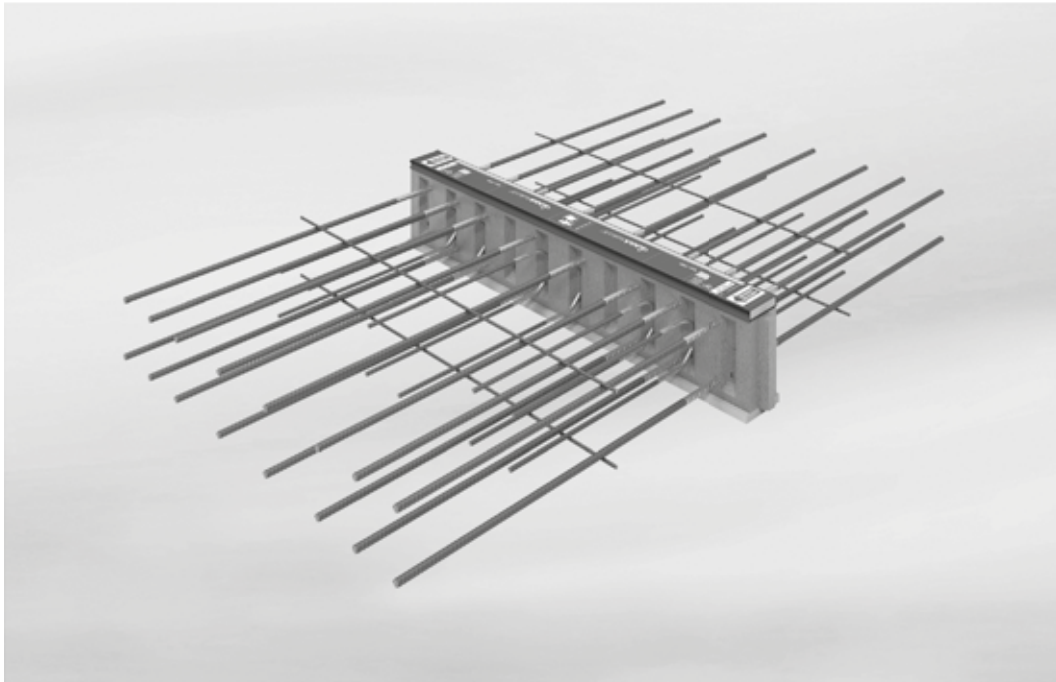


## Schöck Isokorb® Type CMD



The Schöck Isokorb® Type CMD (concrete slab) is suitable for cantilevered balconies that require uplift force resistance, as well as standard gravity force resistance. It transfers positive and negative moments (M, D double) and shear force.

CMD

Products



## Assembly Section Details | Element Arrangement

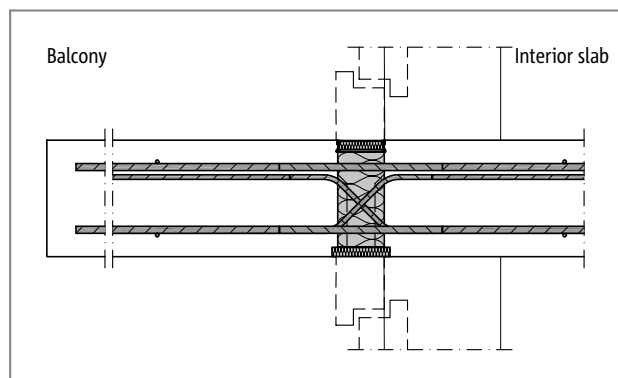


Fig. 1: Schöck Isokorb® Type CMD: Balcony with window wall system

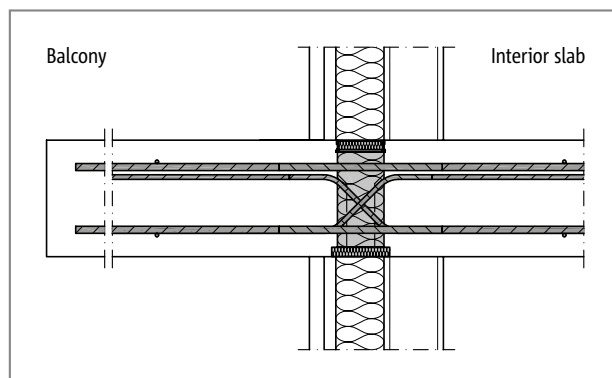


Fig. 2: Schöck Isokorb® Type CMD: Balcony with steel stud wall, cavity insulation and facade cladding

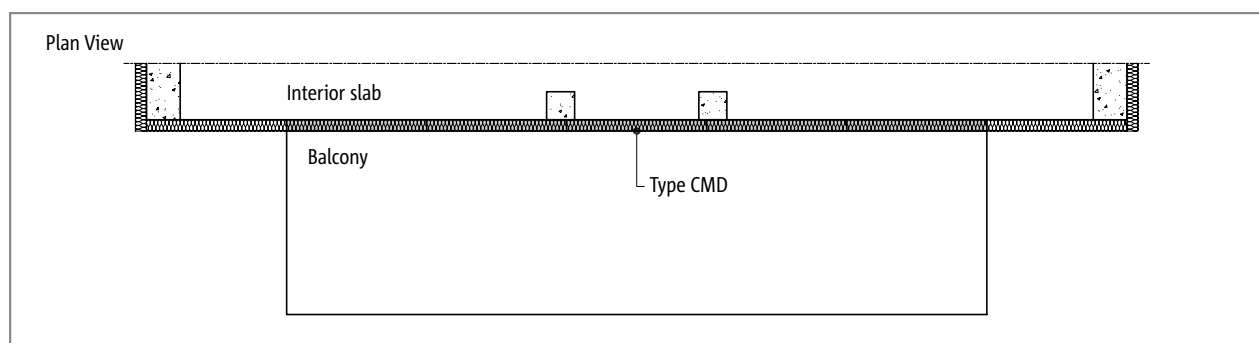


Fig. 3: Schöck Isokorb® Type CMD: Cantilever balcony

### Position of Schöck Isokorb®

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

### Orientation of Schöck Isokorb®

- ▶ The upper bar is above the shear force bars, and the lower bar is in the same layer as the shear force bars.
- ▶ Ensure proper installation orientation as shown in the cross-section view on the design drawings.

### **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). This CC is set to cover the lower bars; the upper bars will have the same CC as a minimum, or greater depending on the slab height. 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%.

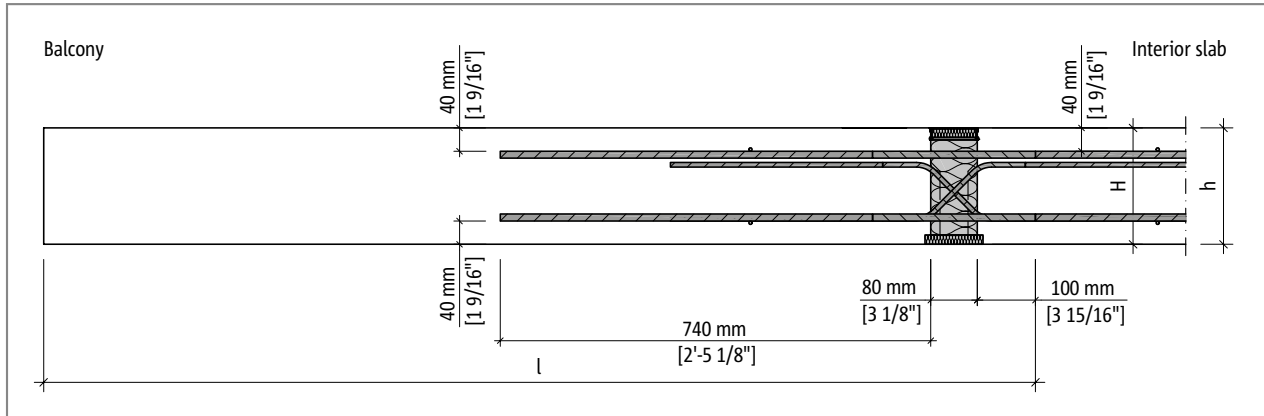


Fig. 4: Schöck Isokorb® Type CMD: Concrete cover CC with flat balcony slab

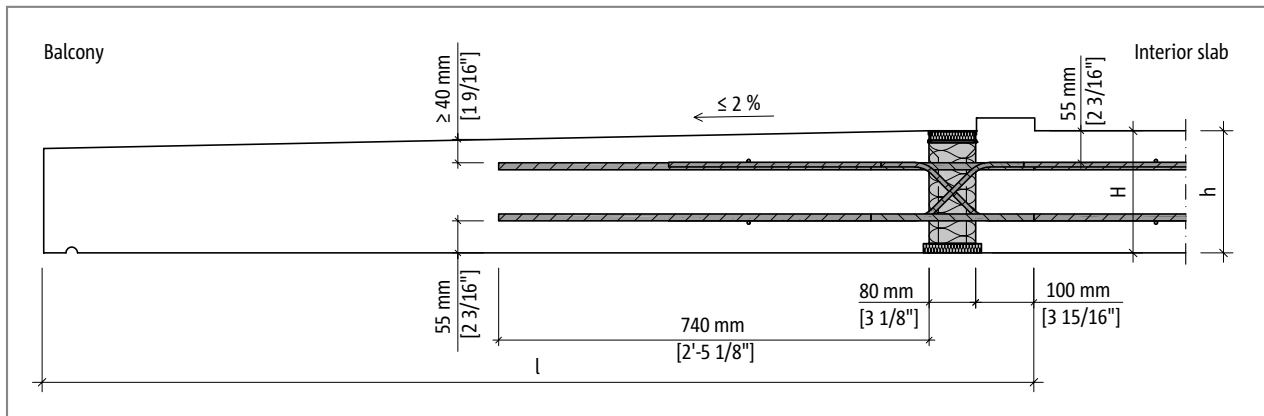
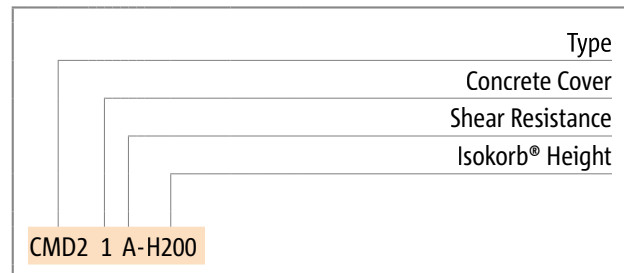
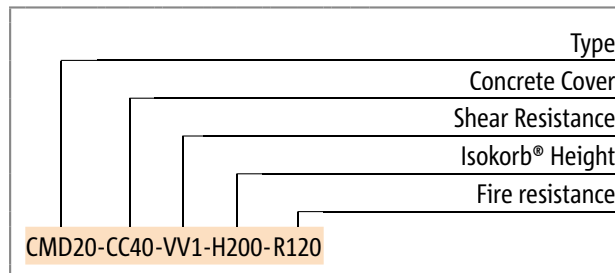


Fig. 5: Schöck Isokorb® Type CMD: Concrete cover CC with sloped balcony slab

## 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.



CMD

Products

## 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].

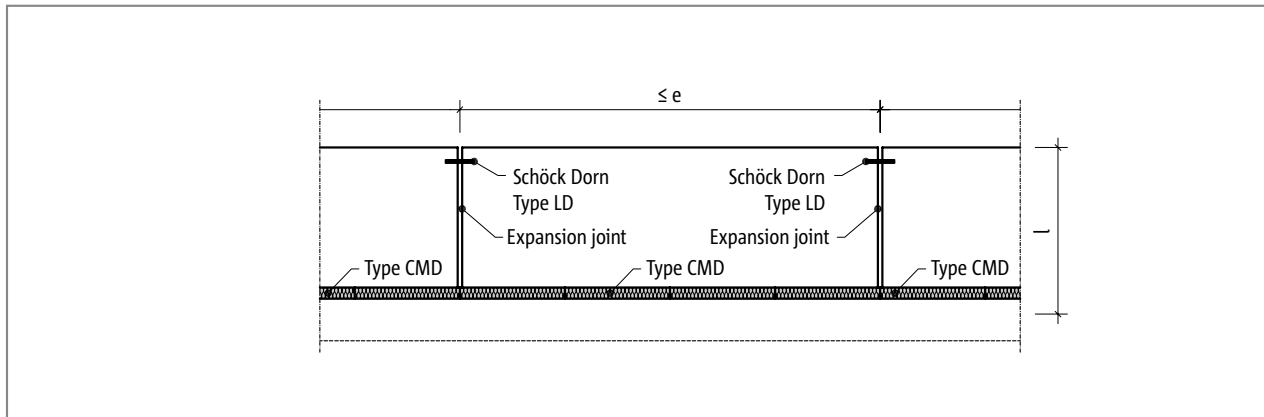


Fig. 6: Schöck Isokorb® Type CMD: Maximum expansion joint spacing

Schöck Isokorb® Type		CMD10 - CMD40
Max expansion joint spacing		e [m]
Insulation Thickness [mm]	80	11.7

Schöck Isokorb® Type		CMD10 - CMD40
Max expansion joint spacing		e [ft in]
Insulation Thickness [in]	3 1/8"	38'-4 5/8"

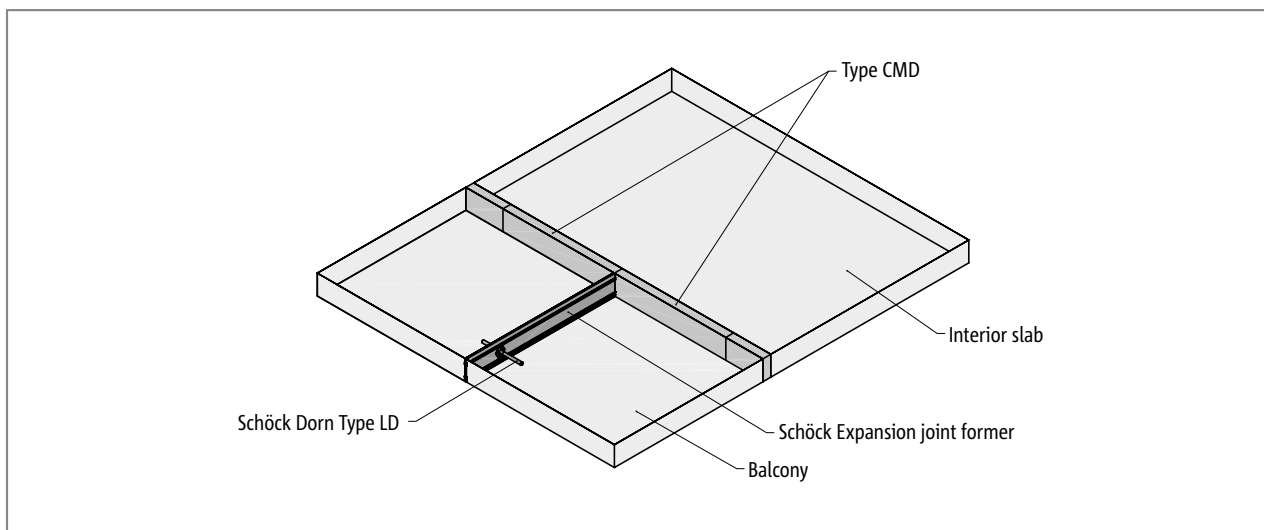


Fig. 7: Schöck Isokorb® Type CMD: The expansion joint former

### **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

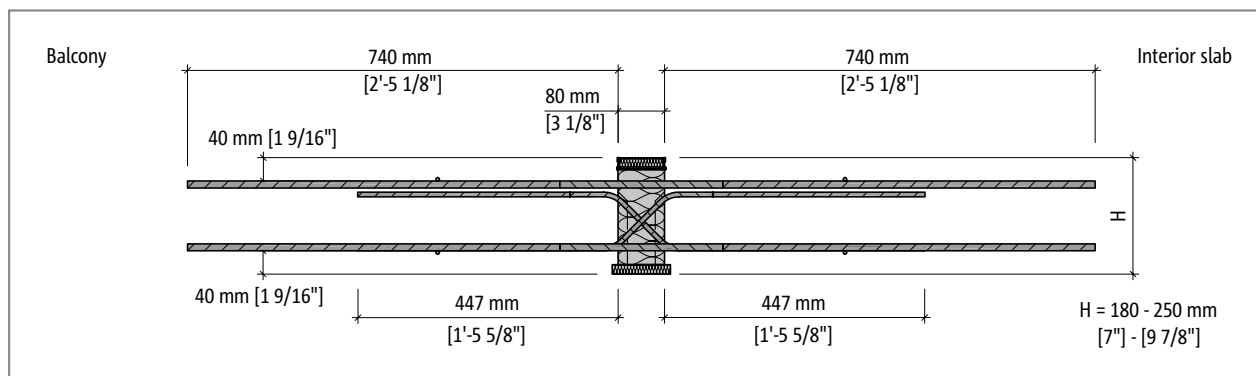


Fig. 8: Product cross-section for Schöck Isokorb® Type CMD10 to CMD40, concrete cover CC40

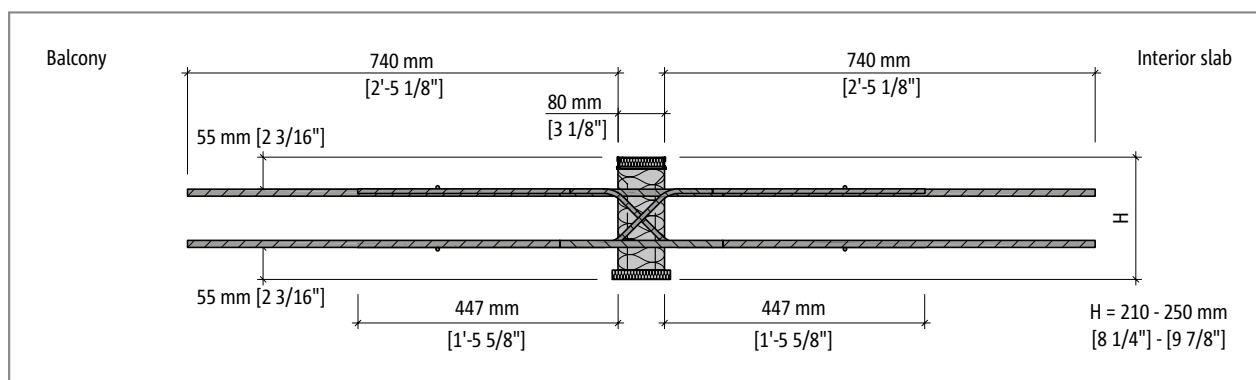


Fig. 9: Product cross-section for Schöck Isokorb® Type CMD10 to CMD40, concrete cover CC5

### Schöck Isokorb® length and configuration

Schöck Isokorb® Type	CMD10	CMD20	CMD30	CMD40
Isokorb®-Length [mm]	1000	1000	1000	1000
Isokorb®-Length [ft in]	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"	3'-3 3/8"
Tension/Compression Bars	2 × 6 ∅ 12	2 × 8 ∅ 12	2 × 10 ∅ 12	2 × 12 ∅ 12
Shear bars VV1	4 ∅ 8 + 4 ∅ 8	4 ∅ 8 + 4 ∅ 8	4 ∅ 8 + 4 ∅ 8	4 ∅ 8 + 4 ∅ 8
Shear bars VV2	6 ∅ 8 + 6 ∅ 8	6 ∅ 8 + 6 ∅ 8	6 ∅ 8 + 6 ∅ 8	6 ∅ 8 + 6 ∅ 8

#### **i** Notes

- ▶ The product cross-sections of the 4 load capacities (CMD10, CMD20, CMD30, CMD40) of the Schöck Isokorb® Type CMD are identical for the respective concrete cover. The load capacities of the Schöck Isokorb® type CMD vary in the number of tension bars and shear force bars.
- ▶ The purpose of the spacer bar is only for stability of the product in shipping and movement on the construction site. It may be cut during the installation. This bar is shown on the following page parallel to the insulation body and crossing the tension bars.
- ▶ 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 Schöck Isokorb® consists of metric components.
- ▶ Reinforcement bars ∅8 correspond to 5/16" diameter
- ▶ Reinforcement bars ∅12 correspond to 1/2" diameter

# Product Dimensioning

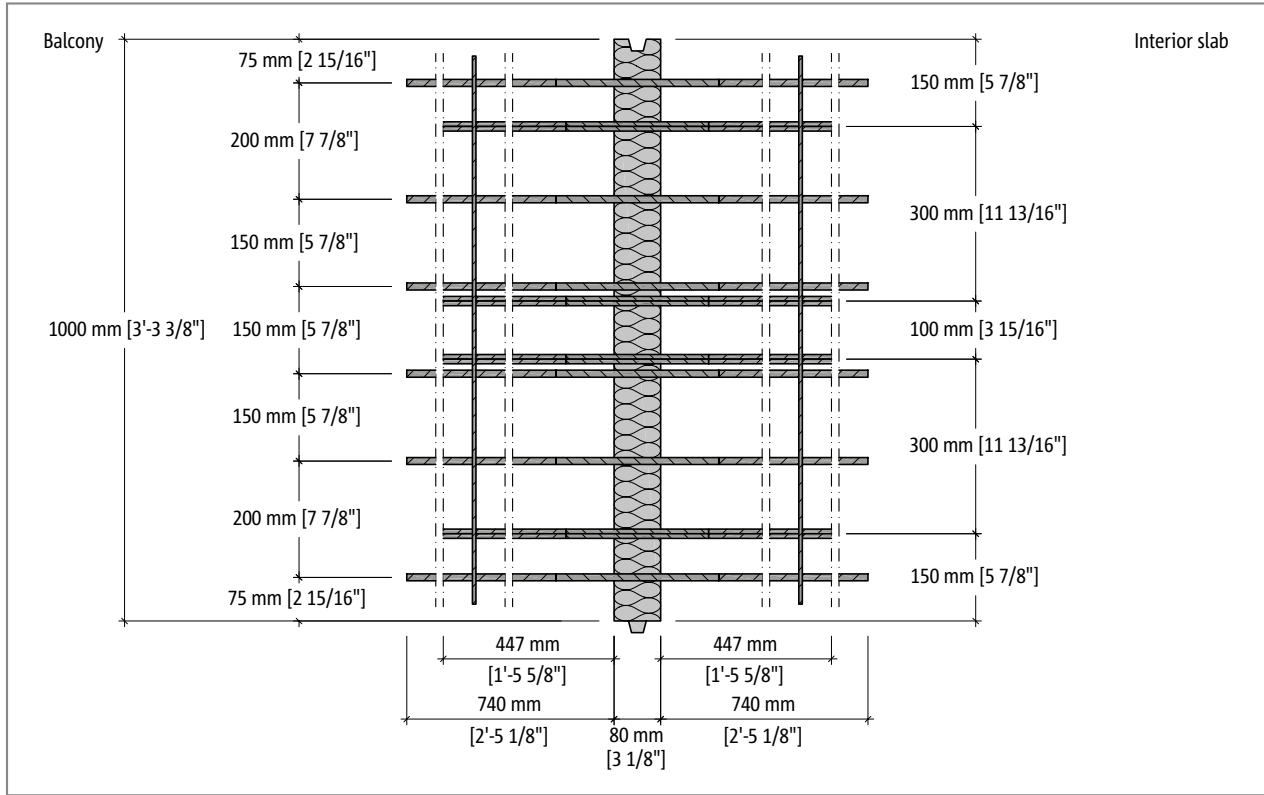


Fig. 10: Schöck Isokorb® Type CMD10-VV1: Overhead view of the product

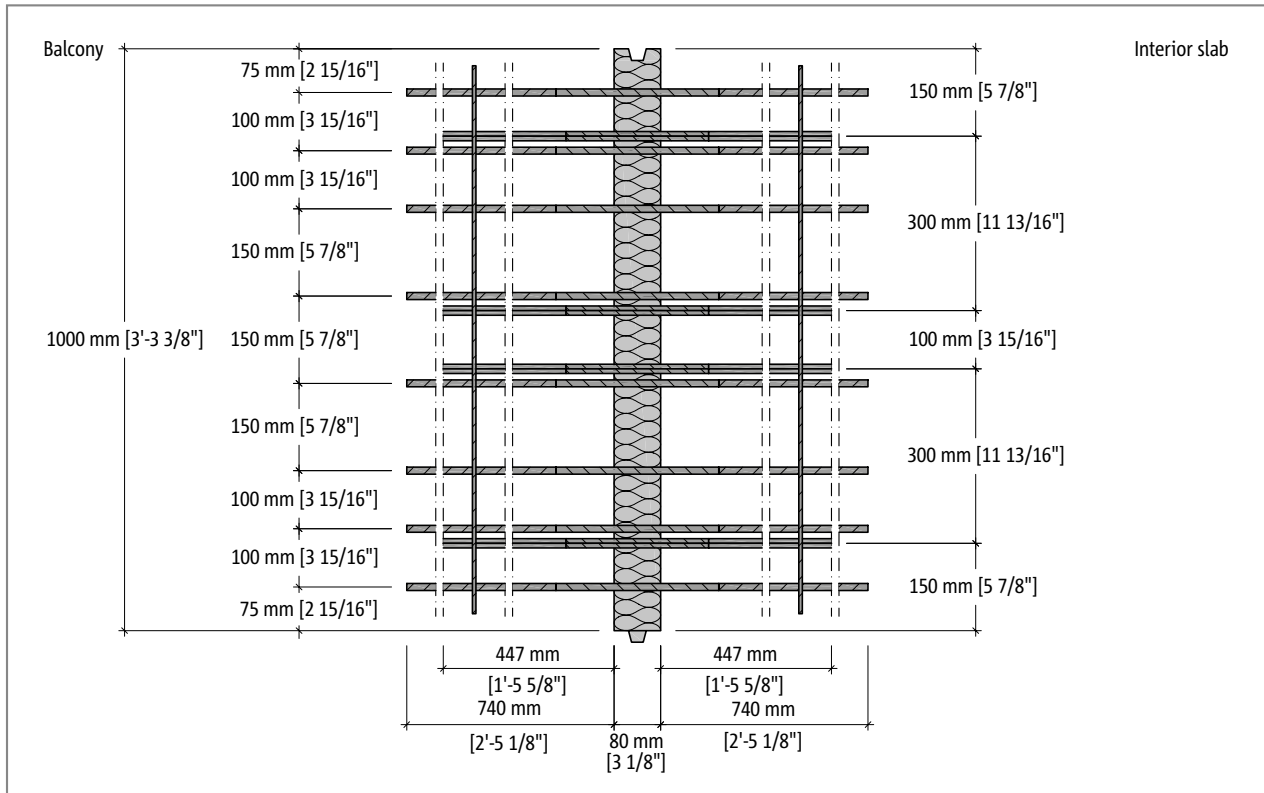


Fig. 11: Schöck Isokorb® Type CMD20-VV1: Overhead view of the product



## Product Dimensioning

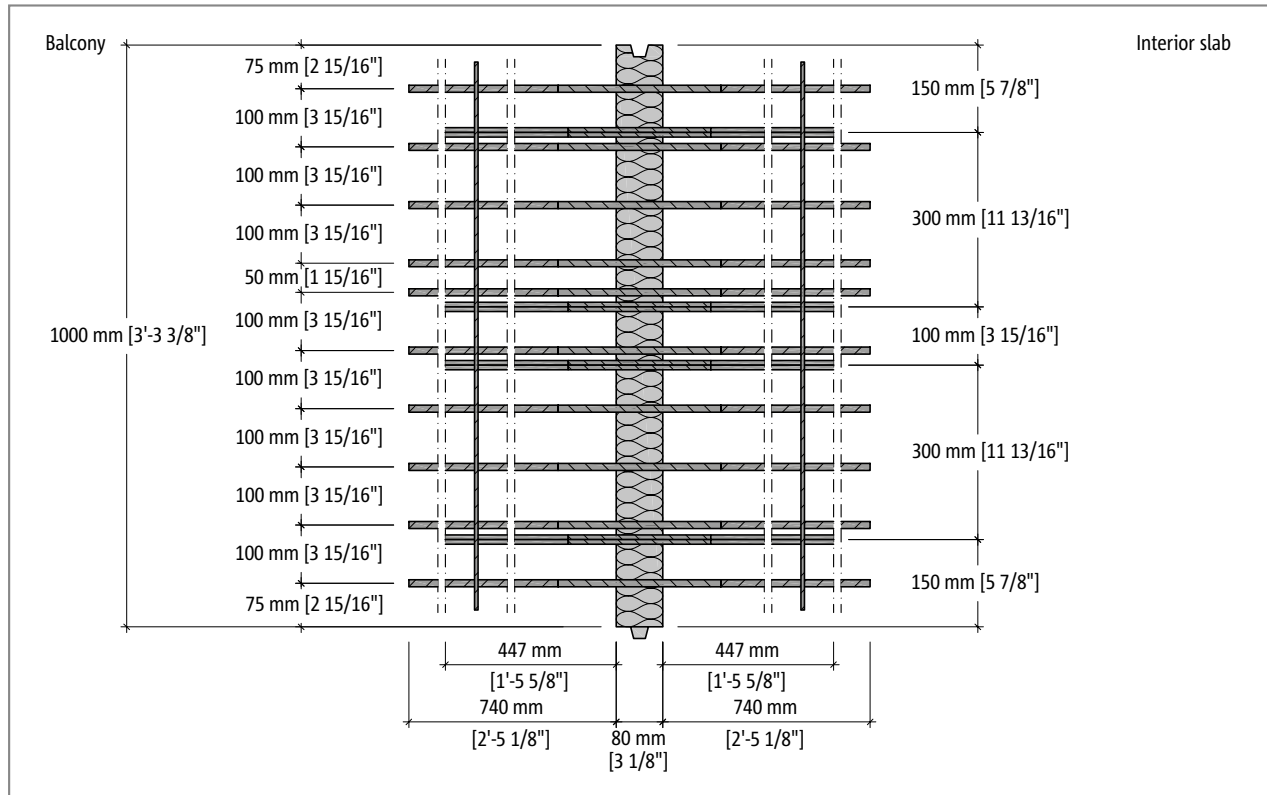


Fig. 12: Schöck Isokorb® Type CMD30-VV1: Overhead view of the product

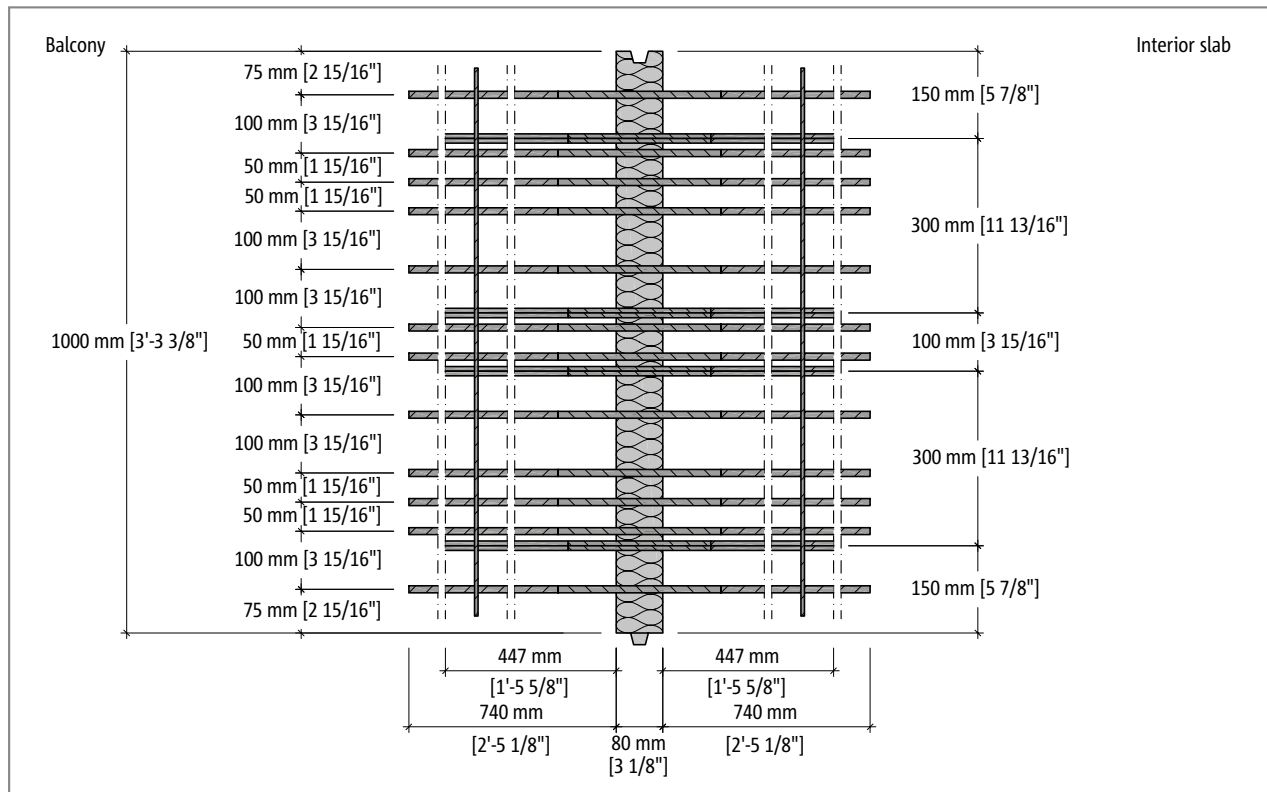


Fig. 13: Schöck Isokorb® Type CMD40-VV1: Overhead view of the product

## Strength Capacity

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

Schöck Isokorb® Type			CMD10	CMD20	CMD30	CMD40
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	$\pm 21.9$	$\pm 29.2$	$\pm 36.5$	$\pm 43.8$
	190	190	$\pm 24.4$	$\pm 32.5$	$\pm 40.6$	$\pm 48.8$
	200	200	$\pm 26.9$	$\pm 35.8$	$\pm 44.8$	$\pm 53.7$
	210	210	$\pm 29.4$	$\pm 39.1$	$\pm 48.9$	$\pm 58.7$
	220	220	$\pm 31.8$	$\pm 42.5$	$\pm 53.1$	$\pm 63.7$
	230	230	$\pm 34.3$	$\pm 45.8$	$\pm 57.2$	$\pm 68.7$
	240	240	$\pm 36.8$	$\pm 49.1$	$\pm 61.4$	$\pm 73.6$
	250	250	$\pm 39.3$	$\pm 52.4$	$\pm 65.5$	$\pm 78.6$
Shear Resistance			$\phi V_n$ [kN/m]			
	VV1		$\pm 52.9$	$\pm 52.9$	$\pm 52.9$	$\pm 52.9$
	VV2		$\pm 79.4$	$\pm 79.4$	$\pm 79.4$	$\pm 79.4$

Schöck Isokorb® Type			CMD10	CMD20	CMD30	CMD40
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]	210	210	$\pm 21.9$	$\pm 29.2$	$\pm 36.5$	$\pm 43.8$
	220	220	$\pm 24.4$	$\pm 32.5$	$\pm 40.6$	$\pm 48.8$
	230	230	$\pm 26.9$	$\pm 35.8$	$\pm 44.8$	$\pm 53.7$
	240	240	$\pm 29.4$	$\pm 39.1$	$\pm 48.9$	$\pm 58.7$
	250	250	$\pm 31.8$	$\pm 42.5$	$\pm 53.1$	$\pm 63.7$
Shear Resistance			$\phi V_n$ [kN/m]			
	VV1		$\pm 52.9$	$\pm 52.9$	$\pm 52.9$	$\pm 52.9$
	VV2		$\pm 79.4$	$\pm 79.4$	$\pm 79.4$	$\pm 79.4$

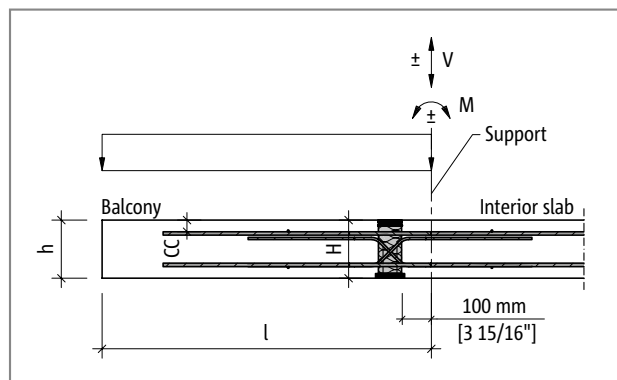


Fig. 14: Schöck Isokorb® Type CMD: Structural system

## Strength Capacity

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

Schöck Isokorb® Type				CMD10	CMD20	CMD30	CMD40	
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"	±4.9	±6.6	±8.2	±9.8	
	190	7 1/2"	7 1/2"	±5.5	±7.3	±9.1	±11.0	
	200	8"	8"	±6.0	±8.1	±10.1	±12.1	
	210	8 1/4"	8 1/2"	±6.6	±8.8	±11.0	±13.2	
	220	8 5/8"	8 3/4"	±7.2	±9.5	±11.9	±14.3	
	230	9"	9"	±7.7	±10.3	±12.9	±15.4	
	240	9 1/2"	9 1/2"	±8.3	±11.0	±13.8	±16.6	
	250	9 7/8"	10"	±8.8	±11.8	±14.7	±17.7	
Shear Resistance				$\phi V_n$ [kips/ft]				
	VV1				±3.6	±3.6	±3.6	±3.6
	VV2				±5.4	±5.4	±5.4	±5.4

Schöck Isokorb® Type				CMD10	CMD20	CMD30	CMD40	
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]	210	8 1/4"	8 1/2"	±4.9	±6.6	±8.2	±9.8	
	220	8 5/8"	8 3/4"	±5.5	±7.3	±9.1	±11.0	
	230	9"	9"	±6.0	±8.1	±10.1	±12.1	
	240	9 1/2"	9 1/2"	±6.6	±8.8	±11.0	±13.2	
	250	9 7/8"	10"	±7.2	±9.5	±11.9	±14.3	
Shear Resistance				$\phi V_n$ [kips/ft]				
	VV1				±3.6	±3.6	±3.6	±3.6
	VV2				±5.4	±5.4	±5.4	±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 CMD must be overlapped with the tensile reinforcement noted below as Position 1. Position 2 (longitudinal edge reinforcement), Position 3 (U-Bars) and Position 4 (U-Bars at the free balcony edges) should also be provided as per the following recommended reinforcement layout.

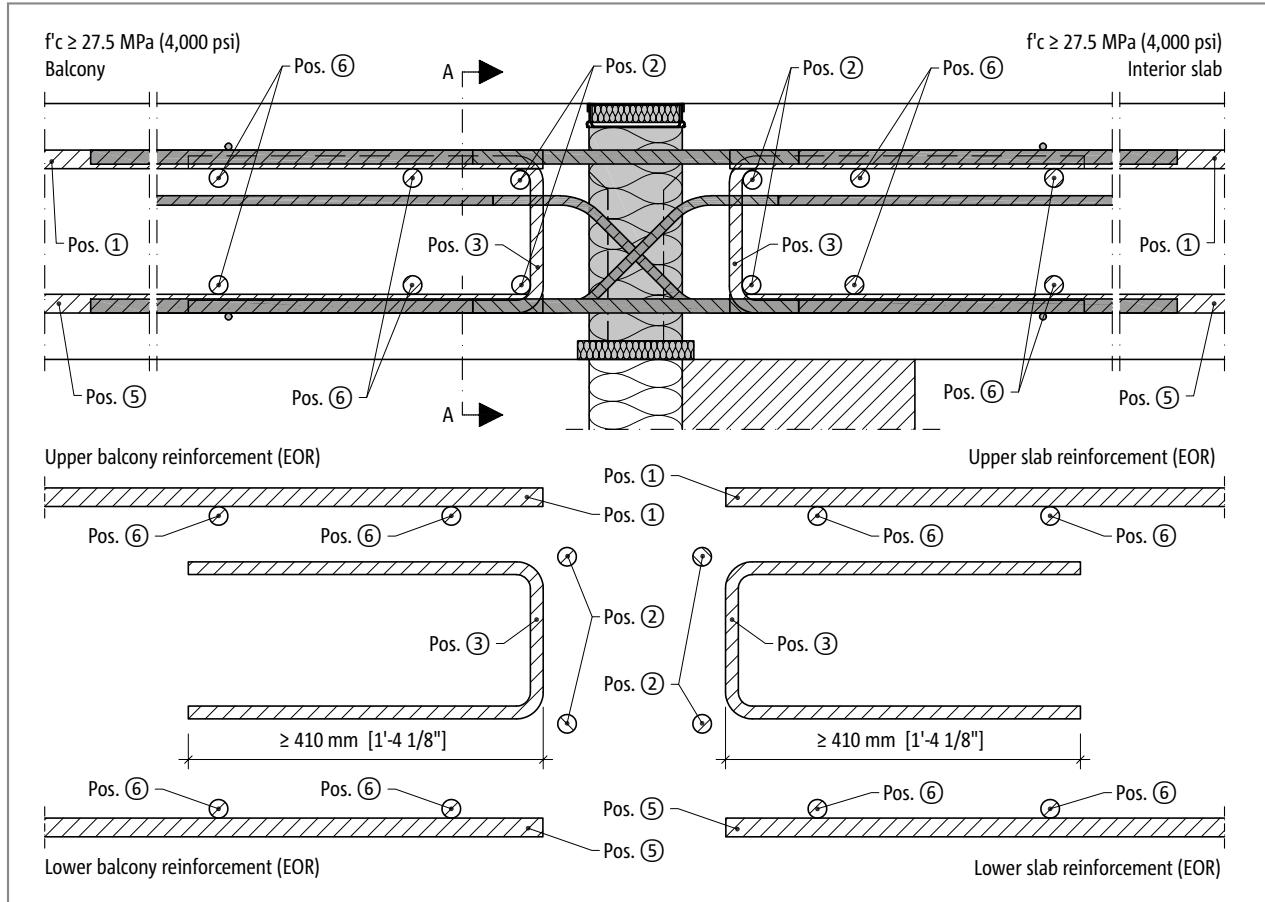


Fig. 15: Schöck Isokorb® Type CMD: Cross section of recommended cast-in-place reinforcement (supplied by others)

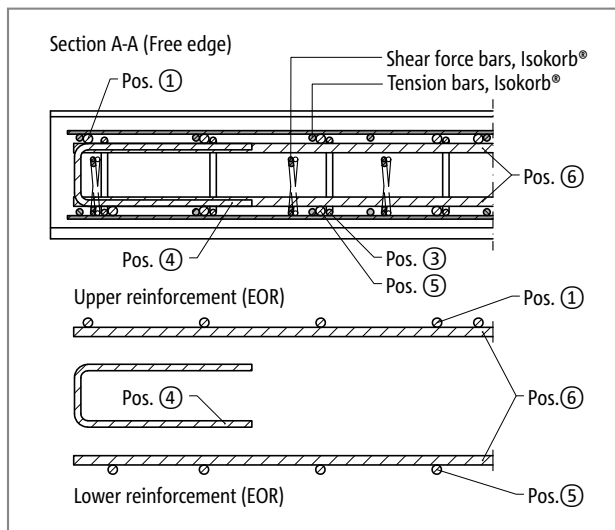


Fig. 16: Schöck Isokorb® Type CMD: Section A-A Depiction of free balcony edge

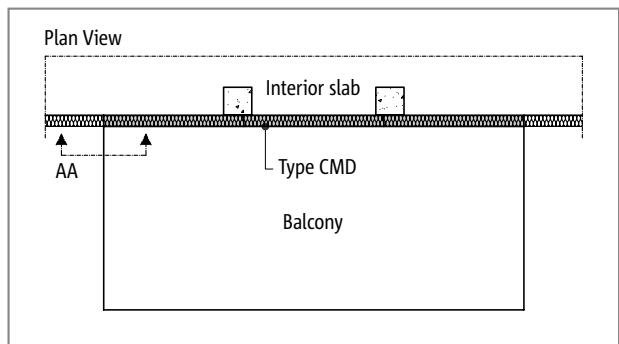


Fig. 17: Schöck Isokorb® Type CMD: Location of section A-A

CMD  
Products

## 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	CMD10	CMD20	CMD30	CMD40
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
Pos. 1 [in <sup>2</sup> /ft]	0.32	0.43	0.53	0.64
Pos. 1 Variant A	#4 @ 150 mm [#4 @ 6"]	#4 @ 125 mm [#4 @ 5"]	#4 @ 100 mm [#4 @ 4"]	#5 @ 125 mm [#5 @ 5"]
Pos. 1 Variant B	#5 @ 250 mm [#5 @ 10"]	#5 @ 200 mm [#5 @ 8"]	#5 @ 150 mm [#5 @ 6"]	#6 @ 200 mm [#6 @ 8"]
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"]			
Pos. 3 Variant B	#5 @ 350 mm [#5 @ 14"]			
<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 spacing of the tension/pressure bars from the free edge or the expansion gap must be at least 50 mm [2"].
- ▶ 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 CMD (see page 10).

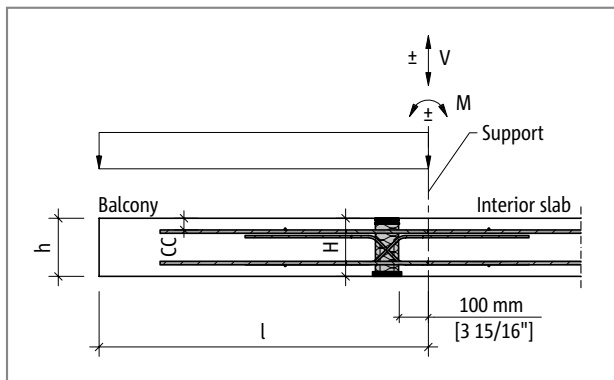


Fig. 18: Schöck Isokorb® Type CMD: Structural system

Schöck Isokorb® Type		CMD10 - CMD40		
Deformation constants with:		$\tan \alpha$ [%]		
Isokorb® height H	[mm]	[in]	CC40 [1 9/16"]	CC55 [2 3/16"]
	180	7"	1.7	-
	190	7 1/2"	1.5	-
	200	8"	1.4	-
	210	8 1/4"	1.2	1.7
	220	8 5/8"	1.1	1.5
	230	9"	1.1	1.4
	240	9 1/2"	1.0	1.2
	250	9 7/8"	0.9	1.1

## ✓ 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?
- Has the maximum permissible expansion gap spacing been taken into consideration for the specific slab configuration?
- 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 = bar length from insulating element) been specified in the design plans?