5	-66.0	-71.5	-77.0	-38.5		
	210	225	240	-13.1	-22.9	-28.6	-33.1	-34.3	-40.1	-45.8	-51.5	-57.2	-63.0	-68.7	-74.4	-80.1	-40.1		
	215	230	245	-13.6	-23.8	-29.7	-34.4	-35.7	-41.6	-47.6	-53.5	-59.5	-65.4	-71.4	-77.3	-83.2	-41.6		
	220	235	250	-14.1	-24.7	-30.8	-35.6	-37.0	-43.2	-49.3	-55.5	-61.7	-67.9	-74.0	-80.2	-86.4	-43.2		
	225	240	255	-14.6	-25.6	-32.0	-36.9	-38.3	-44.7	-51.1	-57.5	-63.9	-70.3	-76.7	-83.1	-89.5	-44.7		
	230	245	260	-15.1	-26.4	-33.1	-38.2	-39.7	-46.3	-52.9	-59.5	-66.1	-72.7	-79.3	-86.0	-92.6	-46.3		
	235	250	265	-15.5	-27.3	-34.2	-39.5	-41.0	-47.8	-54.7	-61.5	-68.3	-75.2	-82.0	-88.8	-95.7	-47.8		
	240	255	270	-16.0	-28.2	-35.3	-40.8	-42.3	-49.4	-56.4	-63.5	-70.6	-77.6	-84.7	-91.7	-98.8	-49.4		
	245	260	275	-16.5	-29.1	-36.4	-42.0	-43.7	-50.9	-58.2	-65.5	-72.8	-80.1	-87.3	-94.6	-101.9	-50.9		
	250	265	280	-17.0	-30.0	-37.5	-43.3	-45.0	-52.5	-60.0	-67.5	-75.0	-82.5	-90.0	-97.5	-105.0	-52.5		
	255	270	285	-17.5	-30.9	-38.6	-44.6	-46.3	-54.1	-61.8	-69.5	-77.2	-84.9	-92.7	-100.4	-108.1	-54.1		
	260	275	290	-18.0	-31.8	-39.7	-45.9	-47.7	-55.6	-63.5	-71.5	-79.4	-87.4	-95.3	-103.3	-111.2	-55.6		
	265	280	295	-18.5	-32.7	-40.8	-47.2	-49.0	-57.2	-65.3	-73.5	-81.7	-89.8	-98.0	-106.1	-114.3	-57.2		
	270	285	300	-19.0	-33.5	-41.9	-48.5	-50.3	-58.7	-67.1	-75.5	-83.9	-92.3	-100.6	-109.0	-117.4	-58.7		
	275	290		-19.5	-34.4	-43.0	-49.7	-51.7	-60.3	-68.9	-77.5	-86.1	-94.7	-103.3	-111.9	-120.5	-60.3		
	280	295		-20.0	-35.3	-44.2	-51.0	-53.0	-61.8	-70.6	-79.5	-88.3	-97.1	-106.0	-114.8	-123.6	-61.8		
	285	300		-20.5	-36.2	-45.3	-52.3	-54.3	-63.4	-72.4	-81.5	-90.5	-99.6	-108.6	-117.7	-126.7	-63.4		
	290			-21.0	-37.1	-46.4	-53.6	-55.6	-64.9	-74.2	-83.5	-92.7	-102.0	-111.3	-120.6	-129.8	-64.9		
	295			-21.5	-38.0	-47.5	-54.9	-57.0	-66.5	-76.0	-85.5	-95.0	-104.5	-114.0	-123.5	-133.0	-66.5		
	300			-22.0	-38.9	-48.6	-56.1	-58.3	-68.0	-77.7	-87.5	-97.2	-106.9	-116.6	-126.3	-136.1	-68.0		



Shear force level		concrete cover top [mm]			ϕV_n [kN/element]													
		C40	C55	C70														
height of connection [mm]	VS	≥165	≥180	≥195	17.3	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	
	V1	≥165	≥180	≥195	30.8	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	61.6	
	V2	≥165	≥180	≥195	46.2	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4	92.4	96.5*	
	V3	≥165	≥180	≥195	61.6	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	123.2	-	
	V4	≥185	≥200	≥215	-	193.0	193.0	193.0	193.0	193.0	193.0	193.0	193.0	193.0	193.0	193.0	120.6	
	V6±	≥165	≥180	≥195	+17.3 /-17.3	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+34.6 /-34.6	+17.3 /-17.3	
	V7±	≥165	≥180	≥195	+34.6 /-26.0	+69.3 /-52.0	+69.3 /-52.0	+69.3 /-52.0	+69.3 /-52.0	+69.3 /-52.0	+69.3 /-52.0	+92.4 /-61.6	+92.4 /-61.6	+92.4 /-61.6	+92.4 /-61.6	+92.4 /-61.6	+46.2 /-30.8	
	V8±	≥185	≥200	≥215	+72.4 /-72.4	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+144.7 /-144.7	+72.4 /-72.4	

Shear force level VS to V4 also possible with lifting shear force (-17.3 kN/element depending on height of connection/concrete cover) (designation: VS±, V1±, V2±, V3± or V4±)

* possible with height ≥180 mm (C40), ≥195 mm (C55), ≥210 mm (C70)

The Egcoibox® is also available as semi-prefab version in variant "FO" (height ≥190 mm) or "F" (height ≥165 mm); e.g. MM50-FO-V1-C40-h200

Reinforcement Egccobox® type MM

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
tensile bars	4 ø 8	4 ø 12	5 ø 12	6 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	13 ø 12	14 ø 12	7 ø 12
length of tensile bars from insulation [mm]	505	610	610	610	610	610	610	610	610	610	610	610	610	610
compression bearings	2 ø 12	4 ø 12	4 ø 12	4 ø 12	5 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	11 ø 12	12 ø 12	6 ø 12
compression bars	-	-	-	-	-	-	-	-	-	-	-	-	-	-
length of compression bars [mm]	-	-	-	-	-	-	-	-	-	-	-	-	-	-
shear force bars VS	2 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 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6	4 ø 6
shear force bars V1	2 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8	4 ø 8
shear force bars V2	3 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	6 ø 8	6 ø 8	6 ø 8	6 ø 8	4 ø 10
shear force bars V3	4 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	8 ø 8	-
shear force bars V4	-	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	8 ø 10	5 ø 10
shear force bars VS±	-	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6	4 ø 6 / 2 ø 6
shear force bars V1±	-	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6	4 ø 8 / 2 ø 6
shear force bars V2±	-	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	6 ø 8 / 2 ø 6	4 ø 10 / 2 ø 6
shear force bars V3±	-	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	8 ø 8 / 2 ø 6	-
shear force bars V4±	-	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	8 ø 10 / 2 ø 6	5 ø 10 / 2 ø 6
shear force bars V6±	2 ø 6 / 2 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 6	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 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	4 ø 6 / 4 ø 6	2 ø 6 / 2 ø 6
shear force bars V7±	4 ø 6 / 3 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	8 ø 6 / 6 ø 6	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	6 ø 8 / 4 ø 8	3 ø 8 / 2 ø 8
shear force bars V8±	3 ø 10 / 3 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	6 ø 10 / 6 ø 10	3 ø 10 / 3 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	11.7	11.7

Rotation spring stiffness Egccobox® type MM

Egccobox type			MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K			
length of element [mm]			500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500			
concrete cover top [mm]			Rotation spring stiffness [kNm/rad/Element]																
			C40	C55	C70														
height of connection [mm]	165	180	195	765	1,057	1,269	1,464	1,535	1,735	2,003	2,271	2,537	2,804	3,069	3,335	3,600	1,800		
	170	185	200	856	1,187	1,424	1,644	1,723	1,947	2,249	2,549	2,848	3,147	3,446	3,744	4,041	2,021		
	175	190	205	953	1,324	1,589	1,834	1,922	2,172	2,509	2,844	3,178	3,511	3,844	4,176	4,508	2,254		
	180	195	210	1,055	1,468	1,762	2,034	2,132	2,410	2,783	3,154	3,525	3,894	4,263	4,632	5,001	2,500		
	185	200	215	1,162	1,620	1,945	2,245	2,352	2,659	3,071	3,481	3,890	4,297	4,705	5,112	5,518	2,759		
	190	205	220	1,274	1,780	2,136	2,466	2,584	2,921	3,373	3,824	4,273	4,721	5,168	5,615	6,062	3,031		
	195	210	225	1,391	1,947	2,337	2,697	2,827	3,195	3,690	4,182	4,673	5,164	5,653	6,142	6,631	3,315		
	200	215	230	1,514	2,121	2,546	2,939	3,080	3,482	4,021	4,557	5,092	5,627	6,160	6,693	7,225	3,613		
	205	220	235	1,642	2,303	2,765	3,191	3,344	3,780	4,366	4,948	5,529	6,109	6,688	7,267	7,845	3,923		
	210	225	240	1,775	2,493	2,992	3,453	3,619	4,091	4,725	5,355	5,984	6,612	7,239	7,865	8,490	4,245		
	215	230	245	1,913	2,690	3,229	3,726	3,905	4,415	5,098	5,779	6,457	7,134	7,811	8,486	9,161	4,581		
	220	235	250	2,056	2,894	3,474	4,009	4,202	4,750	5,486	6,218	6,948	7,677	8,404	9,131	9,858	4,929		
	225	240	255	2,204	3,106	3,728	4,303	4,510	5,098	5,887	6,673	7,457	8,239	9,020	9,800	10,580	5,290		
	230	245	260	2,358	3,326	3,992	4,607	4,829	5,458	6,303	7,145	7,984	8,821	9,657	10,493	11,327	5,664		
	235	250	265	2,516	3,553	4,264	4,921	5,158	5,831	6,734	7,632	8,529	9,423	10,316	11,209	12,100	6,050		
	240	255	270	2,680	3,787	4,546	5,246	5,498	6,216	7,178	8,136	9,091	10,045	10,997	11,948	12,899	6,449		
	245	260	275	2,849	4,029	4,836	5,581	5,850	6,613	7,636	8,656	9,672	10,686	11,699	12,711	13,723	6,861		
	250	265	280	3,024	4,278	5,135	5,927	6,212	7,022	8,109	9,192	10,271	11,348	12,424	13,498	14,572	7,286		
	255	270	285	3,203	4,535	5,444	6,283	6,585	7,444	8,596	9,743	10,888	12,029	13,170	14,309	15,447	7,724		
	260	275	290	3,388	4,800	5,761	6,649	6,969	7,878	9,097	10,311	11,522	12,731	13,938	15,143	16,348	8,174		
	265	280	295	3,577	5,072	6,087	7,026	7,364	8,324	9,613	10,896	12,175	13,452	14,727	16,001	17,274	8,637		
	270	285	300	3,772	5,351	6,423	7,413	7,769	8,782	10,142	11,496	12,846	14,193	15,538	16,882	18,225	9,113		
	275	290		3,972	5,638	6,767	7,810	8,186	9,253	10,686	12,112	13,534	14,954	16,371	17,787	19,202	9,601		
	280	295		4,178	5,932	7,120	8,218	8,613	9,736	11,244	12,744	14,241	15,734	17,226	18,716	20,205	10,102		
	285	300		4,388	6,234	7,483	8,636	9,051	10,232	11,816	13,393	14,966	16,535	18,103	19,668	21,233	10,617		
	290			4,604	6,543	7,854	9,065	9,500	10,740	12,402	14,057	15,708	17,356	19,001	20,644	22,287	11,143		
	295			4,824	6,860	8,234	9,503	9,960	11,260	13,003	14,738	16,469	18,196	19,921	21,644	23,366	11,683		
	300			5,050	7,184	8,624	9,953	10,431	11,792	13,617	15,435	17,247	19,056	20,863	22,667	24,470	12,235		

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / \text{rotation spring stiffness [kNm/rad/Egccobox® element]} \times 1,000 \times \text{cantilever length } l_b [m]$

On-site reinforcement Egccobox® type MM - concrete strength $\geq 5,000$ psi / 34.5 MPa (SI)

Egccobox type	MM10-K	MM20	MM25	MM30	MM35	MM45	MM50	MM55	MM60	MM65	MM70	MM75	MM80	MM80-K
length of element [mm]	500	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500
Egccobox® tensile bars	4 ϕ 8	4 ϕ 12	5 ϕ 12	6 ϕ 12	6 ϕ 12	7 ϕ 12	8 ϕ 12	9 ϕ 12	10 ϕ 12	11 ϕ 12	12 ϕ 12	13 ϕ 12	14 ϕ 12	7 ϕ 12
Egccobox l_p [mm]	470	558	558	558	558	558	558	558	558	558	558	558	558	558
item ① - lapping reinforcement / element - option 1														
$\geq a_g$ [mm ²]	239	479	598	718	718	838	958	1077	1197	1317	1436	1556	1676	838
suggested on-site reinforcement	#3	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4	#4
item ① - lapping reinforcement / element - option 2														
$\geq a_g$ [mm ²]	319	598	748	898	898	1047	1197	1347	1496	1646	1795	1945	2095	1047
suggested on-site reinforcement	#4	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5	#5
item ② - based on ϕV_n: suspension reinforcement shear force / element														
shear force level VS $\geq a_g$ [mm ²] B500	38	77	77	77	77	77	77	77	77	77	77	77	77	77
shear force level V1 $\geq a_g$ [mm ²] B500	68	137	137	137	137	137	137	137	137	137	137	137	137	137
shear force level V2 $\geq a_g$ [mm ²] B500	103	205	205	205	205	205	205	205	205	205	205	205	205	214
shear force level V3 $\geq a_g$ [mm ²] B500	137	274	274	274	274	274	274	274	274	274	274	274	274	-
shear force level V4 $\geq a_g$ [mm ²] B500	-	429	429	429	429	429	429	429	429	429	429	429	429	268
shear force level VS± $\geq a_g$ [mm ²] B500	-	77	77	77	77	77	77	77	77	77	77	77	77	77
shear force level V1± $\geq a_g$ [mm ²] B500	-	137	137	137	137	137	137	137	137	137	137	137	137	137
shear force level V2± $\geq a_g$ [mm ²] B500	-	205	205	205	205	205	205	205	205	205	205	205	205	214
shear force level V3± $\geq a_g$ [mm ²] B500	-	274	274	274	274	274	274	274	274	274	274	274	274	-
shear force level V4± $\geq a_g$ [mm ²] B500	-	429	429	429	429	429	429	429	429	429	429	429	429	268
shear force level V6± $\geq a_g$ [mm ²] B500	38	76	76	76	76	76	76	76	76	76	76	76	76	38
shear force level V7± $\geq a_g$ [mm ²] B500	76	153	153	153	153	153	153	204	204	204	204	204	204	102
shear force level V8± $\geq a_g$ [mm ²] B500	160	320	320	320	320	320	320	320	320	320	320	320	320	160

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_n / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the ϕM_n of the Egccobox® (height Egccobox® = height floor). An other reinforcement selection is possible.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional $\phi M_n / \phi M_n$.

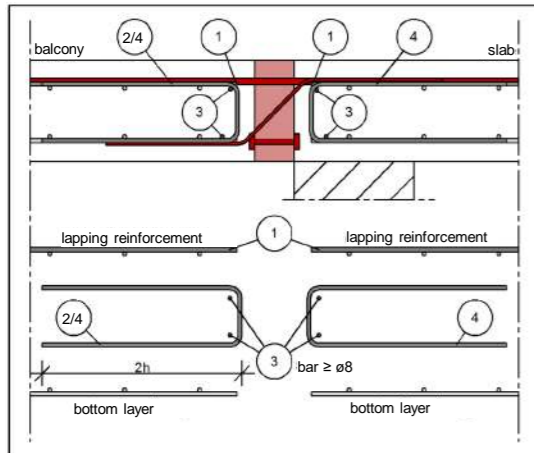
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egccobox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_n / f_{yd}$.

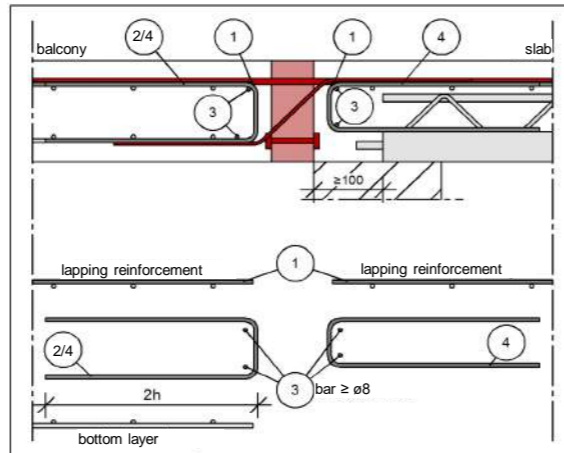
The specifications apply to good bonding conditions.

design proposal

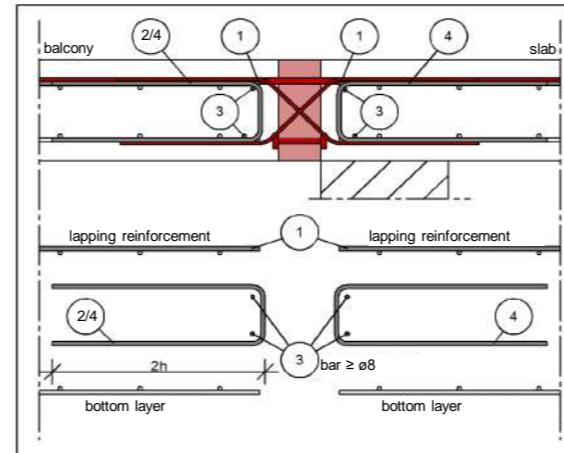
direct support



direct support (semi-prefab slab)



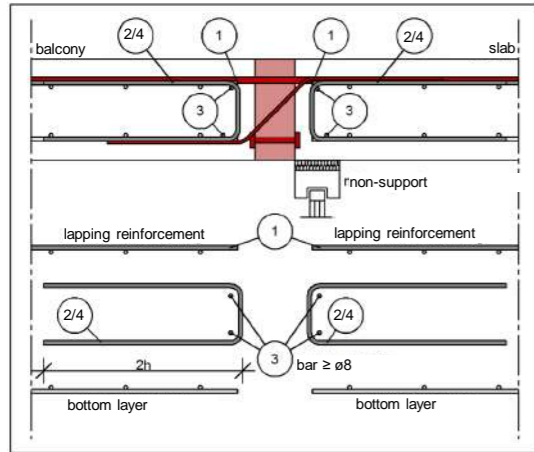
direct support with alternating shear force (V6±, V7±, V8±)



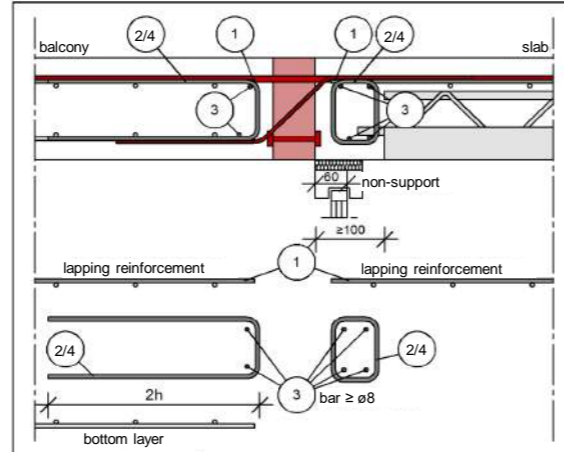
For the Egccobox shear force levels VS± to V4±, a constructive edging on the balcony side is generally sufficient.

design proposal

indirect support



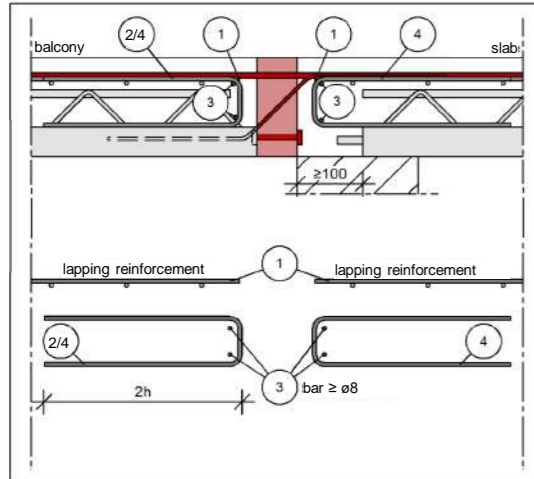
indirect support (semi-prefab slab)



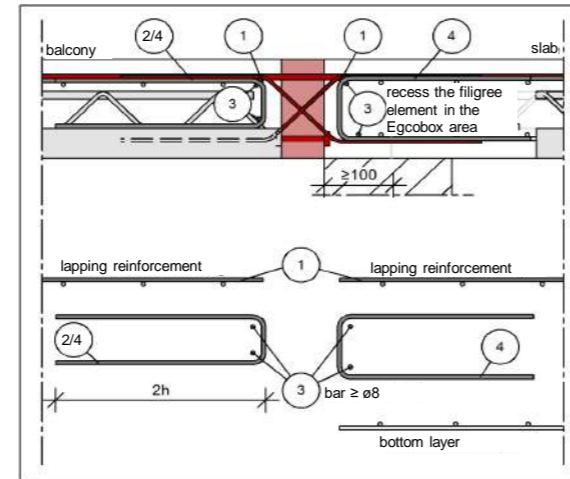
Note indirect support (semi-prefab slab):
The advised u-bar reinforcement item ② is not replacing the required statical reinforcement of the beam. The reinforcement of the beam has to be calculated by the project engineer in additional.

Semi-prefab balcony

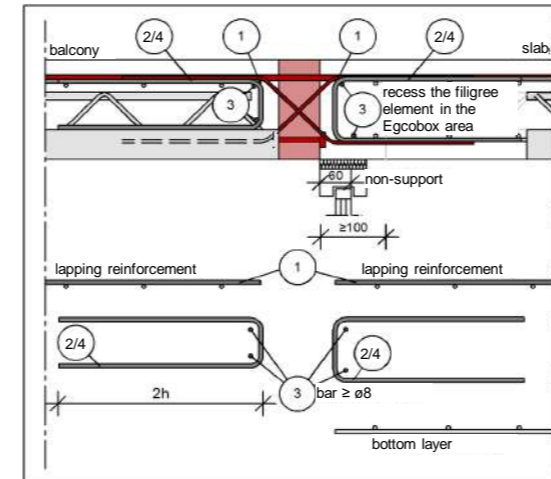
direct support: Egccobox in semi-prefab balcony



direct support: Egccobox with V_{\pm} in semi-prefab balcony



indirect support: Egccobox with V_{\pm} in semi-prefab balcony



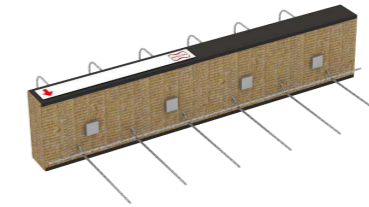
Note Egccobox in semi-prefab balcony:
It is advisable to include the constructive edging on the balcony side (item ④) or the suspension reinforcement (item ②) in the semi-prefab part.
For the Egccobox shear force levels $V_{S\pm}$ to $V_{4\pm}$, a constructive edging on the balcony side is generally sufficient.

Design table Egcobox® type VM - concrete strength $\geq 5,000$ psi / 34.5 MPa (SI)

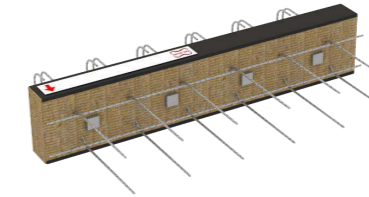
for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
concrete cover top [mm]			ϕV_n [kN/element]									
C40	C55	C70										
height of connection [mm]												
165-300	180-300	195-300	34.6	43.3	61.6	77.0	92.4	123.2	154.0	184.8	-	-
185-300	200-300	215-300	34.6	43.3	61.6	77.0	92.4	123.2	154.0	184.8	241.2	289.4

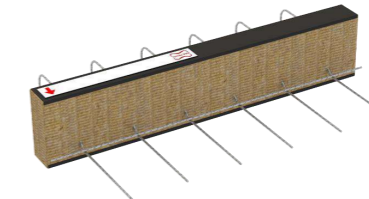
Reinforcement												
shear force bars [qty ϕ mm]	4 ϕ 6	5 ϕ 6	4 ϕ 8	5 ϕ 8	6 ϕ 8	8 ϕ 8	10 ϕ 8	12 ϕ 8	10 ϕ 10	12 ϕ 10		
minimum wall / beam width [mm]	180	180	200	200	200	200	200	200	220	220		
compression bearings [qty ϕ mm]	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	4 ϕ 12	5 ϕ 12	6 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		



VM / VM-K



VM± / VM-K±



VM Z / VM Z-K

Design table Egcobox® type VM-K - concrete strength $\geq 5,000$ psi / 34.5 MPa (SI)

for supported plates for the transmission of shear forces, insulation 80 mm

Egcobox type			VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]			200	250	250	300	400	400	500	500
concrete cover top [mm]			ϕV_n [kN/element]							
C40	C55	C70								
height of connection [mm]										
165-300	180-300	195-300	17.3	30.8	46.2	61.6	77.0	-	107.8	-
185-300	200-300	215-300	17.3	30.8	46.2	61.6	77.0	96.5	107.8	144.7

Reinforcement										
shear force bars [qty ϕ mm]	2 ϕ 6	2 ϕ 8	3 ϕ 8	4 ϕ 8	5 ϕ 8	4 ϕ 10	7 ϕ 8	6 ϕ 10		
minimum wall / beam width [mm]	180	200	200	200	200	220	200	220		
compression bearings [qty ϕ mm]	1 ϕ 12	1 ϕ 12	1 ϕ 12	2 ϕ 12	2 ϕ 12	2 ϕ 12	3 ϕ 12	3 ϕ 12		
applicable expansion joint distances [m]	11.7	11.7	11.7	11.7	11.7	11.7	11.7	11.7		

All Egcobox types can also be produced in the following variants:

- VM_± / VM-K_± - Egcobox® to transfer positive and negative shear forces (shear bars \pm)
- VM Z₋ / VM Z₋-K - Egcobox® without compression bearings (Z = zero stress) to transfer positive shear forces; in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM / VM-K
- VM Z_± / VM Z_±-K_± - Egcobox® without compression bearings (Z = zero stress) to transfer positive and negative shear forces (shear bars \pm); in opposite of a bending resistance support or in combination with the equal type of Egcobox® VM_± / VM-K_±

Egcobox® elements in opposite or on different sides of the balcony is reducing the applicable expansion joint distance to 50% only.

On-site reinforcement Egcoibox® type VM / VM-K - concrete strength $\geq 5,000$ psi / 34.5 MPa (SI)

Egcoibox type	VM48	VM61	VM86	VM108	VM130	VM173	VM216	VM259	VM333	VM399
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000
item ② - based on ϕV_n : suspension reinforcement shear force / element										
$\geq a_s$ [mm ²]	77	96	137	171	205	274	342	411	536	643
x = shear force bar embedment depth (slab) [mm]	155	155	175	175	175	175	175	175	195	195

Egcoibox type	VM24-K	VM43-K	VM65-K	VM86-K	VM108-K	VM130-K	VM151-K	VM200-K
length of element [mm]	200	250	250	300	400	400	500	500
item ② - based on ϕV_n : suspension reinforcement shear force / element								
$\geq a_s$ [mm ²]	38	68	103	137	171	214	240	322
x = shear force bar embedment depth (slab) [mm]	155	175	175	175	175	195	175	195

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force $\phi V_s / f_{yd}$ (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ $\geq \phi 8$) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

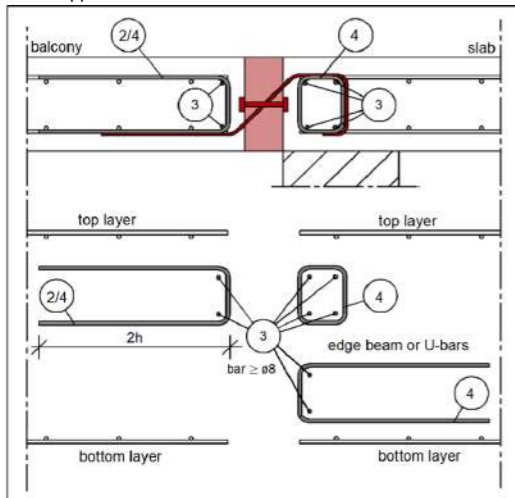
In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force ϕV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with $\phi V_s / f_{yd}$.

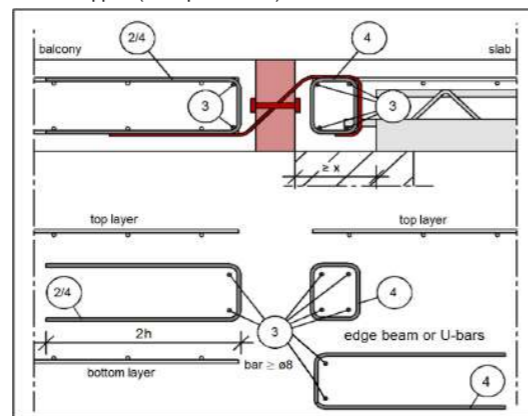
The specifications apply to good bonding conditions.

design proposal

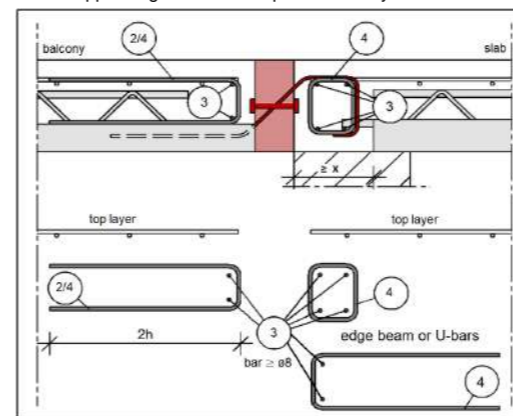
direct support



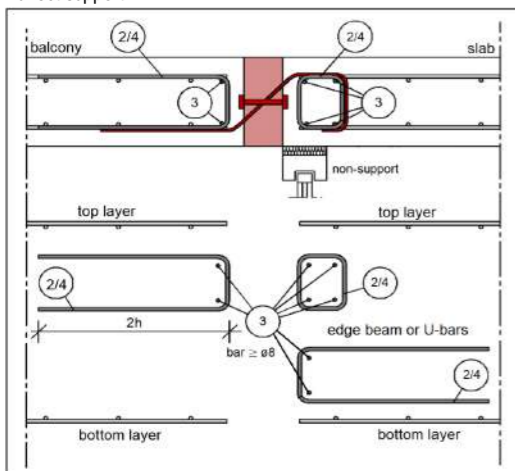
direct support (semi-prefab slab)



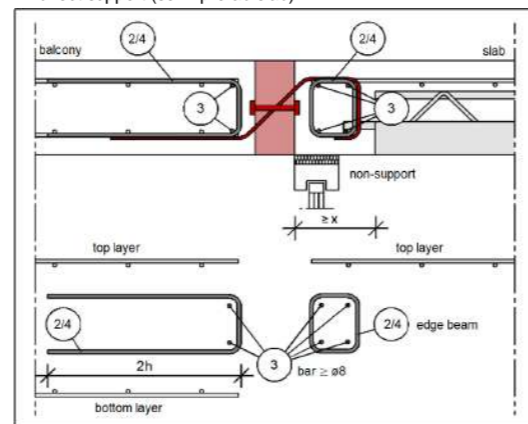
direct support: Egcoibox in semi-prefab balcony



indirect support



indirect support (semi-prefab slab)



Note Egcoibox in semi-prefab balcony:

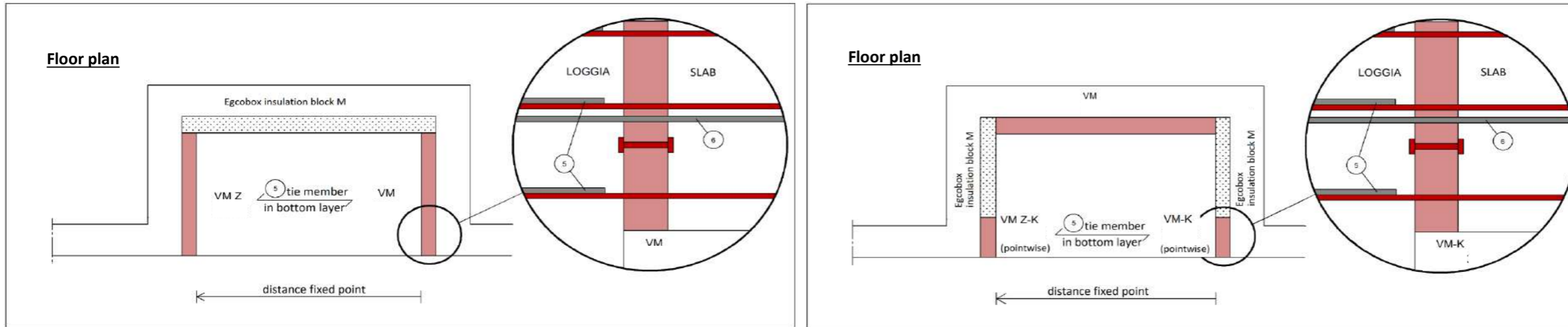
It is advisable to include the constructive edging on the balcony side (item ④ vs. item ②) in the semi-prefab part.

Note indirect support (semi-prefab slab):

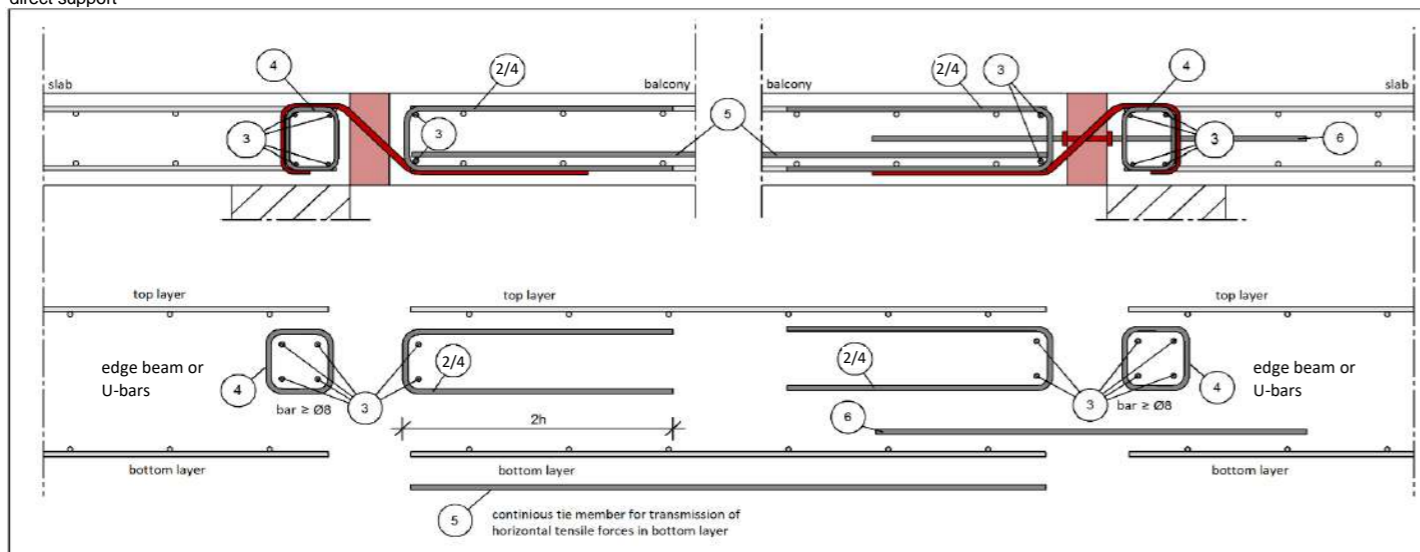
The information on the minimum required connection reinforcement of the Egcoibox of the ceiling-side item ② does not replace the statically selected beam reinforcement of the structural engineer. This has to be considered additionally. The Pos ③ on the ceiling side, however, is only constructive and can be taken into account for the static specifications of the structural engineer.

On-site reinforcement for Egcoibox® VM_± / VM_{-K±}. VM_Z / VM_{-K}, VM_{Z±} / VM_{-K±} is similar.

additional information design proposal Egcoibox® VM Z_ / VM Z_-K



direct support

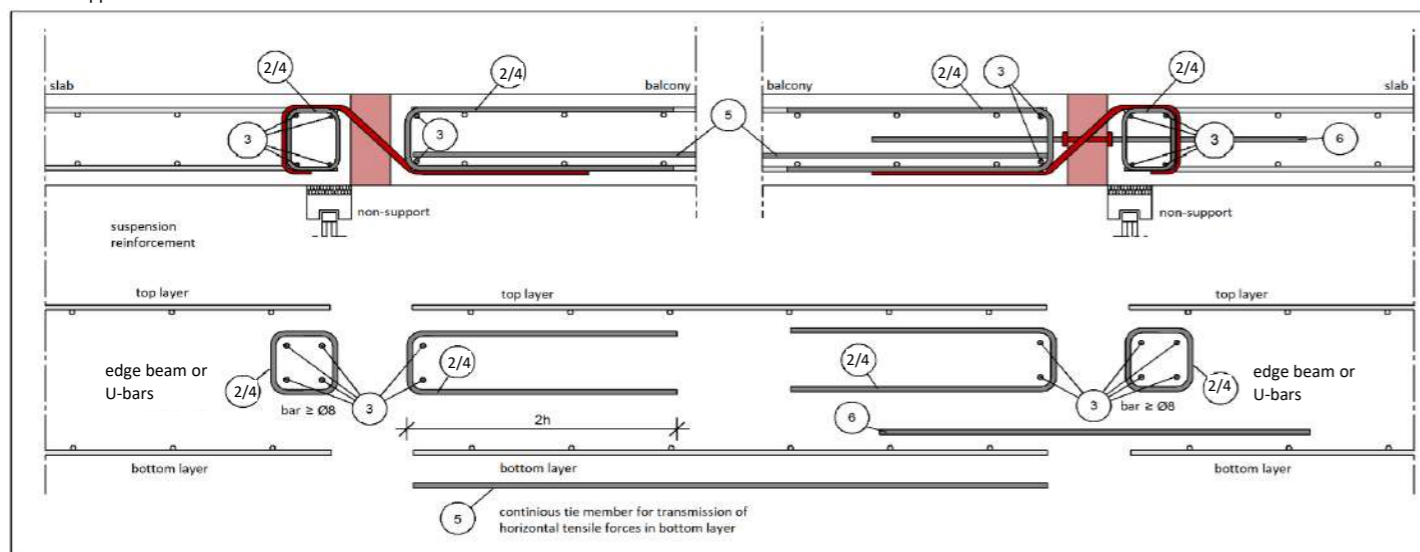


item ⑤+⑥ - additional reinforcement

When planning zero-stress elements, ensure that the resulting tensile forces are transferred in the lower reinforcement layer of the loggia by a tie member (item ⑤) - at least, same a_y as the bars of the Egcoibox®.

In addition, additional tension forces may occur, e.g. due to asymmetrical loading of the balcony plate. These can be absorbed by additional tension rods (V4A) in the Egcoibox VM_ or VM_-K.

indirect support



Design table Egcoibox® type MM± - concrete strength ≥ 5,000 psi / 34.5 MPa (SI)

for cantilever slabs for transmission of positive and negative moments and shear forces, insulation 80 mm

Egcoibox type			MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±			
length of element [mm]			1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500			
concrete cover [mm]			ϕM_n [kNm/element]																	
			C40	C55	C70															
height of connection [mm]	175	205	235	±14.1	±17.6	±21.2	±24.7	±28.2	±31.7	±35.3	±36.3	±41.5	±46.7	±51.9	±31.2	±36.3	±41.5	±49.6		
	180	210	240	±15.0	±18.7	±22.4	±26.2	±29.9	±33.7	±37.4	±38.6	±44.1	±49.6	±55.1	±33.1	±38.6	±44.1	±52.8		
	185	215	245	±15.8	±19.8	±23.7	±27.7	±31.6	±35.6	±39.5	±40.8	±46.7	±52.5	±58.3	±35.0	±40.8	±46.7	±55.9		
	190	220	250	±16.7	±20.8	±25.0	±29.1	±33.3	±37.5	±41.6	±43.1	±49.2	±55.4	±61.5	±36.9	±43.1	±49.2	±59.0		
	195	225	255	±17.5	±21.9	±26.3	±30.6	±35.0	±39.4	±43.8	±45.3	±51.8	±58.3	±64.7	±38.8	±45.3	±51.8	±62.2		
	200	230	260	±18.4	±22.9	±27.5	±32.1	±36.7	±41.3	±45.9	±47.6	±54.4	±61.1	±67.9	±40.8	±47.6	±54.4	±65.3		
	205	235	265	±19.2	±24.0	±28.8	±33.6	±38.4	±43.2	±48.0	±49.8	±56.9	±64.0	±71.1	±42.7	±49.8	±56.9	±68.5		
	210	240	270	±20.1	±25.1	±30.1	±35.1	±40.1	±45.1	±50.1	±52.0	±59.5	±66.9	±74.4	±44.6	±52.0	±59.5	±71.6		
	215	245	275	±20.9	±26.1	±31.4	±36.6	±41.8	±47.0	±52.3	±54.3	±62.0	±69.8	±77.6	±46.5	±54.3	±62.0	±74.7		
	220	250	280	±21.8	±27.2	±32.6	±38.1	±43.5	±49.0	±54.4	±56.5	±64.6	±72.7	±80.8	±48.5	±56.5	±64.6	±77.9		
	225	255	285	±22.6	±28.3	±33.9	±39.6	±45.2	±50.9	±56.5	±58.8	±67.2	±75.6	±84.0	±50.4	±58.8	±67.2	±81.0		
	230	260	290	±23.5	±29.3	±35.2	±41.0	±46.9	±52.8	±58.6	±61.0	±69.7	±78.5	±87.2	±52.3	±61.0	±69.7	±84.2		
	235	265	295	±24.3	±30.4	±36.5	±42.5	±48.6	±54.7	±60.8	±63.3	±72.3	±81.3	±90.4	±54.2	±63.3	±72.3	±87.3		
	240	270	300	±25.2	±31.4	±37.7	±44.0	±50.3	±56.6	±62.9	±65.5	±74.9	±84.2	±93.6	±56.1	±65.5	±74.9	±90.4		
	245	275		±26.0	±32.5	±39.0	±45.5	±52.0	±58.5	±65.0	±67.8	±77.4	±87.1	±96.8	±58.1	±67.8	±77.4	±93.6		
	250	280		±26.9	±33.6	±40.3	±47.0	±53.7	±60.4	±67.1	±70.0	±80.0	±90.0	±100.0	±60.0	±70.0	±80.0	±96.7		
	255	285		±27.7	±34.6	±41.6	±48.5	±55.4	±62.3	±69.3	±72.2	±82.6	±92.9	±103.2	±61.9	±72.2	±82.6	±99.9		
	260	290		±28.6	±35.7	±42.8	±50.0	±57.1	±64.2	±71.4	±74.5	±85.1	±95.8	±106.4	±63.8	±74.5	±85.1	±103.0		
	265	295		±29.4	±36.8	±44.1	±51.5	±58.8	±66.2	±73.5	±76.7	±87.7	±98.6	±109.6	±65.8	±76.7	±87.7	±106.1		
	270	300		±30.3	±37.8	±45.4	±52.9	±60.5	±68.1	±75.6	±79.0	±90.2	±101.5	±112.8	±67.7	±79.0	±90.2	±109.3		
	275			±31.1	±38.9	±46.7	±54.4	±62.2	±70.0	±77.8	±81.2	±92.8	±104.4	±116.0	±69.6	±81.2	±92.8	±112.4		
	280			±32.0	±39.9	±47.9	±55.9	±63.9	±71.9	±79.9	±83.5	±95.4	±107.3	±119.2	±71.5	±83.5	±95.4	±115.6		
	285			±32.8	±41.0	±49.2	±57.4	±65.6	±73.8	±82.0	±85.7	±97.9	±110.2	±122.4	±73.5	±85.7	±97.9	±118.7		
	290			±33.7	±42.1	±50.5	±58.9	±67.3	±75.7	±84.1	±87.9	±100.5	±113.1	±125.6	±75.4	±87.9	±100.5	±121.8		
	295			±34.5	±43.1	±51.8	±60.4	±69.0	±77.6	±86.3	±90.2	±103.1	±116.0	±128.8	±77.3	±90.2	±103.1	±125.0		
	300			±35.4	±44.2	±53.0	±61.9	±70.7	±79.5	±88.4	±92.4	±105.6	±118.8	±132.0	±79.2	±92.4	±105.6	±128.1		

Shear force level		concrete cover [mm]			ϕV_n [kN/element]														
		C40	C55	C70															
height of connection [mm]	VS	≥175	≥205	≥235	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	±45.2	
	V1	≥175	≥205	≥235	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1	±80.1
	V2	≥175	≥205	≥235	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2	±120.2
	V3	≥175	≥205	≥235	±160.2	±160.2	±160.2	±160.2	±160.2	±160.2	±160.2	±160.2	±160.2	±160.2	±160.2	-	-	-	-
	V4	≥195	≥225	≥255	-	-	±187.8	±187.8	±187.8	±187.8	±187.8	±187.8	±187.8	±187.8	±187.8	-	-	-	-
V5	≥195	≥225	≥255	-	-	-	-	±250.4	±250.4	±250.4	±250.4	±250.4	±250.4	±250.4	-	-	-	-	

concrete cover for top and bottom reinforcement Egcoibox® [mm]
other heights on request



Reinforcement Egccobox® type MM±

Egccobox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of tensile bars from insulation [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
compression bearings	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
compression bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
length of compression bars [mm]	610	610	610	610	610	610	610	750	750	750	750	750	750	750	1220
shear force bars VS	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6	2x4 ø 6
shear force bars V1	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8	2x4 ø 8
shear force bars V2	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8	2x6 ø 8
shear force bars V3	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	2x8 ø 8	-	-	-	-
shear force bars V4	-	-	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	2x6 ø 10	-	-	-	-
shear force bars V5	-	-	-	-	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	2x8 ø 10	-	-	-	-
applicable expansion joint distances [m]	13.5	13.5	13.5	13.5	13.5	13.5	13.5	11.7	11.7	11.7	11.7	11.7	11.7	11.7	10.1

Rotation spring stiffness Egccobox® type MM±

Egccobox type				MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]				1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
concrete cover [mm]				Rotation spring stiffness [kNm/rad/Element]														
C40	C55	C70																
height of connection [mm]	175	205	235	618	773	928	1,082	1,237	1,391	1,546	1,484	1,696	1,908	2,120	1,272	1,484	1,696	1,921
	180	210	240	695	869	1,043	1,216	1,390	1,564	1,738	1,673	1,912	2,151	2,390	1,434	1,673	1,912	2,172
	185	215	245	776	970	1,164	1,359	1,553	1,747	1,941	1,873	2,141	2,408	2,676	1,606	1,873	2,141	2,439
	190	220	250	862	1,078	1,293	1,509	1,724	1,940	2,155	2,085	2,382	2,680	2,978	1,787	2,085	2,382	2,720
	195	225	255	952	1,190	1,428	1,666	1,905	2,143	2,381	2,307	2,637	2,967	3,296	1,978	2,307	2,637	3,017
	200	230	260	1,047	1,309	1,570	1,832	2,094	2,356	2,617	2,542	2,905	3,268	3,631	2,178	2,542	2,905	3,330
	205	235	265	1,146	1,433	1,719	2,006	2,292	2,579	2,865	2,787	3,185	3,583	3,981	2,389	2,787	3,185	3,658
	210	240	270	1,250	1,562	1,875	2,187	2,500	2,812	3,125	3,044	3,478	3,913	4,348	2,609	3,044	3,478	4,001
	215	245	275	1,358	1,697	2,037	2,376	2,716	3,055	3,395	3,312	3,785	4,258	4,731	2,839	3,312	3,785	4,360
	220	250	280	1,471	1,838	2,206	2,574	2,941	3,309	3,677	3,591	4,104	4,617	5,130	3,078	3,591	4,104	4,734
	225	255	285	1,588	1,985	2,382	2,779	3,176	3,572	3,969	3,882	4,436	4,991	5,545	3,327	3,882	4,436	5,123
	230	260	290	1,709	2,137	2,564	2,991	3,419	3,846	4,273	4,184	4,781	5,379	5,977	3,586	4,184	4,781	5,528
	235	265	295	1,835	2,294	2,753	3,212	3,671	4,130	4,589	4,497	5,139	5,782	6,424	3,855	4,497	5,139	5,948
	240	270	300	1,966	2,458	2,949	3,441	3,932	4,424	4,915	4,822	5,510	6,199	6,888	4,133	4,822	5,510	6,384
	245	275		2,101	2,626	3,152	3,677	4,202	4,728	5,253	5,157	5,894	6,631	7,368	4,421	5,157	5,894	6,835
	250	280		2,241	2,801	3,361	3,921	4,482	5,042	5,602	5,505	6,291	7,077	7,864	4,718	5,505	6,291	7,302
	255	285		2,385	2,981	3,577	4,173	4,770	5,366	5,962	5,863	6,701	7,538	8,376	5,026	5,863	6,701	7,783
	260	290		2,533	3,167	3,800	4,433	5,067	5,700	6,333	6,233	7,123	8,014	8,904	5,343	6,233	7,123	8,281
	265	295		2,686	3,358	4,030	4,701	5,373	6,044	6,716	6,614	7,559	8,504	9,449	5,669	6,614	7,559	8,793
	270	300		2,844	3,555	4,266	4,977	5,688	6,399	7,110	7,007	8,008	9,008	10,009	6,006	7,007	8,008	9,321
	275			3,006	3,757	4,509	5,260	6,012	6,763	7,515	7,410	8,469	9,528	10,586	6,352	7,410	8,469	9,865
	280			3,172	3,966	4,759	5,552	6,345	7,138	7,931	7,825	8,943	10,061	11,179	6,708	7,825	8,943	10,423
	285			3,343	4,179	5,015	5,851	6,687	7,523	8,359	8,252	9,431	10,609	11,788	7,073	8,252	9,431	10,998
	290			3,519	4,399	5,278	6,158	7,038	7,918	8,797	8,689	9,931	11,172	12,414	7,448	8,689	9,931	11,587
	295			3,699	4,624	5,548	6,473	7,398	8,323	9,247	9,138	10,444	11,749	13,055	7,833	9,138	10,444	12,192
	300			3,883	4,854	5,825	6,796	7,767	8,738	9,708	9,599	10,970	12,341	13,713	8,228	9,599	10,970	12,813

Calculation of rotation in the area of the insulation joint [mm] = $M_{available} [kNm/element] \times 1 / rotation\ spring\ stiffness [kNm/rad/Egccobox®\ element] \times 1,000 \times cantilever\ length\ l_b [m]$

On-site reinforcement Egcoibox® type MM± - concrete strength ≥ 5,000 psi / 34.5 MPa (SI)

Egcoibox type	MM20±	MM25±	MM30±	MM45±	MM50±	MM55±	MM60±	MM65±	MM70±	MM75±	MM80±	MM110-K±	MM120-K±	MM130-K±	MM150-K±
length of element [mm]	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	500	500	500	500
Egcoibox® tensile bars	4 ø 12	5 ø 12	6 ø 12	7 ø 12	8 ø 12	9 ø 12	10 ø 12	7 ø 14	8 ø 14	9 ø 14	10 ø 14	6 ø 14	7 ø 14	8 ø 14	7 ø 16
Egcoibox l ₀ [mm]	558	558	558	558	558	558	558	701	701	701	701	701	701	701	1173
item ① - lapping reinforcement / element - option 1															
≥ a _s [mm²]	479	598	718	838	958	1077	1197	1222	1396	1571	1746	1047	1222	1396	1407
suggested on-site reinforcement	#4	#4	#4	#4	#4	#4	#4	#5	#5	#5	#5	#5	#5	#5	#5
item ① - lapping reinforcement / element - option 2															
≥ a _s [mm²]	598	748	898	1047	1197	1347	1496	1466	1676	1885	2095	1257	1466	1676	1407
suggested on-site reinforcement	#5	#5	#5	#5	#5	#5	#5	#6	#6	#6	#6	#6	#6	#6	#6
item ② - based on φV_n: suspension reinforcement shear force / element															
shear force level VS ≥ a _s [mm²] B500	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
shear force level V1 ≥ a _s [mm²] B500	178	178	178	178	178	178	178	178	178	178	178	178	178	178	178
shear force level V2 ≥ a _s [mm²] B500	267	267	267	267	267	267	267	267	267	267	267	267	267	267	267
shear force level V3 ≥ a _s [mm²] B500	356	356	356	356	356	356	356	356	356	356	356	-	-	-	-
shear force level V4 ≥ a _s [mm²] B500	-	-	417	417	417	417	417	417	417	417	417	-	-	-	-
shear force level V5 ≥ a _s [mm²] B500	-	-	-	-	556	556	556	556	556	556	556	-	-	-	-

item ③+④ - structural reinforcement

On the balcony side, a minimum edge-reinforcement, designed for the shear force φV_a / f_{yd} (item ②), or according to the specifications of the structural engineer (item ④) and a longitudinal reinforcement (item ③ ≥ ø8) must generally be planned.

On the slab side, edge-reinforcement can be dispensed with if the slab is supported directly. The specifications of the structural engineer (item ④) apply.

In the case of indirect support, the minimum edge-reinforcement (item ②) or as specified by the structural engineer (item ③ and ④) must be provided.

The suggested lapping reinforcement is selected (item ①) to transfer 100% of the φM_n of the Egcoibox® (height Egcoibox® = height floor). An other reinforcement selection is possible.

Depending on the moment load (negative or positive moment), the overlap of the bending tension reinforcement (item ①) can only be sufficient in the top or lower layer.

In case of an other reinforcement selection shall be approved the lapping reinforcement in accordance with ACI / CA. The reinforcement cross section or the lapping length can be derated in reference of utilization proportional φM_l / φM_n.

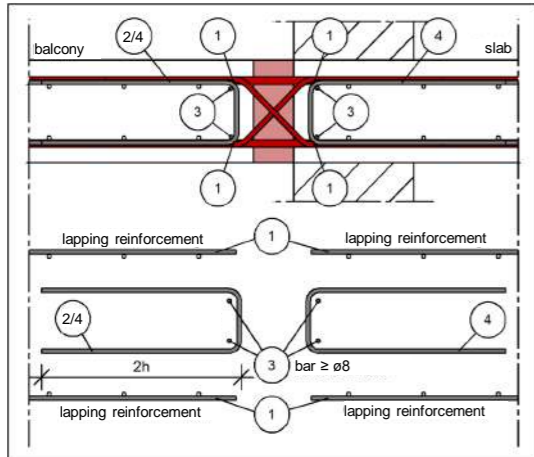
The lapping reinforcement must be approved by the structural engineer.

The proposed steel cross-section a_s (item ②) covers the maximum design transverse force φV_n of the Egcoibox®. In case of smaller actions, the edge reinforcement may be determined with φV_a / f_{yd}.

The specifications apply to good bonding conditions.

design proposal

direct support



indirect support

