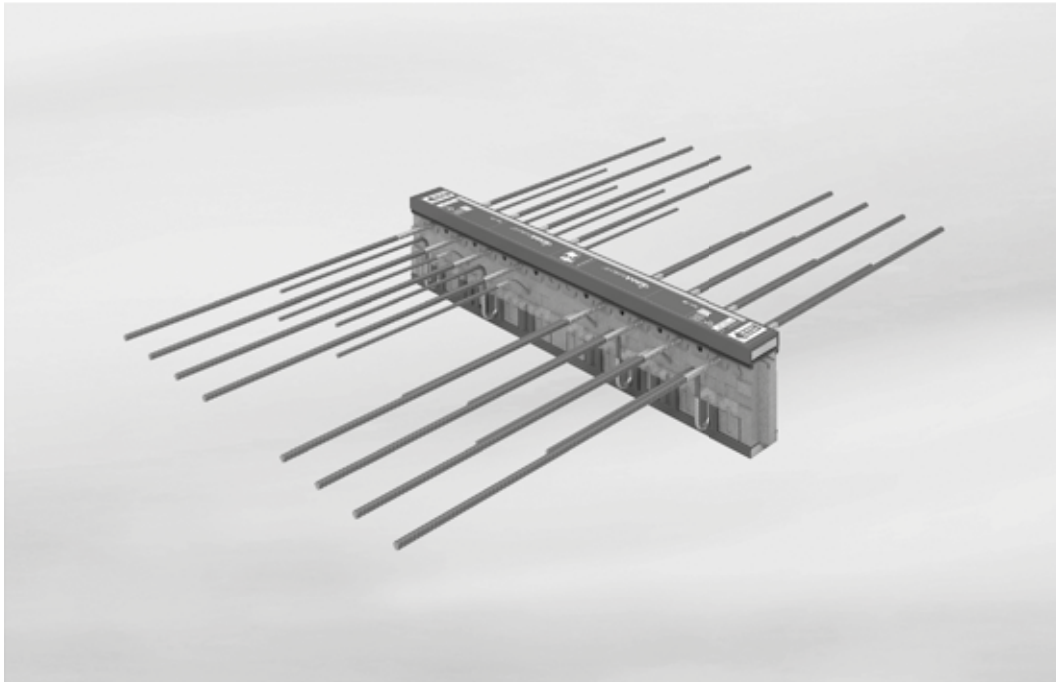


## Schöck Isokorb® Type CM



The Schöck Isokorb® Type CM is suitable for cantilevered reinforced concrete slabs. (C for concrete slab)  
It transmits negative moment (M) and positive shear force.

CM

Products

## Assembly Section Details | Element Arrangement

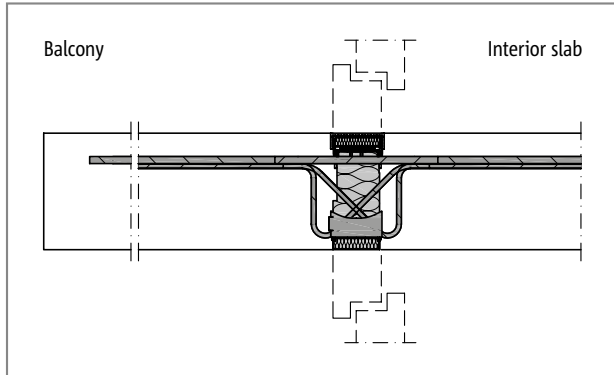


Fig. 1: Schöck Isokorb® Type CM: Balcony with window wall system

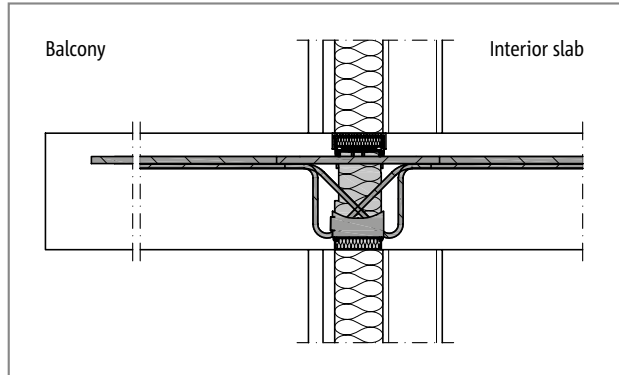


Fig. 2: Schöck Isokorb® Type CM: Balcony with steel stud wall, cavity insulation and facade cladding

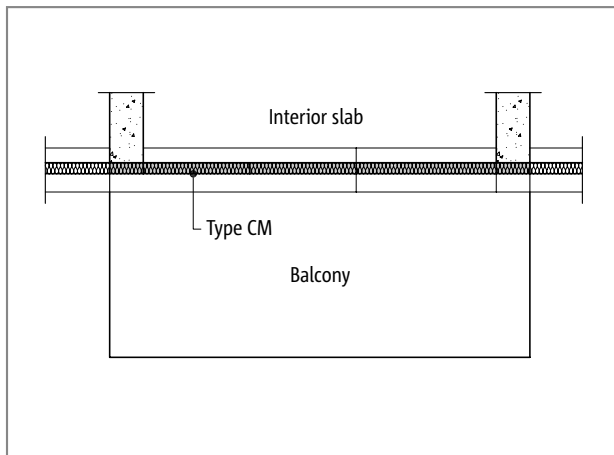


Fig. 3: Schöck Isokorb® type CM: Cantilever balcony

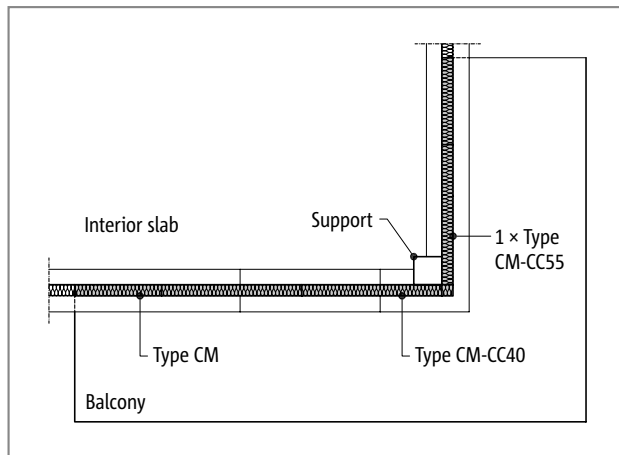


Fig. 4: Schöck Isokorb® type CM: Balcony with outer corners

### Position of Schöck Isokorb®

For optimal thermal performance the Schöck Isokorb® should be aligned with the insulation layer.

### Orientation of Schöck Isokorb®

- ▶ Attention: the Schöck Isokorb® does not have a symmetrical design in all cases.
- ▶ Ensure proper installation orientation as shown in the cross-section view on the design drawings.
- ▶ Must be installed right-side up with the tension bars on top.

### **i** Notes

- ▶ In the presence of horizontal loads, e.g. from earthquakes, Schöck Isokorb® module CEQ must be used.
- ▶ If the Schöck Isokorb® is used in precast concrete construction, a cast-in-place strip of concrete (width = bar length from insulating element) must be allowed for sufficient connection bar anchorage.

## Concrete Cover

### Concrete cover (CC)

The concrete cover of the Schöck Isokorb® is set to either 40 mm [1 9/16"] (CC40) or 55 mm [2 3/16"] (CC55). We recommend selecting the CC55 concrete cover for balcony slabs that are sloped for drainage. This allows the surface of the balcony slab to be sloped by 2%.

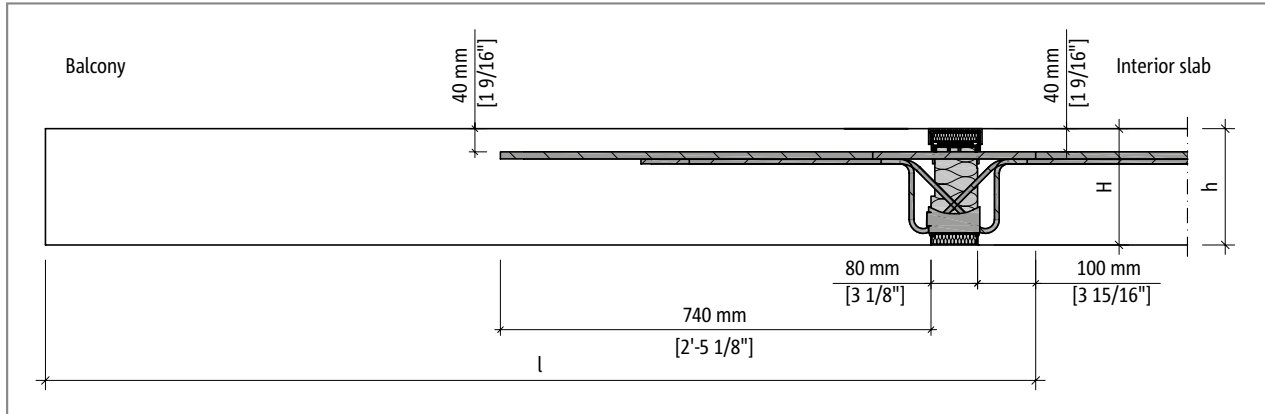


Fig. 5: Schöck Isokorb® Type CM: Concrete cover CC with flat balcony slab

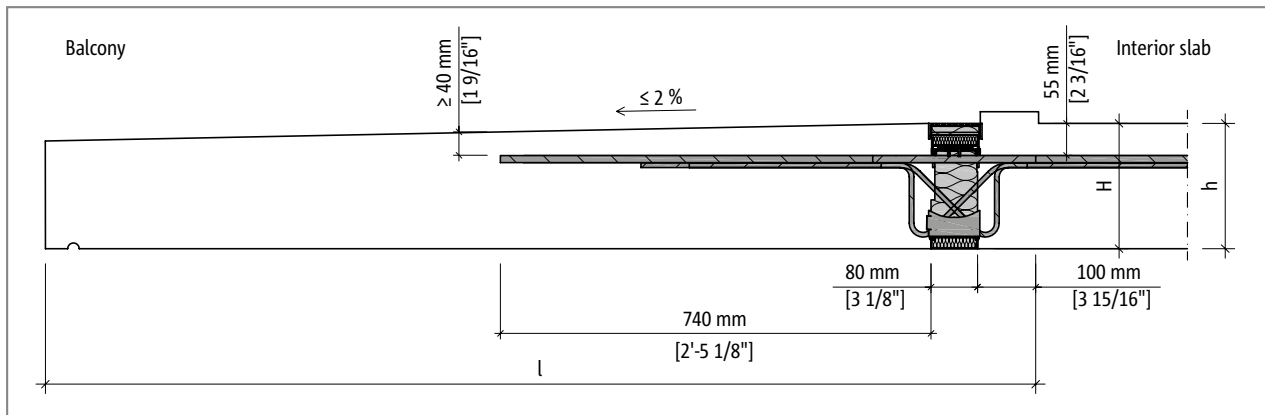


Fig. 6: Schöck Isokorb® Type CM: Concrete cover CC with sloped balcony slab

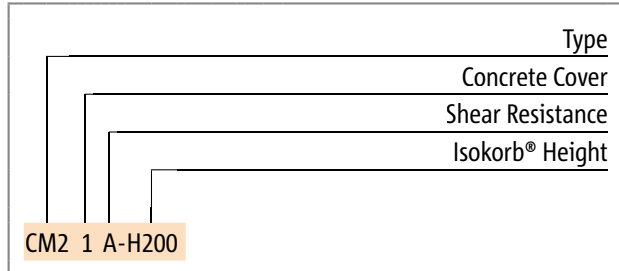
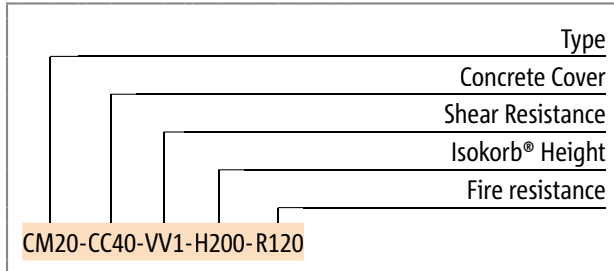
CM

Products

## Type Designation

### Type designation

The following product naming system is used to specify the attributes of the Schöck Isokorb® product as required in the structural design. This naming system ensures that the product is manufactured in accordance with the required specification. There is also a short-form of each product name to facilitate recognition of the product on the construction site during installation. Every Schöck Isokorb® product comes with both its full production designation and short-form name printed on the label on each unit to ensure the product type is clearly represented. The design drawings will always show the full production name as well as the short-form installation name for cross referencing. Only the short-form product names are included on the installation drawings.



## Slab Geometry

### Recommended maximum cantilever length

The following maximum cantilever lengths “l” are recommended in order to avoid excessive vibration behaviour in the balcony slab.

Schöck Isokorb® Type		CM10 - CM50	
max “l” with Isokorb height “H”		l <sub>max</sub> [m]	
Isokorb® height H	[mm]	CC40	CC55
	180	1.95	1.74
	190	2.10	1.88
	200	2.25	2.03
	210	2.39	2.17
	220	2.54	2.32
	230	2.68	2.46
	240	2.83	2.61
	250	2.98	2.76

Schöck Isokorb® Type			CM10 - CM50	
max “l” with Isokorb height “H”			l <sub>max</sub> [ft in]	
Isokorb® height H	[in]	[mm]	CC 1 9/16"	CC 2 3/16"
	7"	180	6'-5"	5'-8"
	7 1/2"	190	6'-10"	6'-2"
	7 7/8"	200	7'-4"	6'-6"
	8 1/4"	210	7'-10"	7'-2"
	8 5/8"	220	8'-4"	7'-7"
	9"	230	8'-10"	8'-0"
	9 1/2"	240	9'-3"	8'-6"
	9 7/8"	250	9'-8"	9'-0"

### Cantilever length for the structural calculations

The balcony support is assumed to be 100 mm [4"] from the Schöck Isokorb® insulation body on the interior slab side.

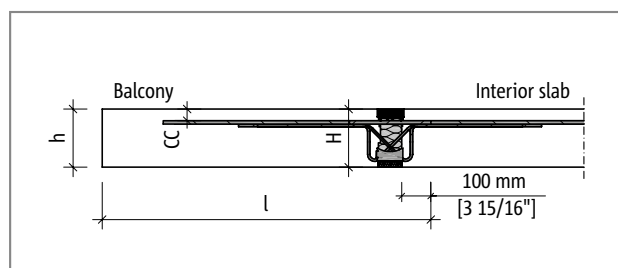


Fig. 7: Schöck Isokorb® Type CM: Structural system

### i Notes

- ▶ Special designs are available for slab height H = 160 - 170 mm [6 1/4" - 6 3/4"] with CC30 - CC35 mm [1 1/8" - 1 3/8"].

## Expansion Joint Spacing

### Expansion joints (recommended spacing)

Expansion joints are recommended to protect balcony slabs from temperature cracking when they are continuous for more than a critical length. The expansion joint spacing shown below corresponds to a temperature difference of  $\Delta T = 70\text{ °C}$  [126 °F].

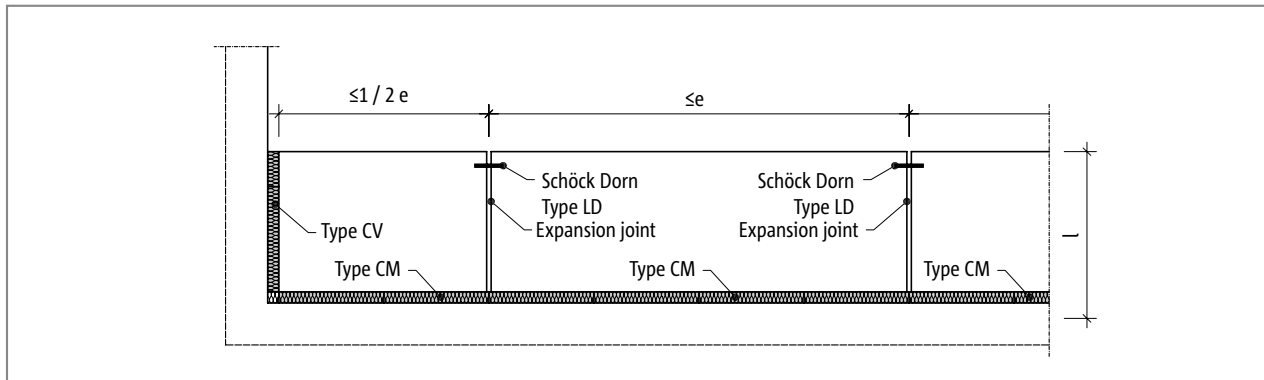


Fig. 8: Schöck Isokorb® Type CM: Maximum expansion joint spacing

Schöck Isokorb® Type		CM10 - CM50
Max expansion joint spacing		e [m]
Insulation Thickness [mm]	80	11.3

Schöck Isokorb® Type		CM10 - CM50
Max expansion joint spacing		e [ft in]
Insulation Thickness [in]	3 1/8"	37'-0 7/8"

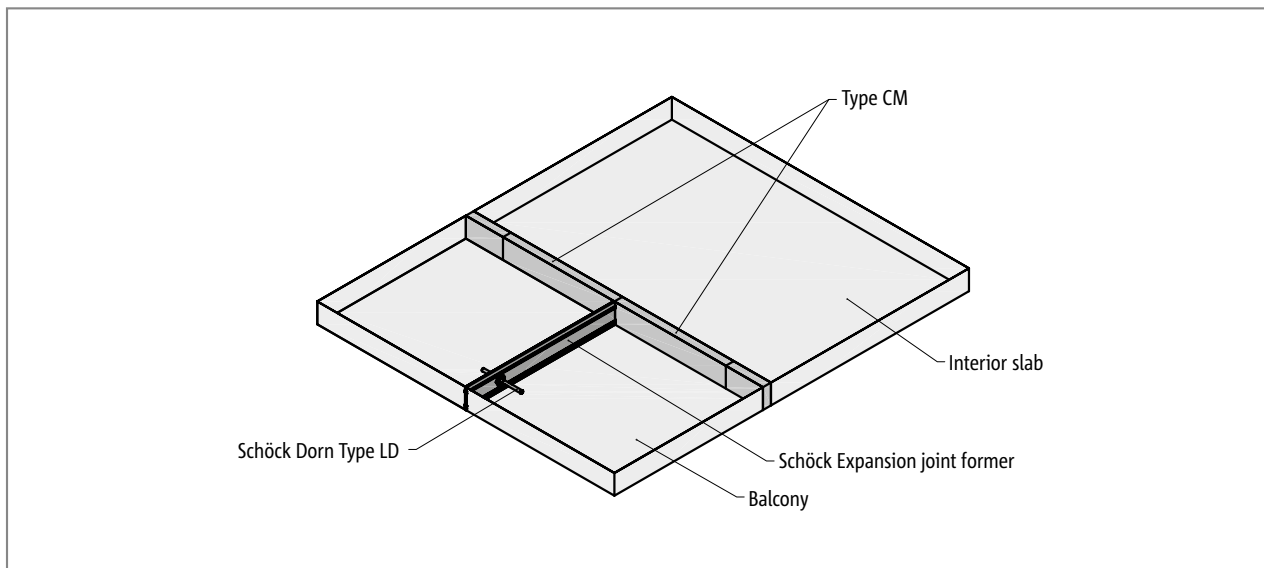


Fig. 9: Schöck Isokorb® Type CM: The expansion joint former

### **i** Notes

- ▶ The maximum expansion joint spacing must be verified by the Engineer of Record (EOR).
- ▶ The joint must be free to contract or expand in the longitudinal direction. Schöck Dorn LD in stainless steel A4 would be a suitable dowel connector for the expansion joint with the Schöck expansion joint former board.
- ▶ The Schöck expansion joint former board is available from Schöck USA Inc.

## Product Dimensioning

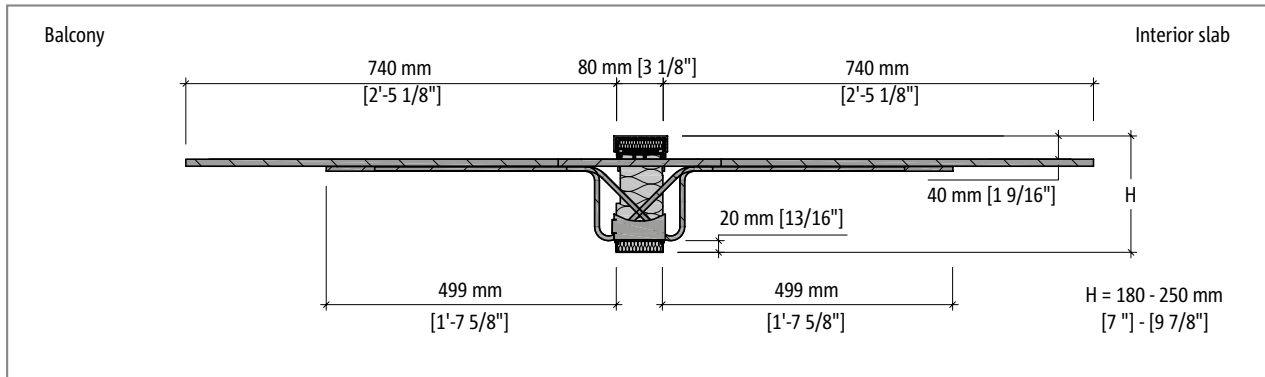


Fig. 10: Schöck Isokorb® Type CM10 to CM40 with concrete cover CC40: Product cross-section

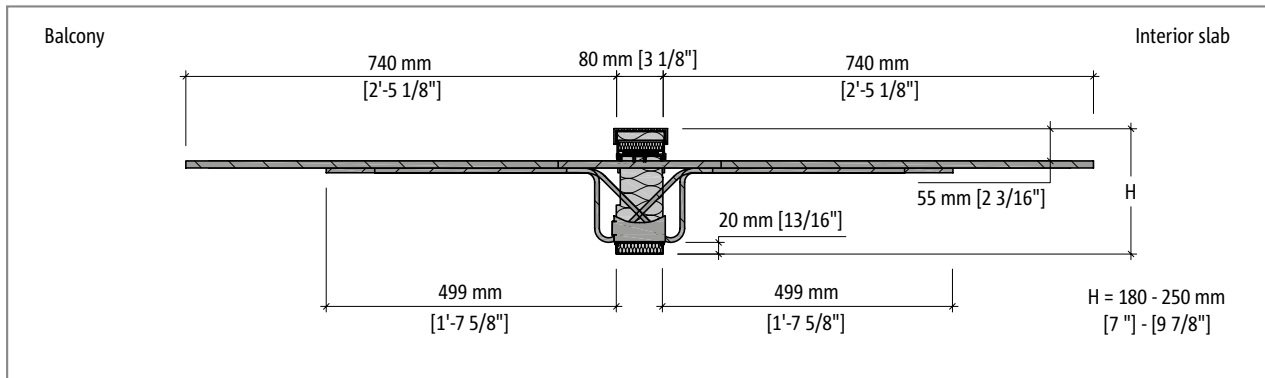


Fig. 11: Schöck Isokorb® Type CM10 to CM40 with concrete cover CC55: Product cross-section

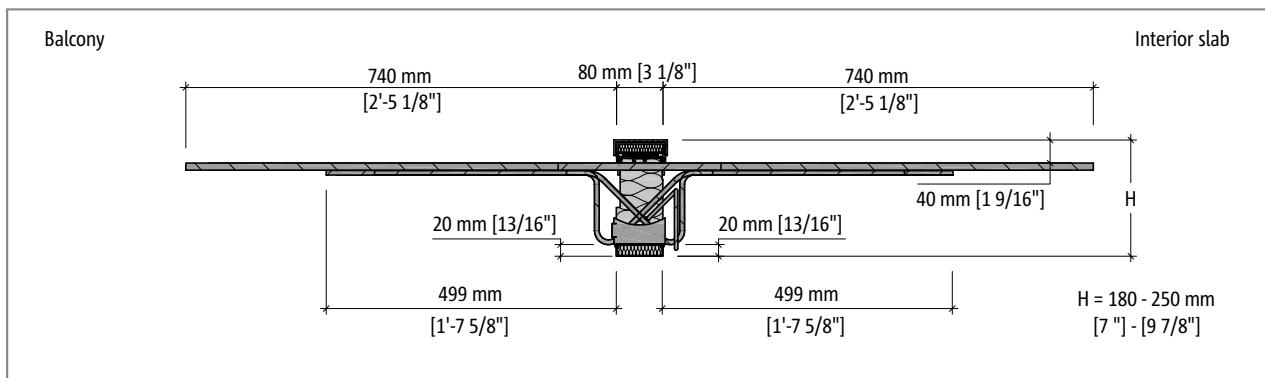


Fig. 12: Schöck Isokorb® Type CM50 with concrete cover CC40: Product cross-section

CM

Products

## Product Dimensioning

### Schöck Isokorb® length and configuration

Schöck Isokorb® Type	CM10	CM20	CM30	CM40	CM50
Isokorb®-Length [mm]	1000	1000	1000	1000	1000
Isokorb®-Length [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
Tension bars	6 ∅ 12	8 ∅ 12	10 ∅ 12	12 ∅ 12	14 ∅ 12
Shear bars VV1	4 ∅ 8 + 4 ∅ 8	4 ∅ 8 + 4 ∅ 8	4 ∅ 8 + 4 ∅ 8	4 ∅ 8 + 4 ∅ 8	6 ∅ 8 + 6 ∅ 8
Shear bars VV2	6 ∅ 8 + 6 ∅ 8	6 ∅ 8 + 6 ∅ 8	6 ∅ 8 + 6 ∅ 8	6 ∅ 8 + 6 ∅ 8	8 ∅ 8 + 6 ∅ 8
Concrete comp. bearing modules VV1	8	10	12	14	18
Concrete comp. bearing modules VV2	12	12	12	14	18
Special stirrup reinforcement	-	-	-	-	4

#### **i** Notes

- ▶ The product cross-sections of the 5 load capacities (CM10, CM20, CM30, CM40, CM50) of the Schöck Isokorb® type CM are identical for the respective concrete cover. The load capacities of the Schöck Isokorb® type CM vary in the number of tension bars, compression bars, shear force bars and HTE pressure bearing modules.
- ▶ The Schöck Isokorb® may be cut at locations of free insulation where no structural components conflict with the line of cut. The pressure bearing modules require at least 50 mm [2"] of concrete cover; ensure adequate spacing from the edge of the concrete slab. The spacing of the shear force bars along the length of the Schöck Isokorb® must be at least 100 mm [4"] and no more than 150 mm [6"].
- ▶ The shear force bar lengths vary as shown in the following plan details.
- ▶ The Schöck Isokorb® consists of metric components.
- ▶ Reinforcement bars ∅8 correspond to 5/16" diameter
- ▶ Reinforcement bars ∅12 correspond to 1/2" diameter



## Product Dimensioning

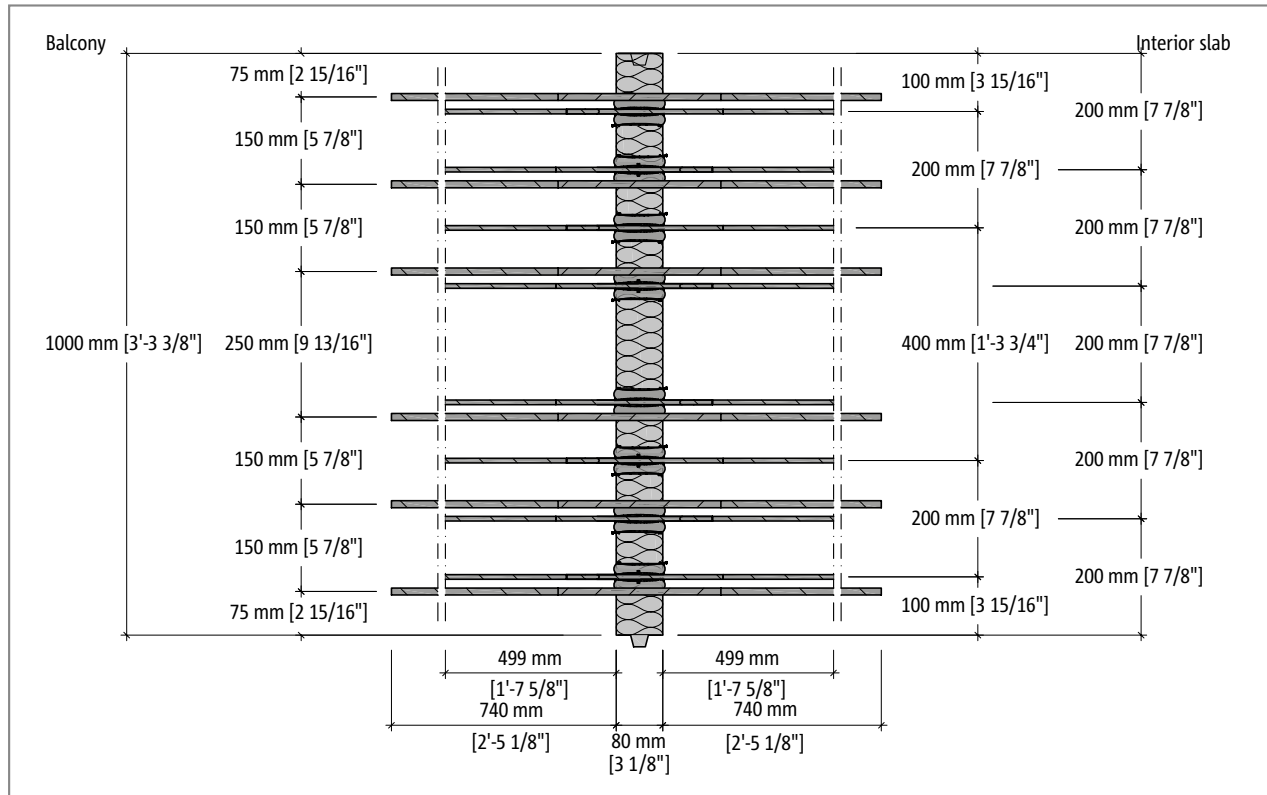


Fig. 13: Schöck Isokorb® Type CM10-VV1: Overhead view of the product

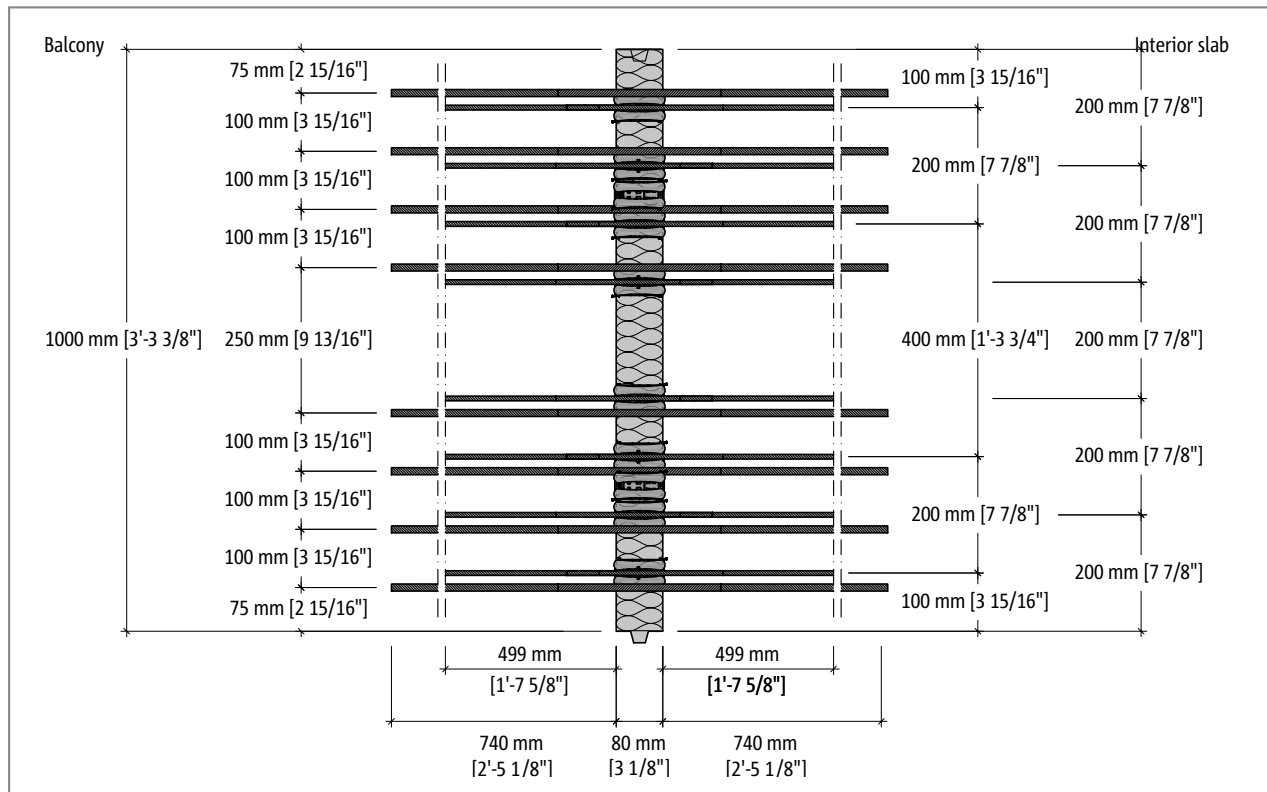


Fig. 14: Schöck Isokorb® Type CM20-VV1: Overhead view of the product

# Product Dimensioning

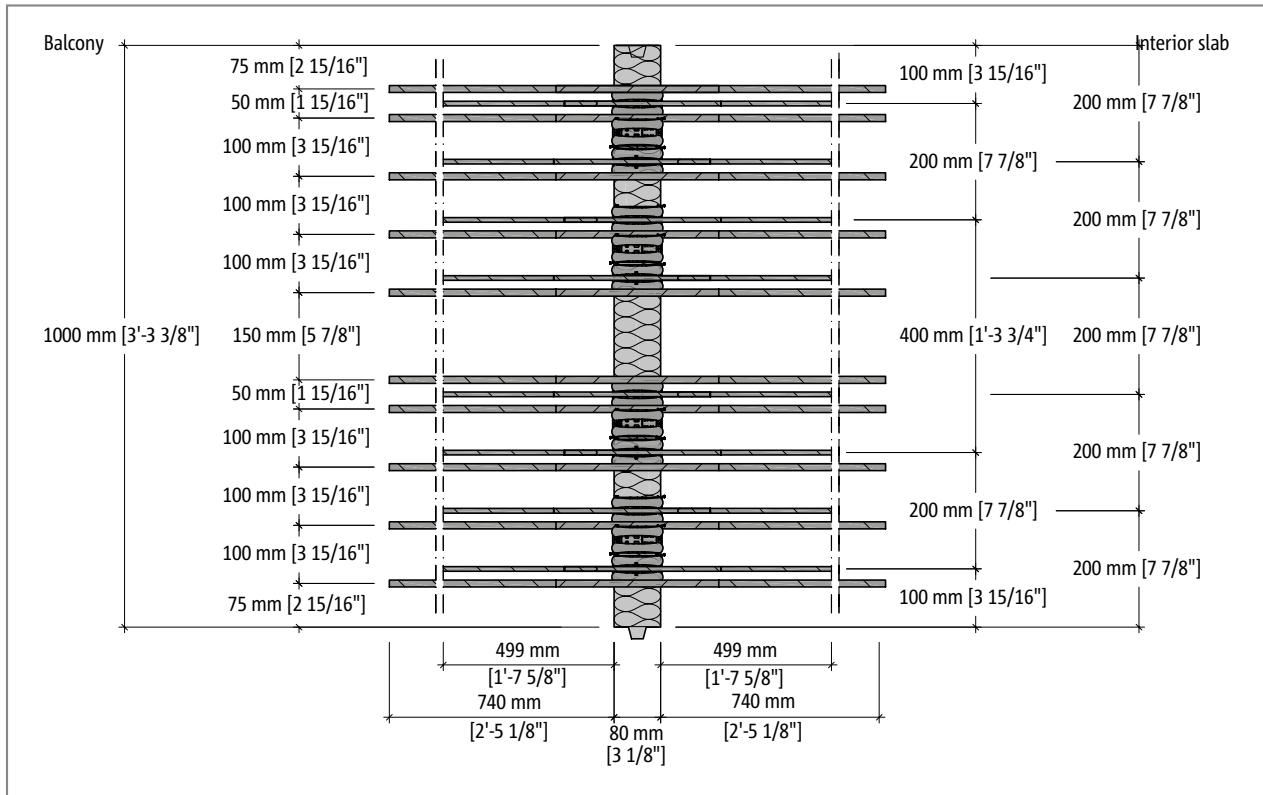


Fig. 15: Schöck Isokorb® Type CM30-VV1: Overhead view of the product

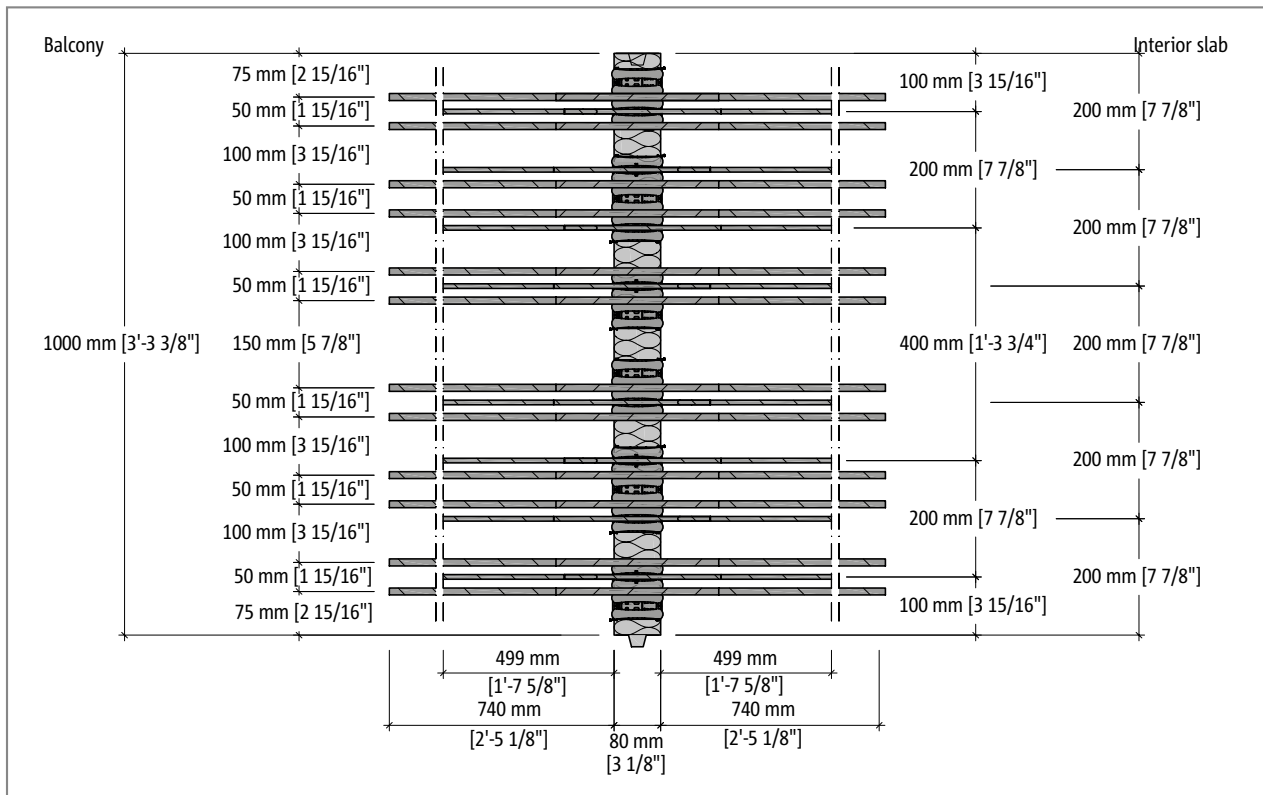


Fig. 16: Schöck Isokorb® Type CM40-VV1: Overhead view of the product

## Product Dimensioning

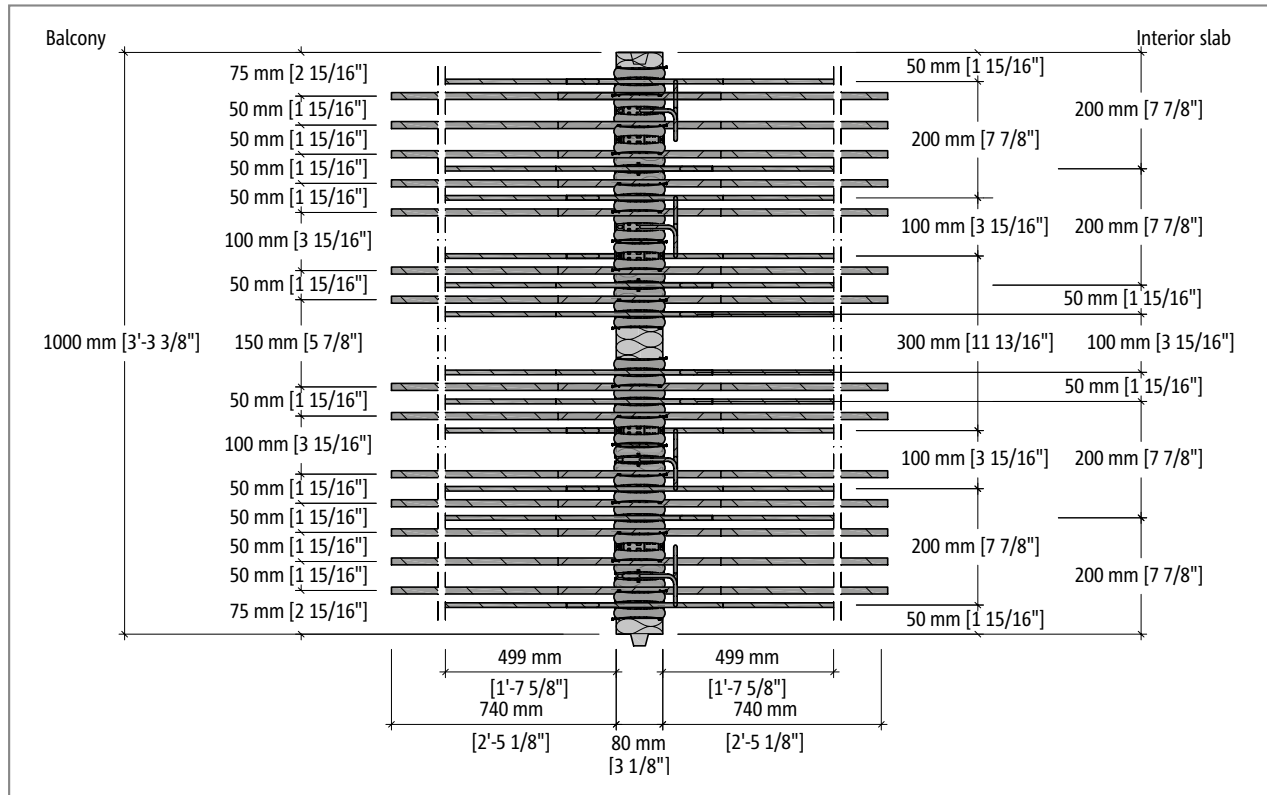


Fig. 17: Schöck Isokorb® Type CM50-VV1: Overhead view of the product

CM

Products

# Strength Capacity

## Product selection table as per ACI 318-14

Schöck Isokorb® Type			CM10	CM20	CM30	CM40	CM50
Design Values with	Isokorb® height H [mm]	Minimum slab height [mm]	Concrete Strength $\geq 27,5$ MPa				
			$\phi M_n$ [kNm/m]				
Concrete cover CC40 [mm]	180	180	-24.3	-30.5	-36.6	-42.7	-55.0
	190	190	-26.8	-33.7	-40.5	-47.2	-60.7
	200	200	-29.3	-36.9	-44.3	-51.6	-66.4
	210	210	-31.8	-40.1	-48.1	-56.1	-72.1
	220	220	-34.4	-43.3	-51.9	-60.6	-77.9
	230	230	-36.9	-46.4	-55.7	-65.0	-83.6
	240	240	-39.4	-49.6	-59.5	-69.5	-89.3
	250	250	-41.9	-52.8	-63.4	-73.9	-95.0
Shear Resistance			$\phi V_n$ [kN/m]				
	VV1		$\pm 52.9$	$\pm 52.9$	$\pm 52.9$	$\pm 52.9$	$\pm 79.4$
	VV2		$\pm 79.4$	$\pm 79.4$	$\pm 79.4$	$\pm 79.4$	105.9/-79.4

Schöck Isokorb® Type			CM10	CM20	CM30	CM40	CM50
Design Values with	Isokorb® height H [mm]	Minimum slab height [mm]	Concrete Strength $\geq 27,5$ MPa				
			$\phi M_n$ [kNm/m]				
Concrete cover CC55 [mm]	180	180	-20.5	-25.8	-30.9	-36.1	-46.4
	190	190	-23.0	-28.9	-34.7	-40.5	-52.1
	200	200	-25.5	-32.1	-38.5	-45.0	-57.8
	210	210	-28.0	-35.3	-42.4	-49.4	-63.5
	220	220	-30.6	-38.5	-46.2	-53.9	-69.3
	230	230	-33.1	-41.7	-50.0	-58.3	-75.0
	240	240	-35.6	-44.8	-53.8	-62.8	-80.7
	250	250	-38.2	-48.0	-57.6	-67.2	-86.4
Shear Resistance			$\phi V_n$ [kN/m]				
	VV1		$\pm 52.9$	$\pm 52.9$	$\pm 52.9$	$\pm 52.9$	$\pm 79.4$
	VV2		$\pm 79.4$	$\pm 79.4$	$\pm 79.4$	$\pm 79.4$	105.9/-79.4

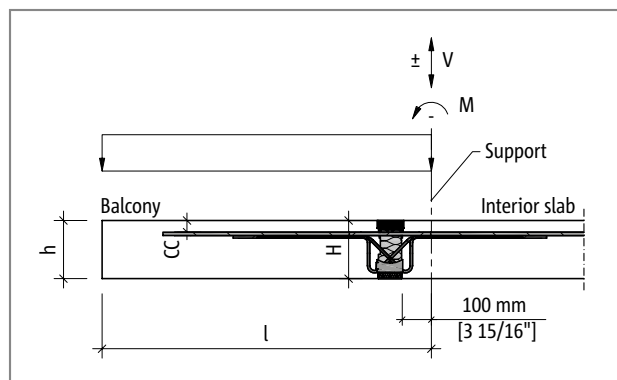


Fig. 18: Schöck Isokorb® Type CM: Structural system

## Strength Capacity

### Product selection table as per ACI 318-14

Schöck Isokorb® Type				CM10	CM20	CM30	CM40	CM50
Design Values with	Isokorb® height H [mm]	Isokorb® height H [in]	Minimum slab height [in]	Concrete Strength $\geq 4.000$ psi				
				$\phi M_n$ [kip-ft/ft]				
Concrete cover CC 1 9/16" [in]	180	7"	7"	-5.5	-6.9	-8.2	-9.6	-12.4
	190	7 1/2"	7 1/2"	-6.0	-7.6	-9.1	-10.6	-13.6
	200	7 7/8"	7 7/8"	-6.6	-8.3	-10.0	-11.6	-14.9
	210	8 1/4"	8 1/2"	-7.2	-9.0	-10.8	-12.6	-16.2
	220	8 5/8"	8 3/4"	-7.7	-9.7	-11.7	-13.6	-17.5
	230	9"	9"	-8.3	-10.4	-12.5	-14.6	-18.8
	240	9 1/2"	9 1/2"	-8.9	-11.2	-13.4	-15.6	-20.1
	250	9 7/8"	10"	-9.4	-11.9	-14.2	-16.6	-21.4
Shear Resistance				$\phi V_n$ [kips/ft]				
	VV1			$\pm 3.6$	$\pm 3.6$	$\pm 3.6$	$\pm 3.6$	$\pm 5.4$
	VV2			$\pm 5.4$	$\pm 5.4$	$\pm 5.4$	$\pm 5.4$	7.3/-5.4

Schöck Isokorb® Type				CM10	CM20	CM30	CM40	CM50
Design Values with	Isokorb® height H [mm]	Isokorb® height H [in]	Minimum slab height [in]	Concrete Strength $\geq 4.000$ psi				
				$\phi M_n$ [kip-ft/ft]				
Concrete cover CC 2 3/16" [in]	180	7"	7"	-4.6	-5.8	-6.9	-8.1	-10.4
	190	7 1/2"	7 1/2"	-5.2	-6.5	-7.8	-9.1	-11.7
	200	7 7/8"	7 7/8"	-5.7	-7.2	-8.7	-10.1	-13.0
	210	8 1/4"	8 1/2"	-6.3	-7.9	-9.5	-11.1	-14.3
	220	8 5/8"	8 3/4"	-6.9	-8.7	-10.4	-12.1	-15.6
	230	9"	9"	-7.4	-9.4	-11.2	-13.1	-16.9
	240	9 1/2"	9 1/2"	-8.0	-10.1	-12.1	-14.1	-18.1
	250	9 7/8"	10"	-8.6	-10.8	-13.0	-15.1	-19.4
Shear Resistance				$\phi V_n$ [kips/ft]				
	VV1			$\pm 3.6$	$\pm 3.6$	$\pm 3.6$	$\pm 3.6$	$\pm 5.4$
	VV2			$\pm 5.4$	$\pm 5.4$	$\pm 5.4$	$\pm 5.4$	7.3/-5.4

### **i** Notes

- ▶ If any concrete on the interior or exterior of the Schöck Isokorb® is less than 27.5 MPa [4,000 psi] contact Schöck Design Department.
- ▶ The Engineer of Record (EOR) must confirm strength of the slabs attached at either side to the Schöck Isokorb®.
- ▶ The shear capacity of the slabs must be verified by the Engineer of Record (EOR).
- ▶ For seismic loads Schöck Isokorb® has to be combined with the Schöck Isokorb® Type CEQ.
- ▶ The Schöck Isokorb® capacities consider a maximum permitted bar separation for lap splices according to ACI 318-11. This has to be taken into account by the Engineer of Record (EOR).
- ▶ Special designs are available for slab height H=160 - 170 mm [6 1/4" - 6 3/4"] with CC30 - CC35 mm [1 1/8" - 1 3/8"].
- ▶ The values shown in the design capacity tables are ultimate (factored) values.
- ▶ The support is assumed to be 100 mm [4"] from the Schöck Isokorb® insulation body on the interior slab side.
- ▶ For SI: 1 inch = 25.4 mm, 1 lbf = 4.448 N, 1 psi = 0.006897 MPa. For pound-inch units: 1 mm = 0.03937 inches, 1 N = 0.2248 lbf, 1 MPa = 145.0 psi.

# On Site Reinforcement

The cast-in-place floor and balcony slab reinforcement is to be defined by the Engineer of Record (EOR) of the building in accordance with structural requirements. The tension bars of the Schöck Isokorb® type CM must be overlapped with the tensile reinforcement noted below as Position 1. Position 2 (longitudinal edge reinforcement), Position 3 (L-Bars) and Position 4 (U-Bars at the free balcony edges) should also be provided as per the following recommended reinforcement layout.

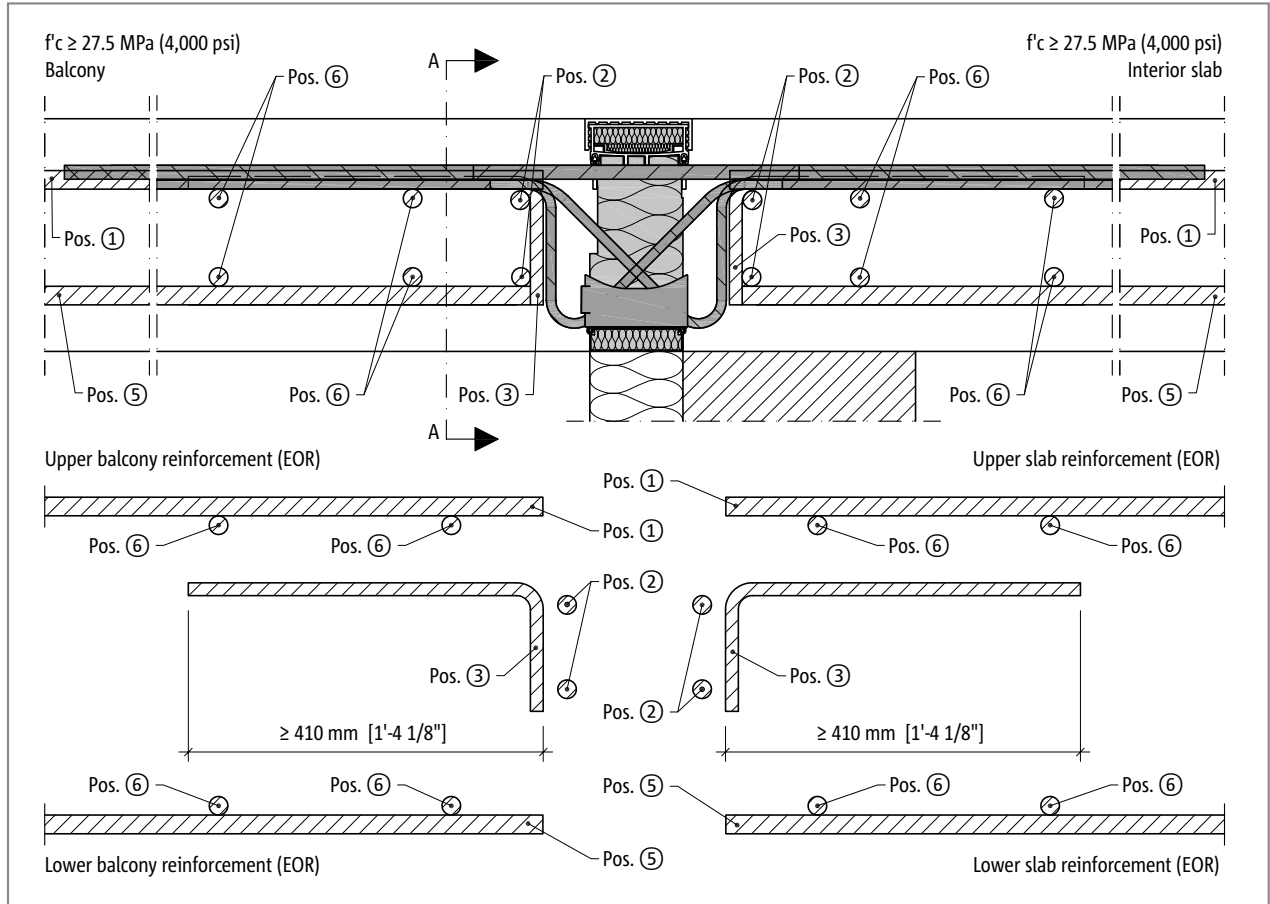


Fig. 19: Schöck Isokorb® Type CM: Cross section of recommended cast-in-place reinforcement (supplied by others)

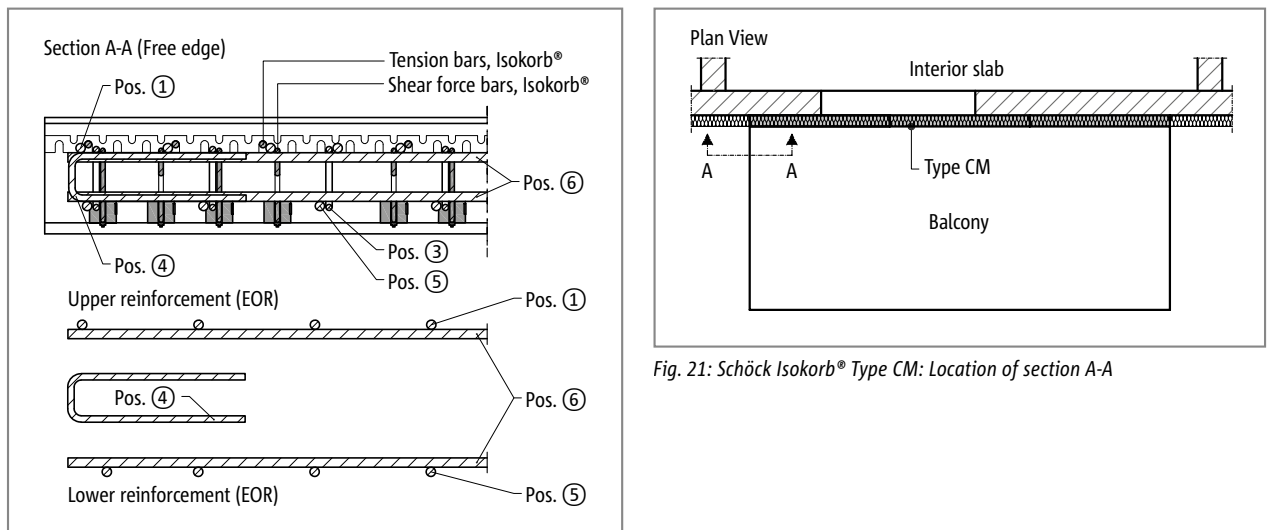


Fig. 20: Schöck Isokorb® Type CM: Section A-A Depiction of free balcony edge

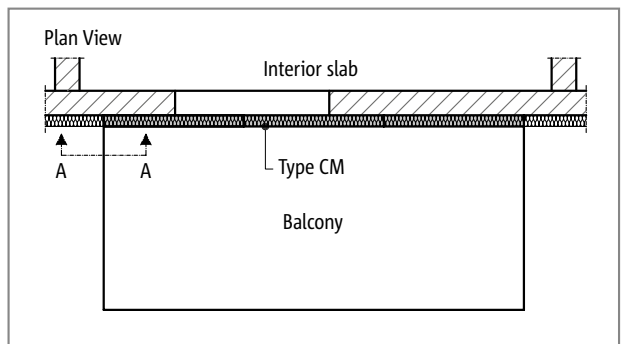


Fig. 21: Schöck Isokorb® Type CM: Location of section A-A

## On Site Reinforcement

At the table below are suggestions for cast-in-place connective reinforcement for 100 % section strength with minimum concrete strength of 27.5 MPa [4,000 psi]. The existing slab reinforcement can be taken into account for the required reinforcement of connections with Schöck Isokorb®.

Schöck Isokorb® Type	CM10	CM20	CM30	CM40	CM50
On Site Reinforcement	Concrete Strength $\geq$ 27,5 MPa (4.000 psi)				
<b>Pos. 1 Slab Reinforcement</b>					
Pos. 1 [mm <sup>2</sup> /m]	680	910	1130	1360	1590
Pos. 1 [in <sup>2</sup> /ft]	0,32	0,43	0,53	0,64	0,75
Pos. 1 Variant A	#4 @ 150 mm [#4 @ 6"]	#4 @ 125 mm [#4 @ 5"]	#4 @ 100 mm [#4 @ 4"]	#5 @ 125 mm [#5 @ 5"]	#5 @ 100 mm [#5 @ 4"]
Pos. 1 Variant B	#5 @ 250 mm [#5 @ 10"]	#5 @ 200 mm [#5 @ 8"]	#5 @ 150 mm [#5 @ 6"]	#6 @ 200 mm [#6 @ 8"]	#6 @ 150 mm [#6 @ 6"]
Required lap splice length	562 mm [22 1/8"]				
Lap splice length provided by Schöck Isokorb®	700 mm [27 1/2"]				
<b>Pos. 2 Longitudinal Bars Parallel to Insulation</b>					
Pos. 2 Variant A	4 × #3				
Pos. 2 Variant B	4 × #5				
<b>Pos. 3 Constructive edge reinforcement at Isokorb joint</b>					
Pos. 3 Variant A	#3 @ 250 mm [#3 @ 10"]	#3 @ 200 mm [#3 @ 8"]	#3 @ 200 mm [#3 @ 8"]	#4 @ 250 mm [#4 @ 10"]	#4 @ 250 mm [#4 @ 10"]
Pos. 3 Variant B	#5 @ 300 mm [#5 @ 12"]	#5 @ 300 mm #5 @ 12"	#5 @ 300 mm [#5 @ 12"]	#5 @ 300 mm [#5 @ 12"]	#5 @ 300 mm [#5 @ 12"]
<b>Pos. 4 Constructive edge reinforcement at free slab edges</b>					
Pos. 4 [mm <sup>2</sup> /m] / [in <sup>2</sup> /ft]	In accordance with EOR specifications				
<b>Pos. 5 Bottom layer reinforcement</b>					
Pos. 5 [mm <sup>2</sup> /m] / [in <sup>2</sup> /ft]	In accordance with EOR specifications				
<b>Pos. 6 Longitudinal reinforcement</b>					
Pos. 6 [mm <sup>2</sup> /m] / [in <sup>2</sup> /ft]	In accordance with EOR specifications				

### **i** Notes

- ▶ Pos. 1 must run as close as possible to the thermal insulation at both sides of Schöck Isokorb®, taking the required concrete cover into consideration.
- ▶ Pos. 4 should be chosen such that the U-bars can be arranged between the legs of Pos. 3.
- ▶ All free edges must be stiffened using structural U-bars as per Engineer of Record (EOR) specifications.
- ▶ The centerline distance of any pressure element from any free concrete edge, including expansion joints, must be at least 50 mm [2"].
- ▶ The centerline distance of any tension or shear bar from any free concrete edge, including expansion joints, must be at least 50 mm [2"].
- ▶ The lap splice length provided by Schöck Isokorb® = the length of the tension bar from the face of Schöck Isokorb® to the free end - concrete cover (CC).
- ▶ The usage of Schöck Isokorb® in balconies assumes stiff slab edges to ensure only shear forces affecting the connection and no field moment. The formation of stiff slab edges must be specified by EOR.

## Deflection/Camber

As the Schöck Isokorb® undergoes service loading, an internal deformation is caused by the elongation of the tension bars and shortening of the compression modules of the product. The final slope of the balcony slab results from deflection as per ACI 318-14 ( $w_1$ ) plus the internal deformation ( $w_2$ ) from the Schöck Isokorb®.

To calculate  $w_2$  deformation constants ( $\tan \alpha$ ) are provided in the table below as a worst case-scenario for loading the Schöck Isokorb® to maximum capacity. To determine  $w_2$  multiply the deformation constant ( $\tan \alpha$ ) by the length of the cantilever and a work-ratio of the serviceability moment to the full-capacity moment resistance of the product. Any requirement to pre-camber the balcony formwork can be determined if the desired final slope of the balcony is not achieved for drainage purposes.

Deformation ( $w_2$ ) as a result of Schöck Isokorb®

$$w_2[\text{in}] \text{ or } [\text{mm}] = \tan \alpha \times \ell \times M / \phi M_n \times 1/100$$

$\tan \alpha$  = Insert value from table below

$\ell$  = Cantilever length [in] or [mm]

$M$  = Nominal (unfactored) moment resistance [kip-ft/ft] or [kNm/m]

The load combination to be used here is defined by the Engineer of Record (EOR)

$\phi M_n$  = Ultimate (factored) moment resistance [kip-ft/ft] or [kNm/m] of the Schöck Isokorb® type CM (see page 13).

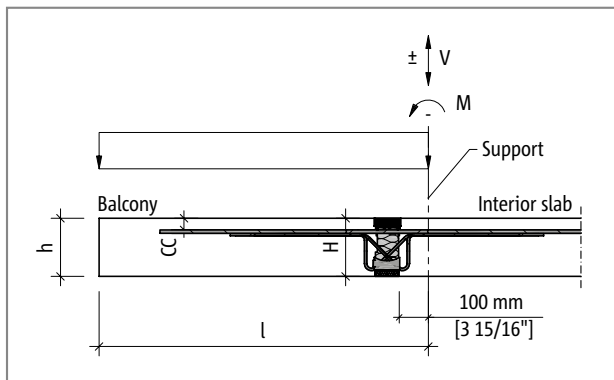


Fig. 22: Schöck Isokorb® Type CM: Structural system

Schöck Isokorb® Type			CM10 - CM50	
Deformation constants with:			$\tan \alpha$ [%]	
Isokorb® height H	[mm]	[in]	CC40 [1 9/16"]	CC55 [2 3/16"]
	180	7"	1.3	1.5
	190	7 1/2"	1.2	1.3
	200	7 7/8"	1.1	1.2
	210	8 1/4"	1.0	1.1
	220	8 5/8"	0.9	1.0
	230	9"	0.9	0.9
	240	9 1/2"	0.8	0.9
	250	9 7/8"	0.8	0.8



## ✓ Check List

- Has the recommended maximum cantilever length for the selected height of the Schöck Isokorb® been taken into consideration?
- Has the system length “l” been used for the design?
- Have the factored forces at the Schöck Isokorb® connection been determined at design level?
- Has the critical concrete strength been taken into consideration in the choice of design table?
- Has an appropriate concrete cover been selected and used with the calculation tables?
- Have both slabs adjacent to the Isokorb® been verified for bending and shear capacities by the Engineer of Record (EOR)?
- Has the additional deformation as a result of the Schöck Isokorb® been taken into consideration in the deflection calculations of the overall structure?
- Has the required camber been specified in the design drawings? Was the drainage direction taken into consideration in the camber specification?
- Have the outer corners been designed using Schöck Isokorb® type CM-CC40 and Schöck Isokorb® type CM-CC55 .
- Has the maximum permissible expansion gap spacing been taken into consideration for the specific slab configuration?
- Have the horizontal loads such as those from wind pressure or seismic loading been taken into consideration? Additional CEQ modules may be required.
- Has the connecting reinforcement in the balcony and interior slabs been defined by the Engineer of Record (EOR)?
- When using Schöck Isokorb® in a pre-cast application, has a cast-in-place strip of concrete (width  $\geq 50$  mm [2"] from any compression modules) been specified in the design plans?