



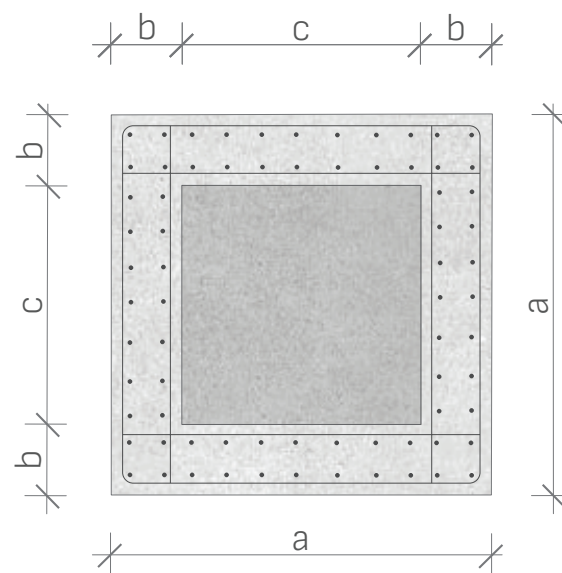
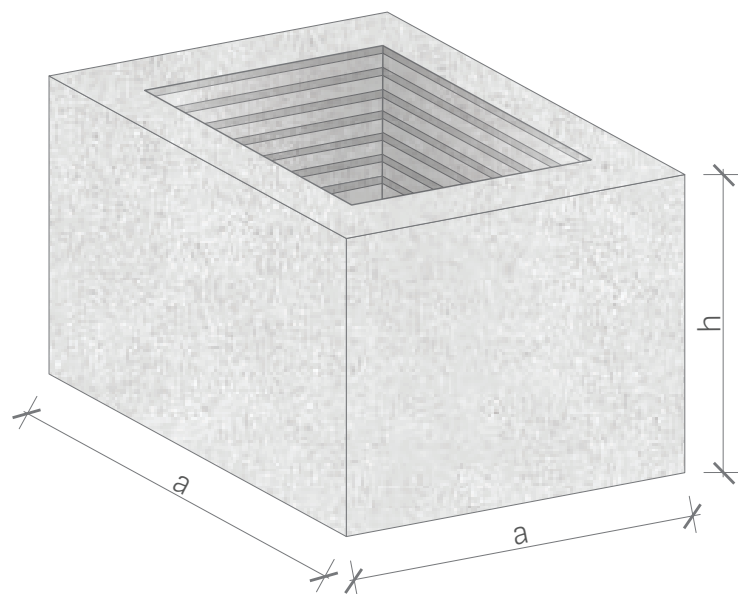
Product catalogue

of
prefabricated reinforced
concrete elements

ZSK STOMANOBETON

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Kremikovtsi Industrial Zone
e-mail: zsk1960@abv.bg
phone: +359 2 994 34 64
fax: +359 2 994 35 15





MATERIAL

CHARACTERISTICS

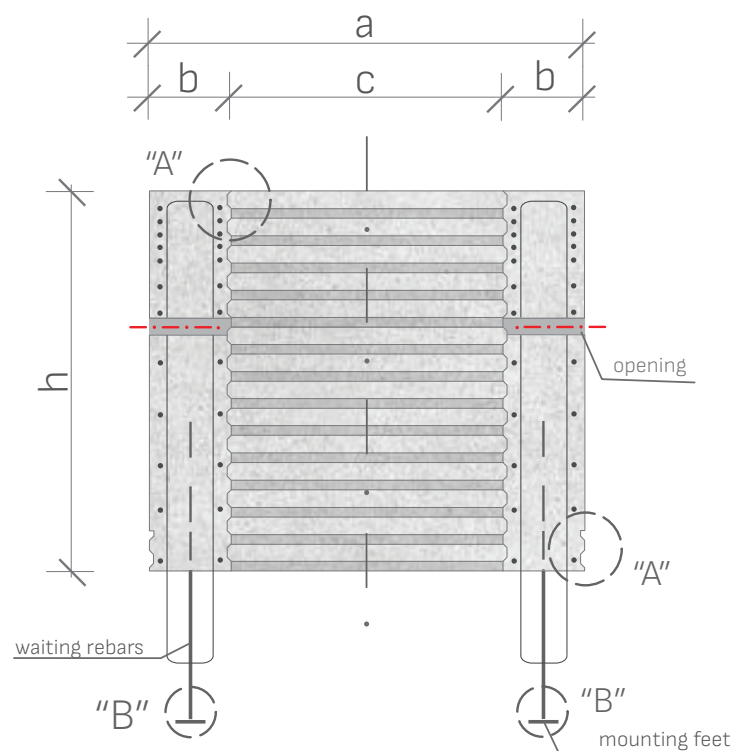
Concrete

C $\geq$ 35/45

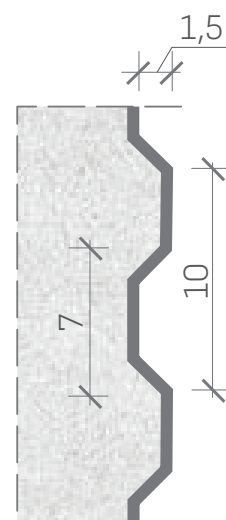
Steel

B500

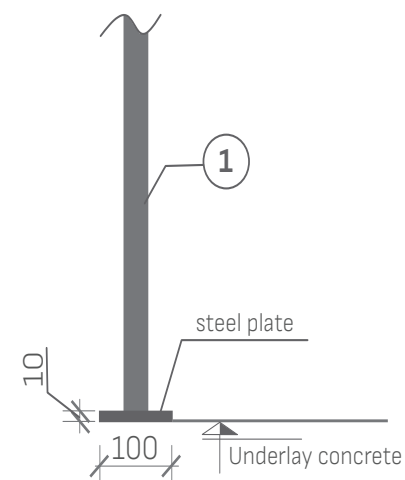
Column	Socket			
	a	b	c	h
30/30	100	25	50	*
40/40	110	25	60	*
50/50	120	25	70	*
60/60	130	25	80	*
70/70	150	30	90	*
75/75	155	30	95	*
80/80	160	30	100	*



Detail "A"

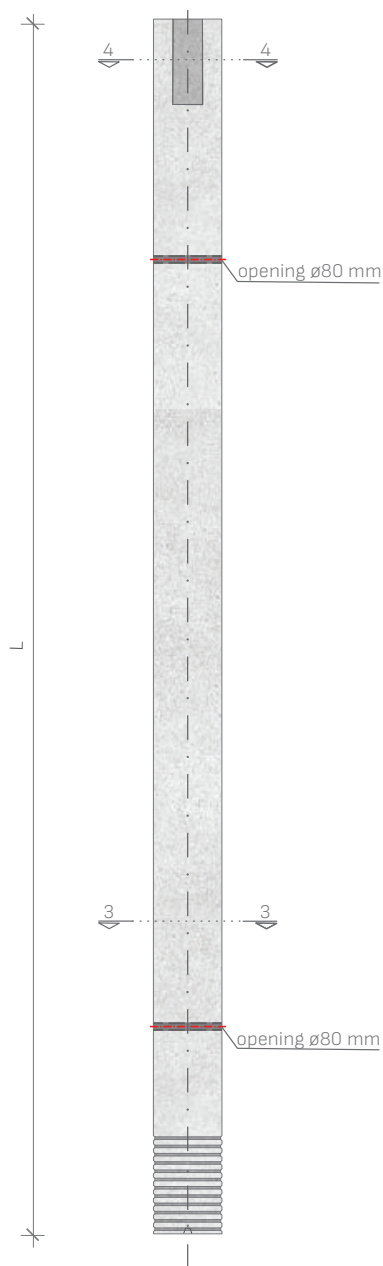


Detail "B"

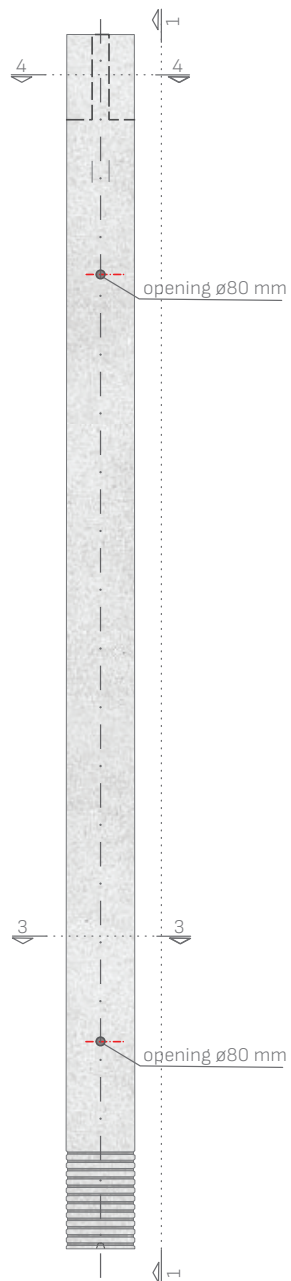


- a** - full bearing
- b** - reduced bearing
- *** - according to calculation
- - formwork
- ~ - free surface

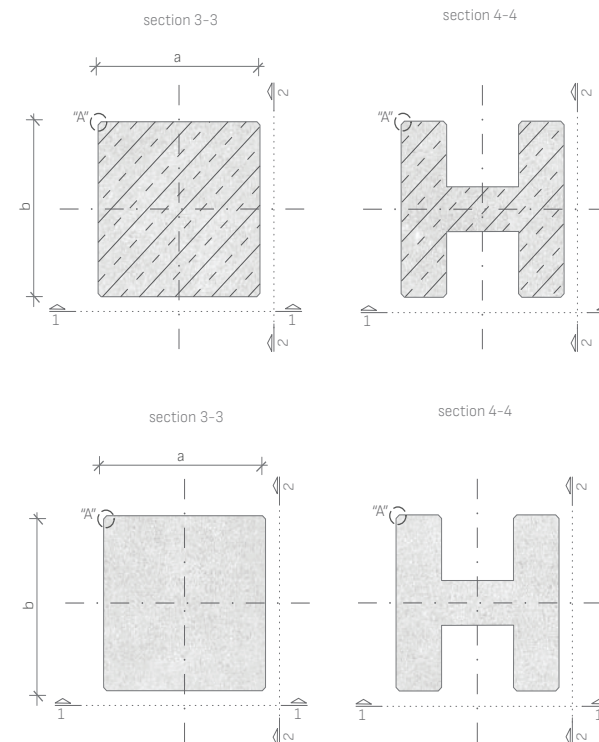
View 1-1



View 2-2

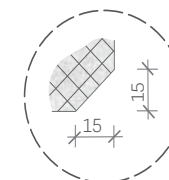


MATERIAL	CHARACTERISTICS
Concrete	C≥30/37
Steel	B500



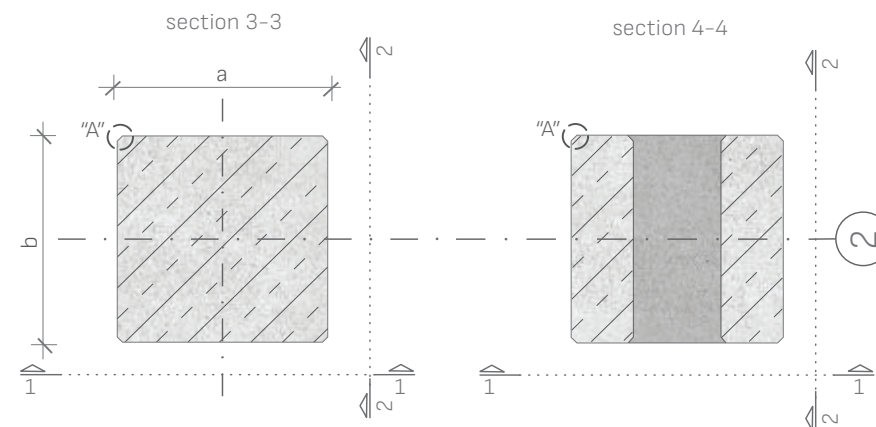
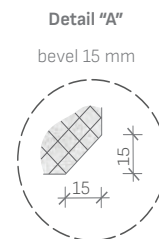
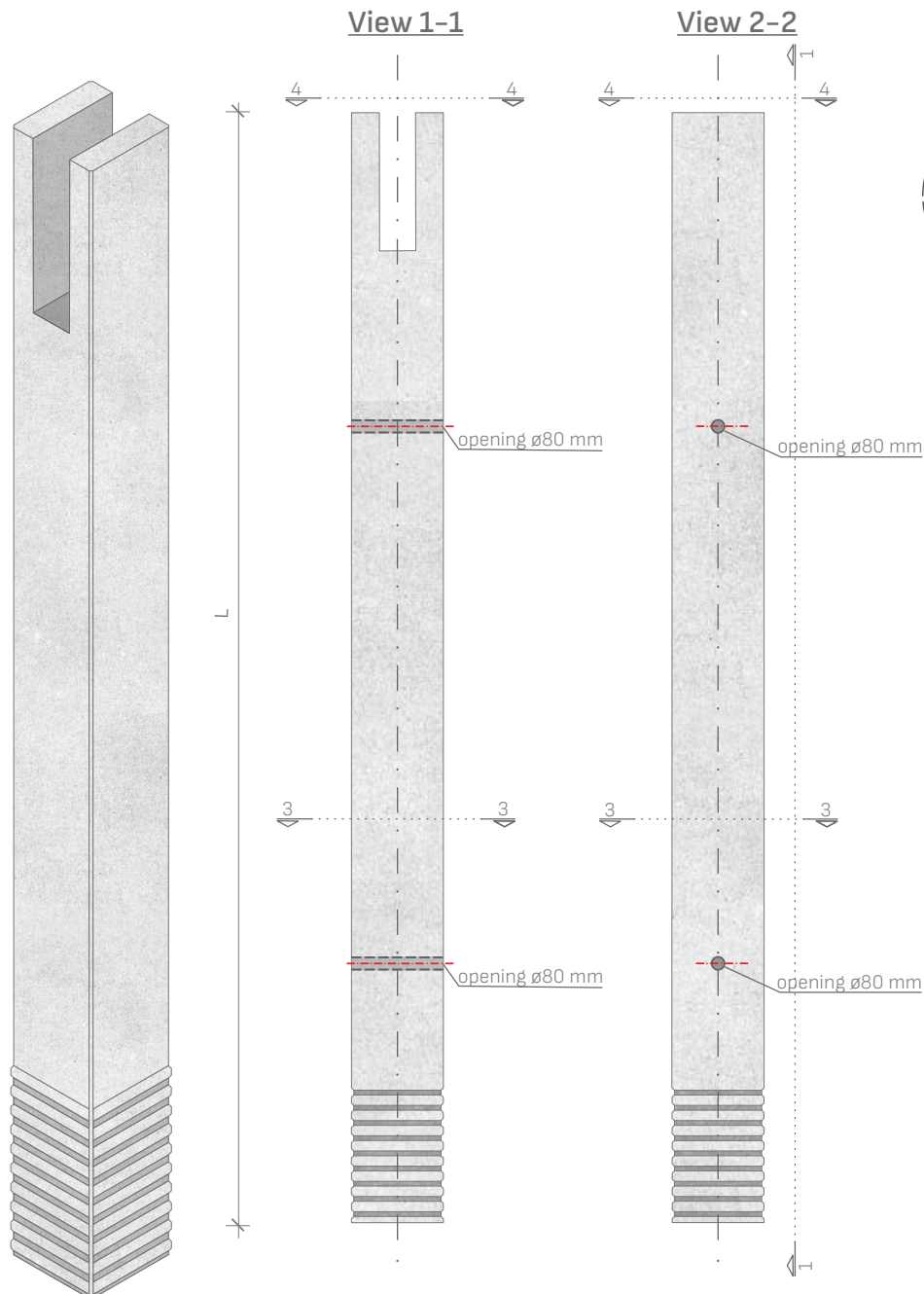
Detail "A"

bevel 15 mm



COLUMN		
a	b	L
30	30	*
40	40	*
50	50	*
60	60	*
70	70	*
75	75	*
80	80	*
90	90	*
100	100	*

- a** - full bearing
- b** - reduced bearing
- *** - according to calculation
- - formwork
- ~ - free surface



MATERIAL

CHARACTERISTICS

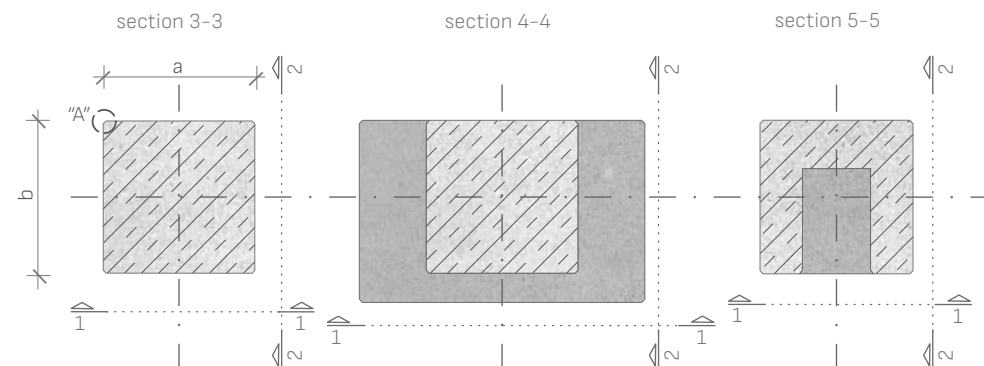
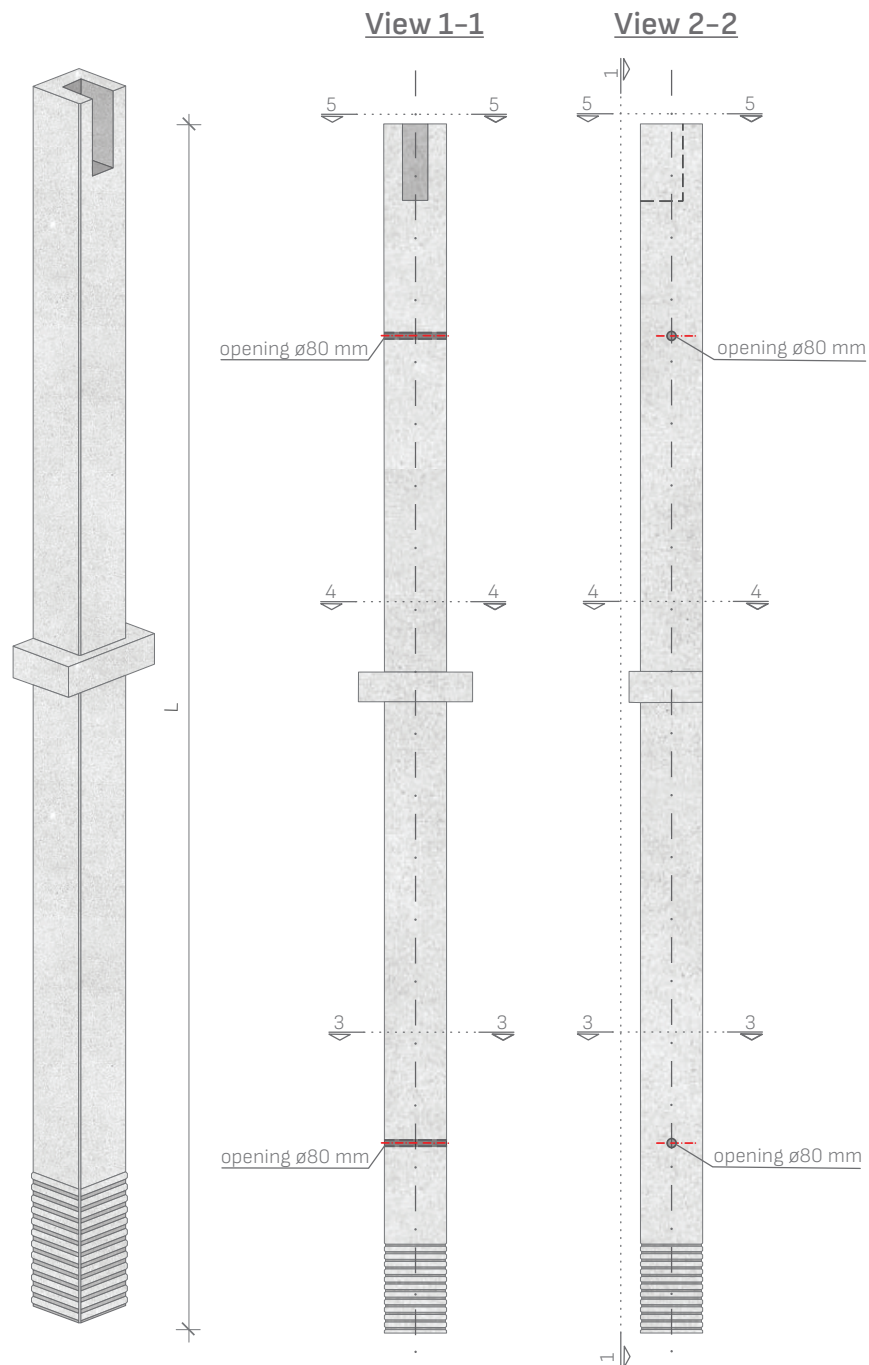
Concrete

C $\geq$ 30/37

Steel

B500





MATERIAL

CHARACTERISTICS

Concrete

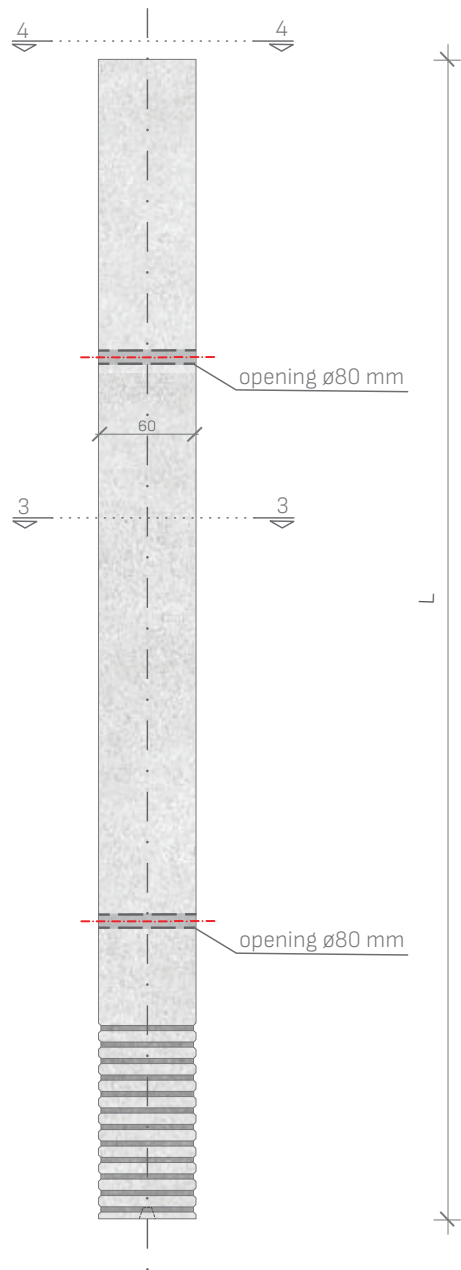
C $\geq$ 30/37

Steel

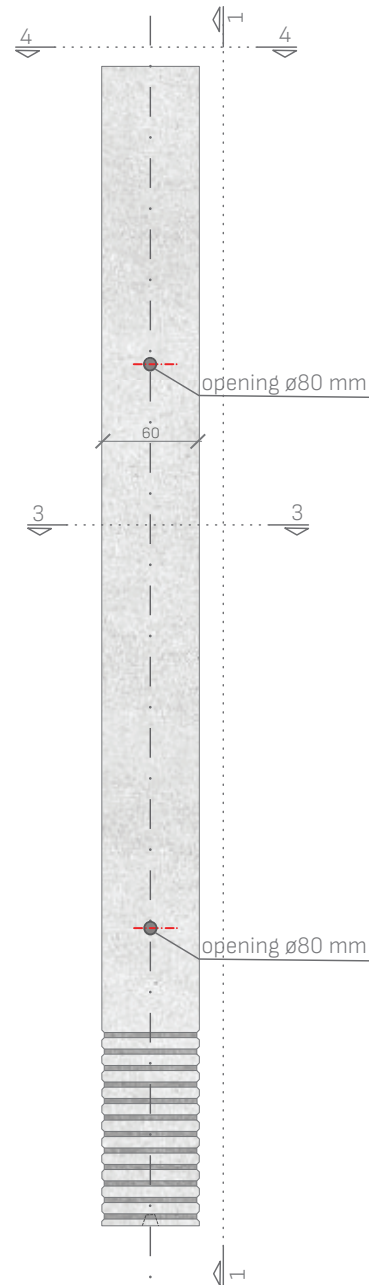
B500



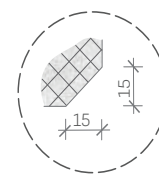
View 1-1



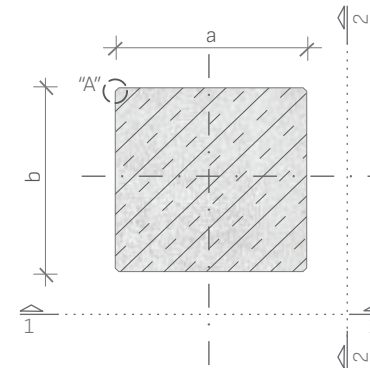
View 2-2



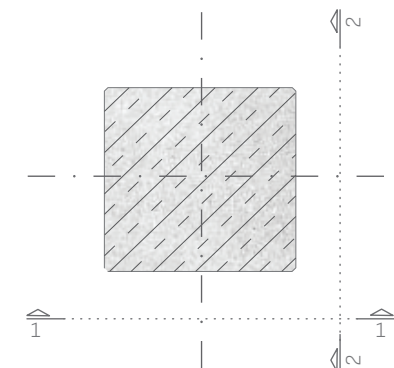
Detail "A"
bevel 15 mm



section 3-3



section 4-4



MATERIAL

CHARACTERISTICS

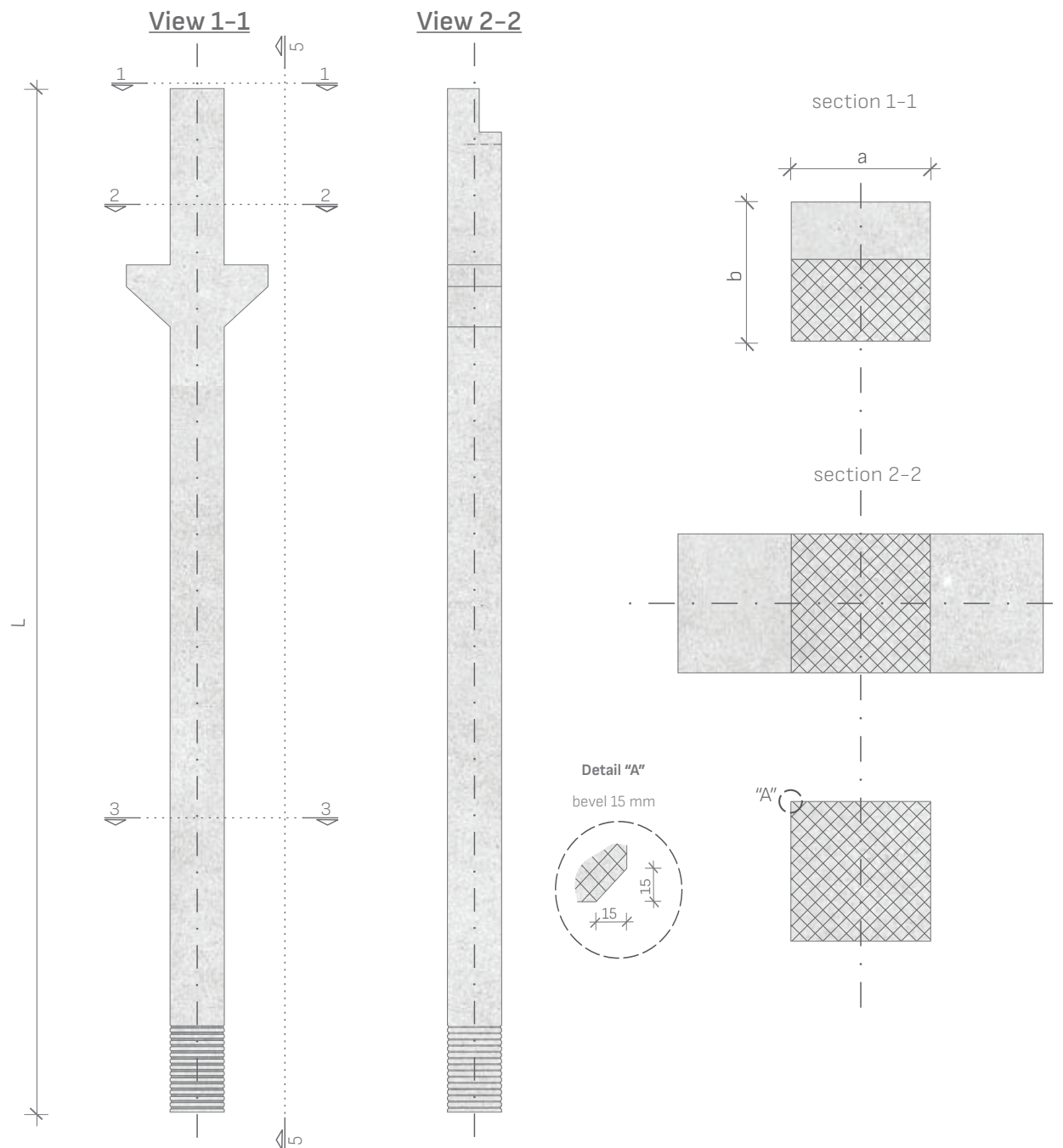
Concrete

C_{30/37}

Steel

B500





MATERIAL

CHARACTERISTICS

Concrete

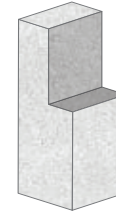
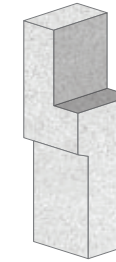
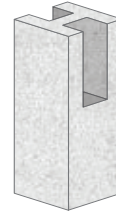
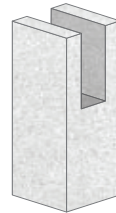
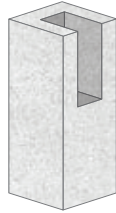
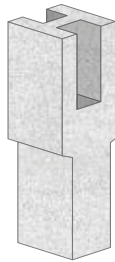
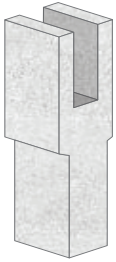
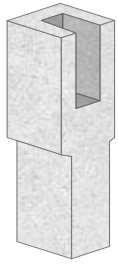
C $\geq$ 30/37

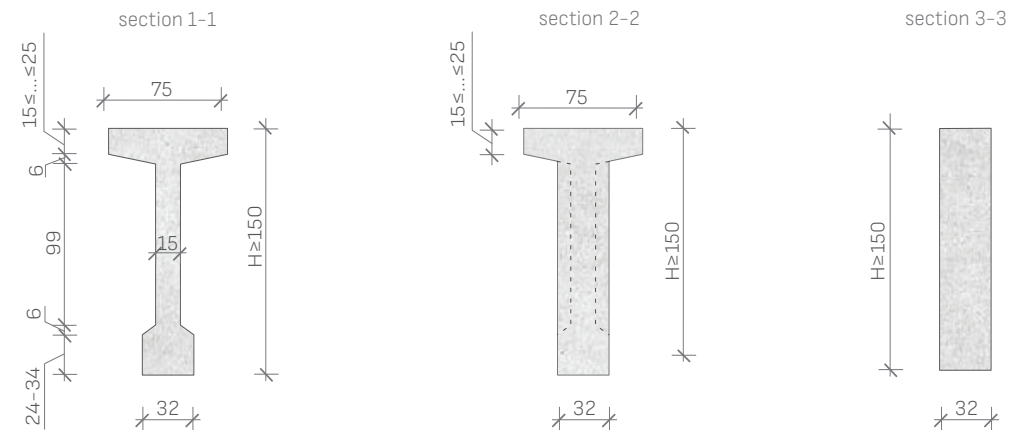
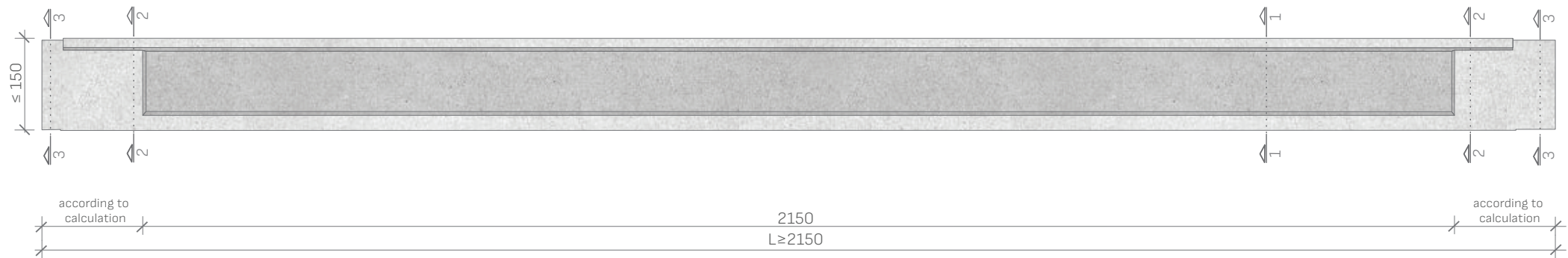
Steel

B500

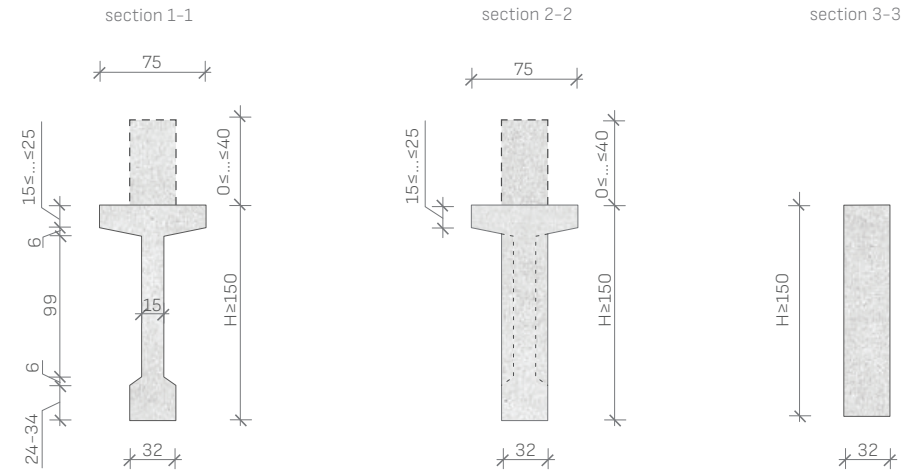
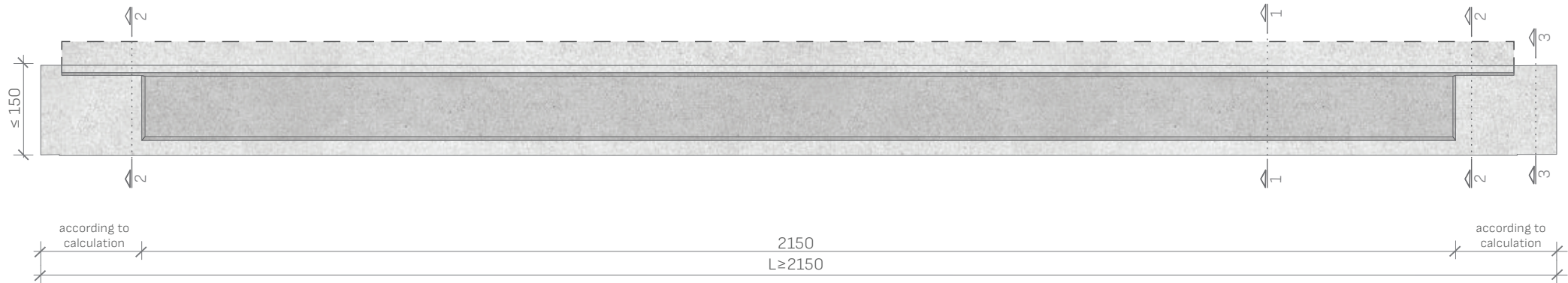


Hollow core





MATERIAL	CHARACTERISTICS
Concrete	C $\geq$ 30/37
Steel	B500



MATERIAL

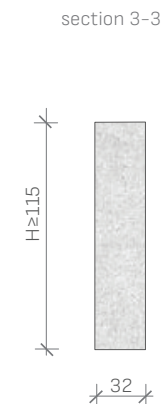
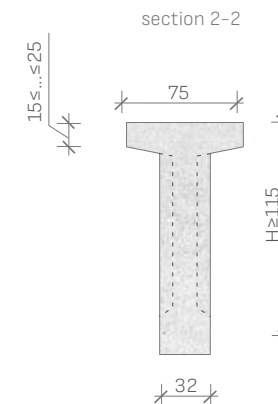
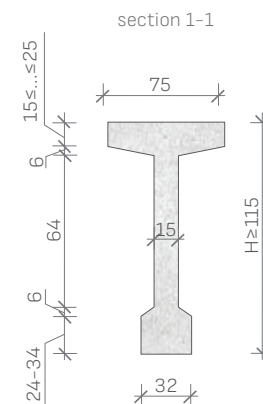
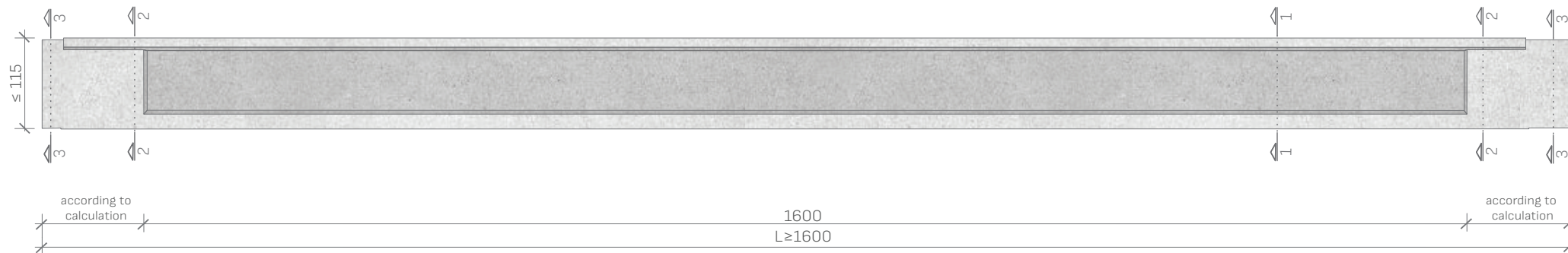
CHARACTERISTICS

Concrete

C $\geq$ 30/37

Steel

B500

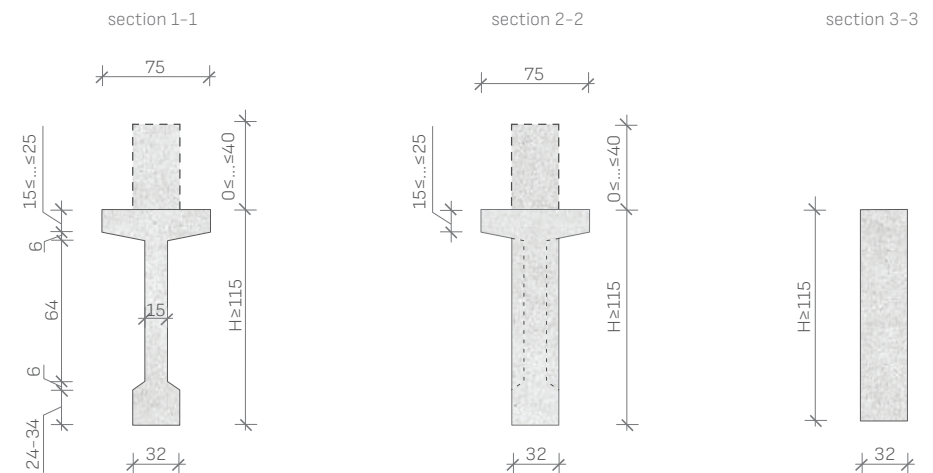
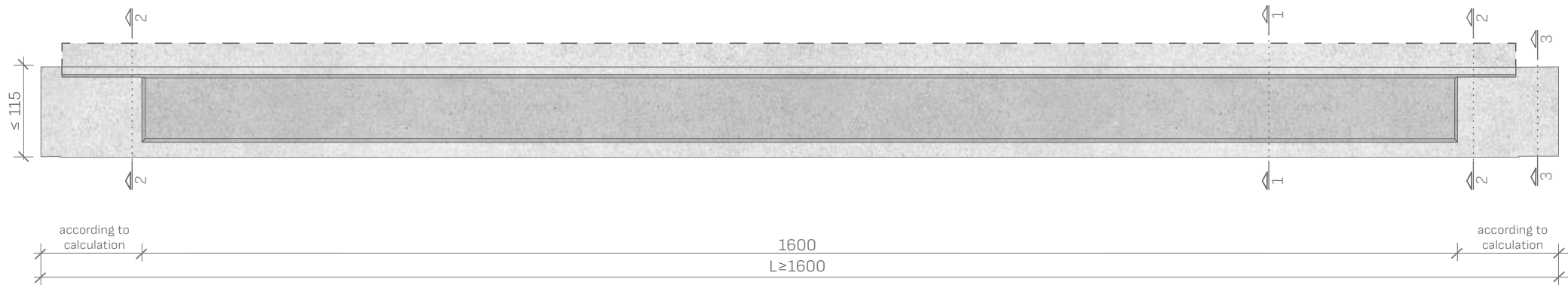
**MATERIAL****CHARACTERISTICS**

Concrete

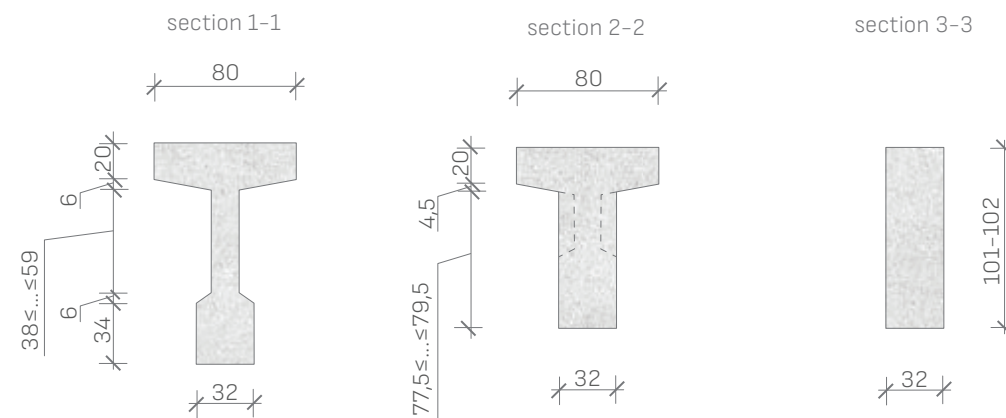
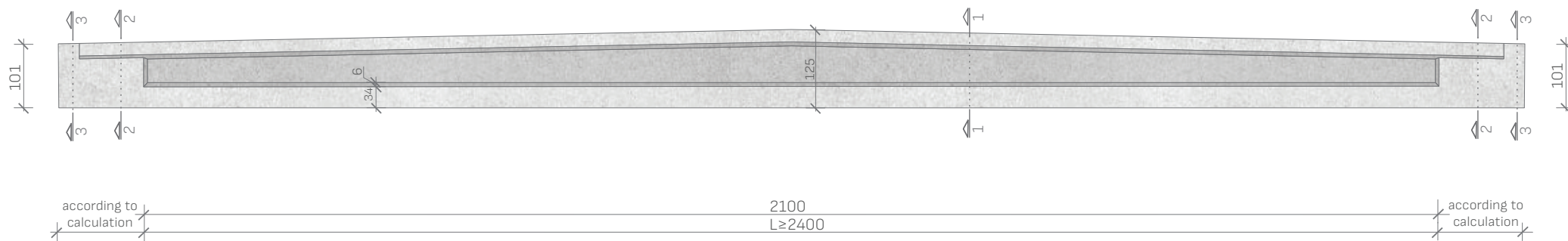
 $C \geq 30/37$

Steel

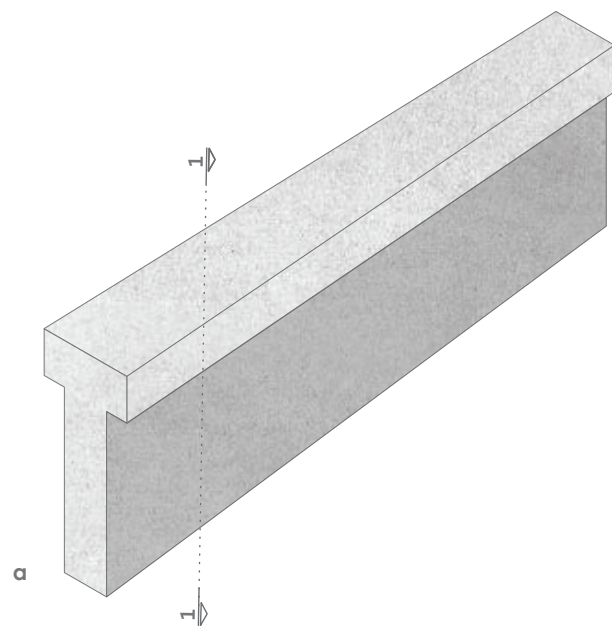
B500



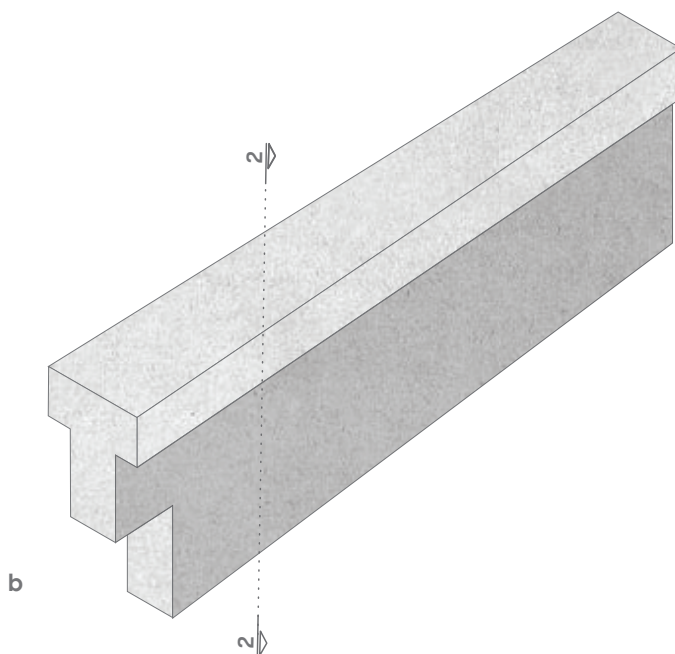
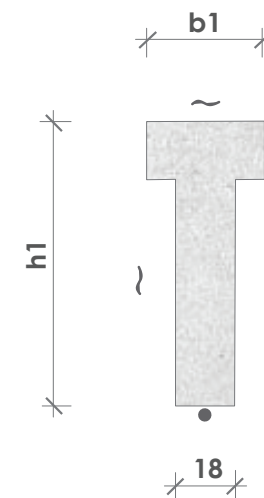
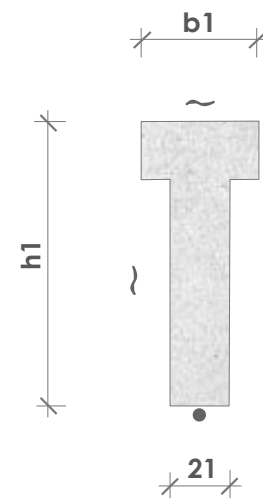
MATERIAL	CHARACTERISTICS
Concrete	C $\geq$ 30/37
Steel	B500



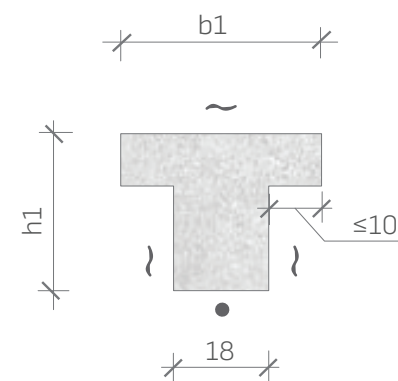
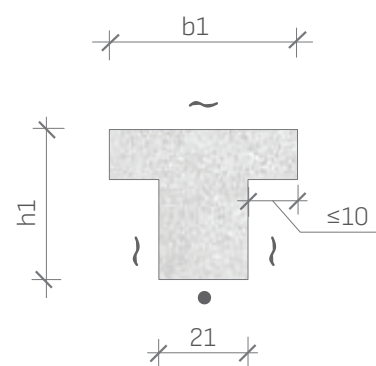
MATERIAL	CHARACTERISTICS
Concrete	C _{30/37}
Steel	B500



View 1-1

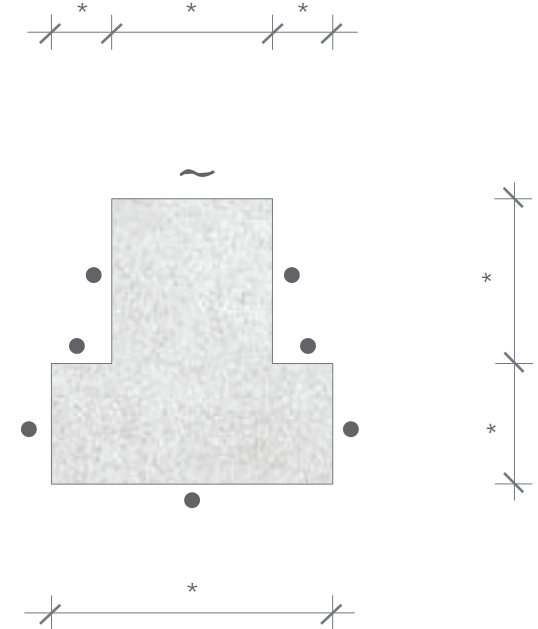
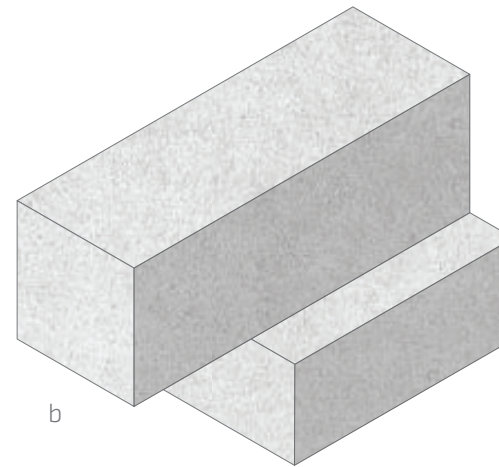
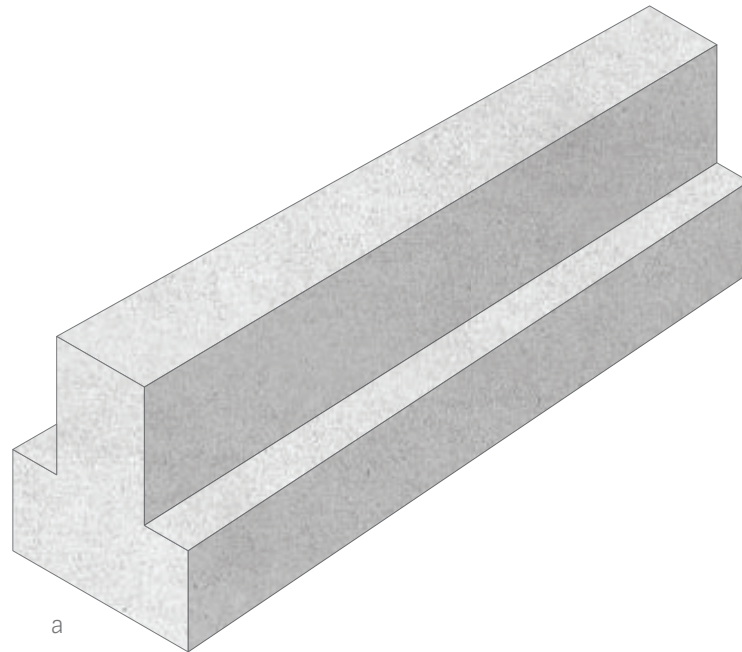


View 2-2



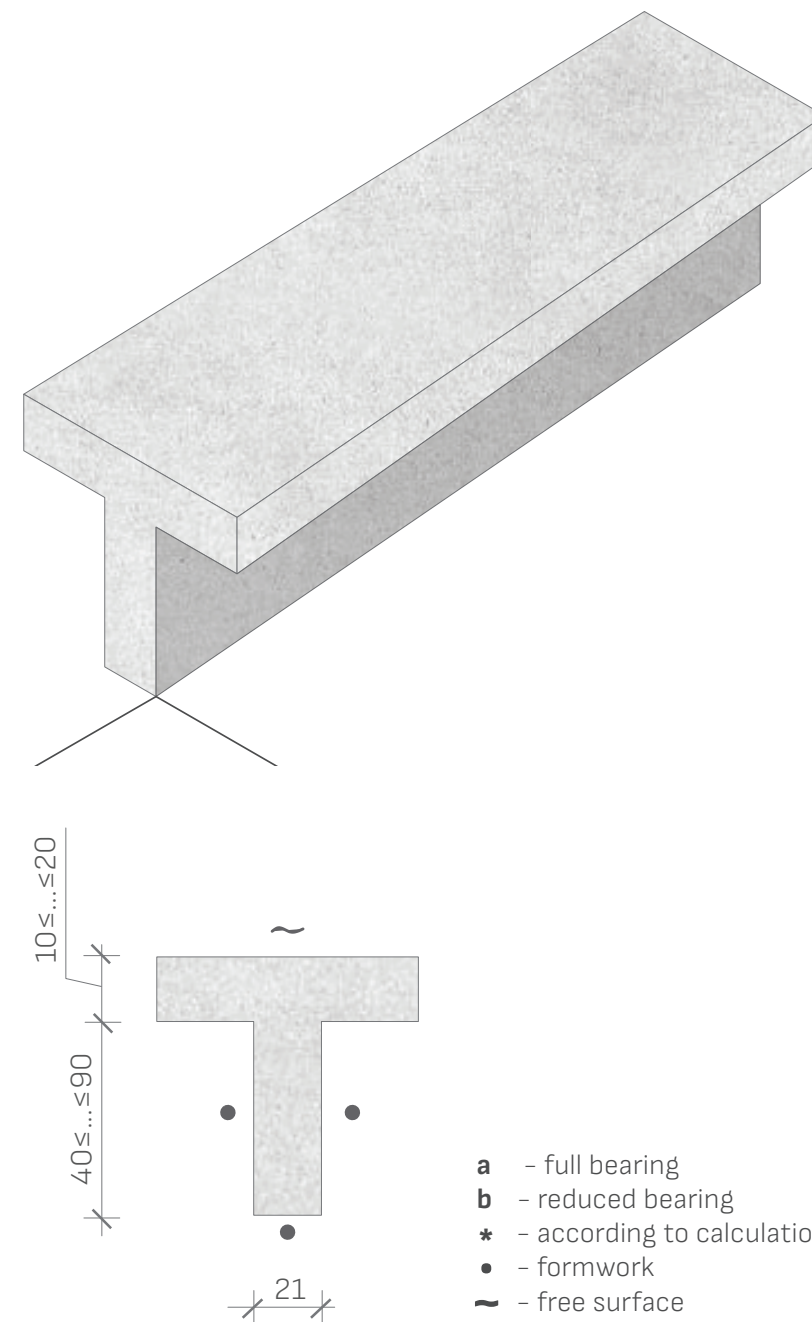
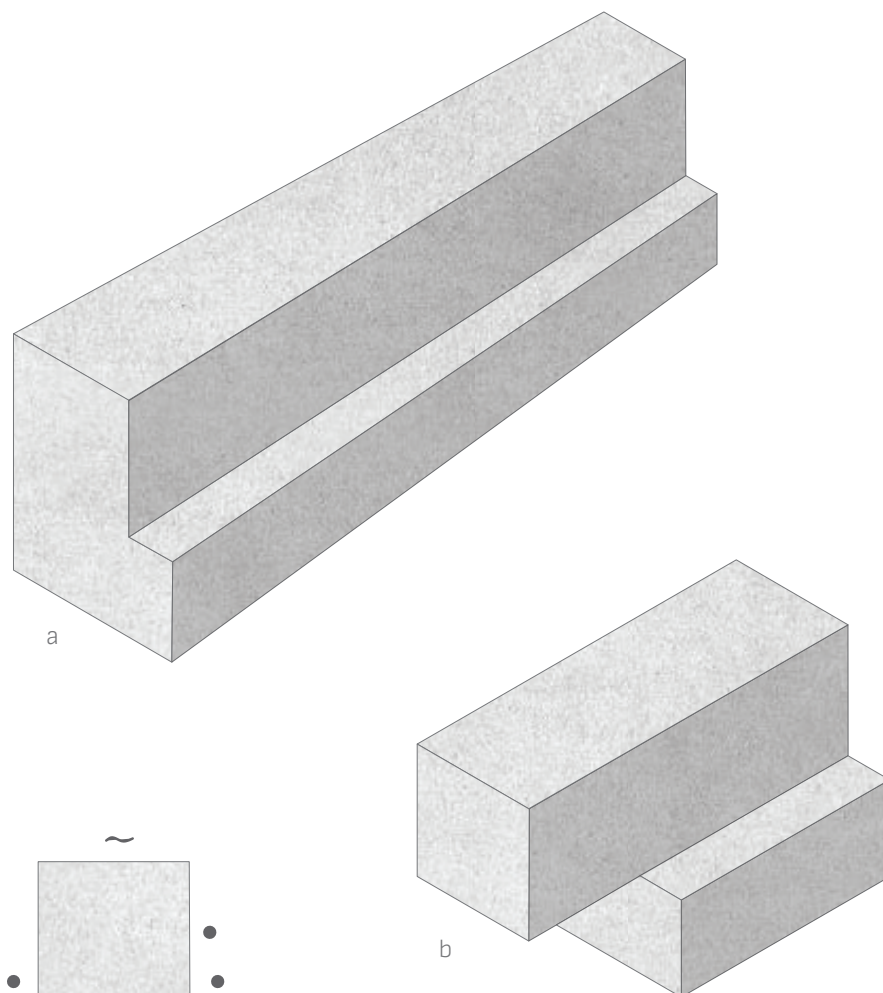
MATERIAL	CHARACTERISTICS
Concrete	C≥30/37
Steel	B500

- a** - full bearing
- b** - reduced bearing
- *** - according to calculation
- - formwork
- ~ - free surface



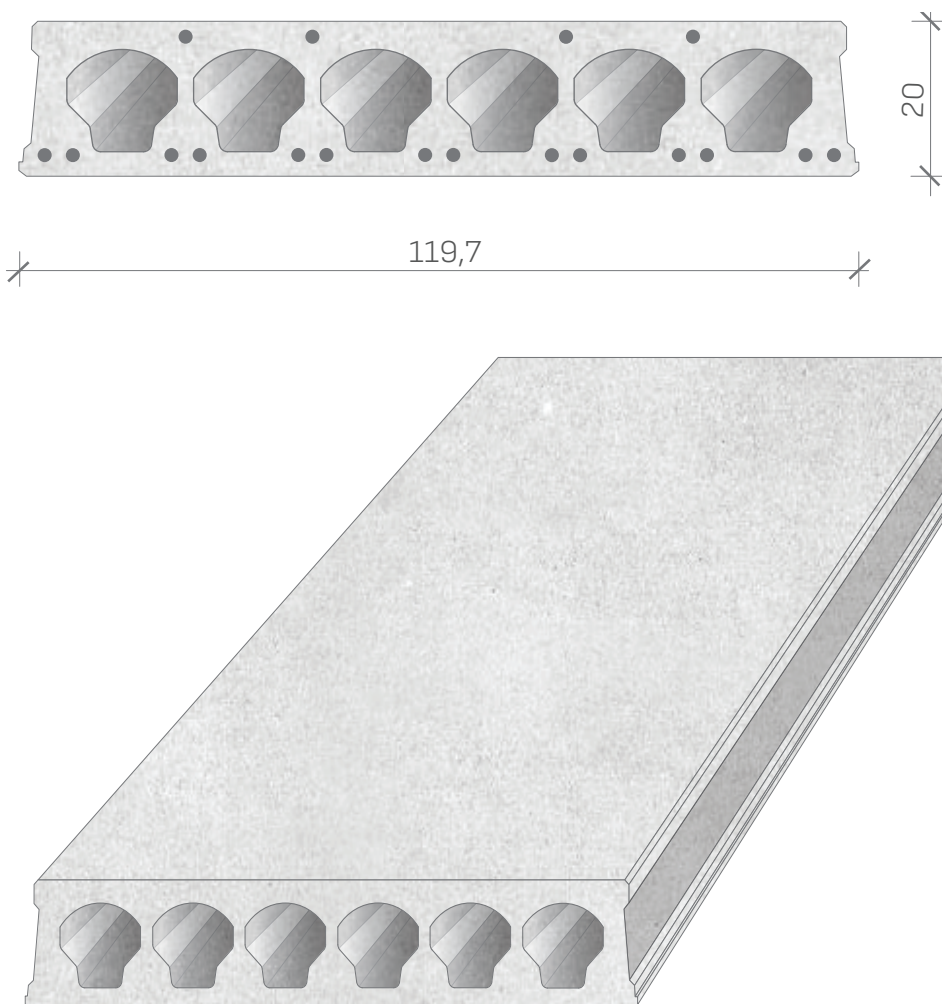
MATERIAL	CHARACTERISTICS
Concrete	C≥30/37
Steel	B500

- a** – full bearing
- b** – reduced bearing
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- ~** – free surface



Hollow core slab SC 20/120 cm

MATERIAL	CHARACTERISTICS
Concrete	C ₂₅ /60
Steel	B500



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SC 20x120 - 6 cores (drawing nr. 55/11172)

Topping = 0 cm

Reinforcement type	CFB	EFB	GFB	LFB	NFB	PFB	SFB	UFB	
Upper reinforcement	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	
Lower reinforcement	7φ7	7φ9.3	5φ9.3 + 2φ12.5	2φ9.3 + 5φ12.5	7φ12.5	2φ9.3 + 7φ12.5	5φ9.3 + 7φ12.5	7φ9.3 + 7φ12.5	
Reinforcement (kg/m ²)	2.77	3.39	3.93	4.73	5.27	5.95	6.97	7.65	
Mrd (kNm/m)	51.5	75.3	90.5	112.8	127.3	145.7	171.8	187.9	

perm. load (kN/m ²)	live load (kN/m ²)	CLEAR SPAN ACCORDING TO EUROCODE								
1.00	1.00	6.99	7.72	8.06	8.54	8.84	9.22	9.73	10.02	
1.50	1.00	6.67	7.38	7.70	8.15	8.43	8.78	9.26	9.53	
1.50	1.50	6.46	7.26	7.57	8.01	8.28	8.62	9.09	9.36	
1.50	2.00	6.28	7.15	7.45	7.87	8.14	8.48	8.93	9.19	
1.50	2.50	6.11	7.04	7.33	7.75	8.01	8.33	8.78	9.04	
1.50	3.00	5.95	6.94	7.22	7.63	7.88	8.20	8.64	8.89	
1.50	3.50	5.80	6.84	7.12	7.52	7.76	8.08	8.50	8.75	
1.50	4.00	5.66	6.75	7.02	7.41	7.65	7.96	8.38	8.62	
1.50	4.50	5.50	6.66	6.93	7.31	7.54	7.85	8.25	8.49	
1.50	5.00	5.35	6.48	6.83	7.21	7.44	7.74	8.14	8.37	
1.50	5.50	5.21	6.31	6.75	7.12	7.35	7.63	8.03	8.25	
1.50	6.00	5.08	6.16	6.67	7.03	7.25	7.53	7.92	8.14	
1.50	6.50	4.96	6.01	6.59	6.94	7.16	7.44	7.82	8.04	
1.50	7.00	4.85	5.88	6.45	6.86	7.08	7.35	7.72	7.94	
1.50	8.00	4.65	5.63	6.18	6.71	6.92	7.18	7.54	7.75	
1.50	9.00	4.47	5.41	5.94	6.48	6.76	7.02	7.37	7.57	
1.50	10.00	4.30	5.22	5.73	6.25	6.52	6.85	7.21	7.41	
1.50	12.50	3.97	4.81	5.07	5.75	6.03	6.33	6.75	6.99	
1.50	15.00	3.70	4.48	4.53	5.12	5.50	5.92	6.30	6.53	
1.50	20.00	3.29	3.99	3.79	4.25	4.55	4.93	5.32	5.35	

Self weight of hollow core slab + jointfilling : 3.17 + 0.17 = 3.34 kN/m²

Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 1 hour

Deflection criteria :

- Long term deflection under self weight of the slab + total permanent load + 40% of the live load < L / 250
- Long term deflection under total permanent load + 40% of the live load < L / 500

Acoustic insulation R_w' : 52.7 dB

Thermal resistance R_e : 0.191 m²K/W

Concrete quality : C50/60

Concrete cover on lower reinforcement = 30mm

Prestressing of upper reinforcement = 40% of f_{pk}

Prestressing of lower reinforcement = 60% of f_{pk}

f_{pk} = 1770 N/mm² for wires φ5

f_{pk} = 1670 N/mm² for wires φ7

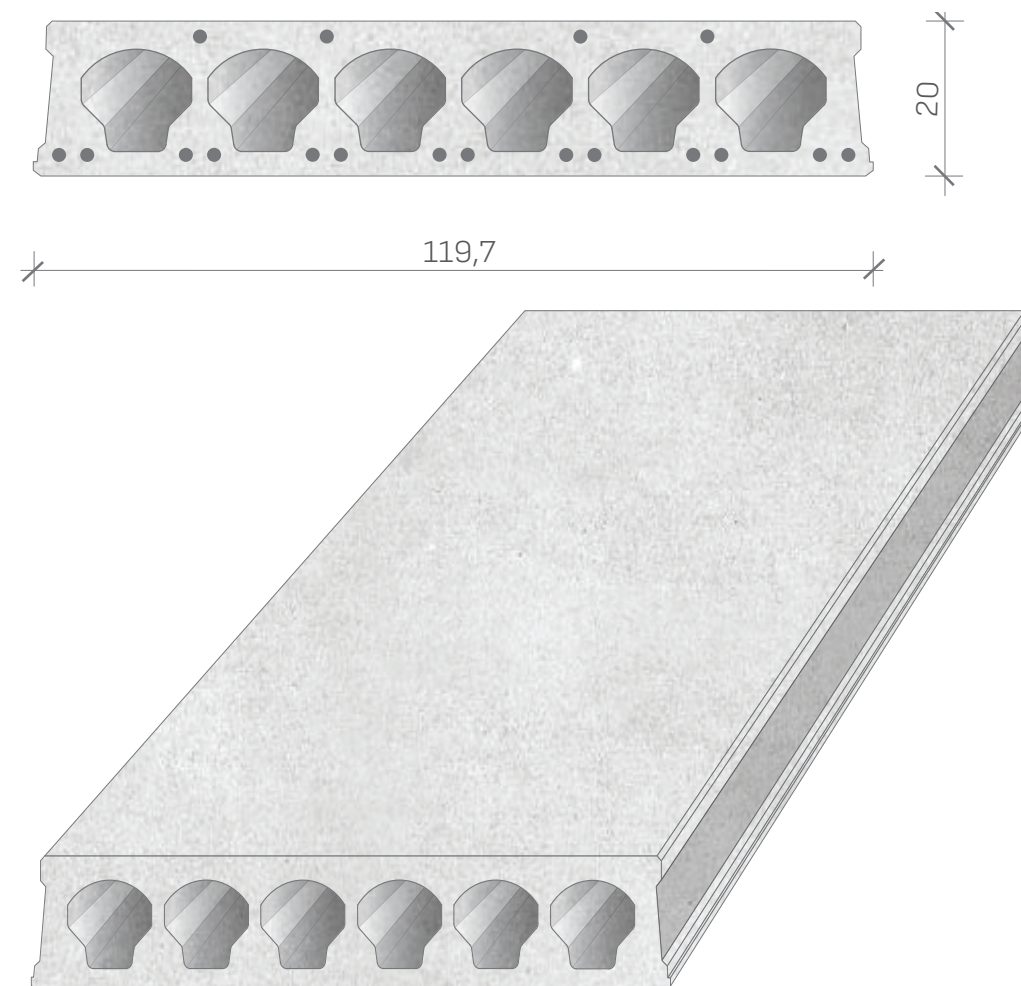
f_{pk} = 1860 N/mm² for strands φ9.3 and φ12.5

Echo Engineering is not responsible for direct or indirect damage as a result of imperfections in these data

B. Hendriks - 23-06-04

Hollow core slab SC 20/120 cm

MATERIAL	CHARACTERISTICS
Concrete	C _{50/60}
Steel	B500



ECHO ENGINEERING N.V.
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SC 20x120 - 6 cores (drawing nr. 55/11172)

Topping = 0 cm

Reinforcement type	CF6B	EF6B	GF6B	LF6B	NF6B	PF6B	SF6B	UF6B	
Upper reinforcement	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	
Lower reinforcement	7φ7	7φ9.3	5φ9.3 + 2φ12.5	2φ9.3 + 5φ12.5	7φ12.5	2φ9.3 + 7φ12.5	5φ9.3 + 7φ12.5	7φ9.3 + 7φ12.5	
Reinforcement (kg/m ²)	2.77	3.39	3.93	4.73	5.27	5.95	6.97	7.65	
Mrd (kNm/m)	46.9	68.3	81.9	101.8	114.7	131.1	153.6	167.9	

perm. load (kN/m ²)	live load (kN/m ²)	CLEAR SPAN ACCORDING TO EUROCODE							
1.00	1.00	6.56	7.30	7.56	7.95	8.20	8.52	8.96	9.23
1.50	1.00	6.25	6.99	7.24	7.60	7.83	8.12	8.54	8.79
1.50	1.50	6.06	6.88	7.12	7.47	7.69	7.98	8.39	8.63
1.50	2.00	5.89	6.77	7.01	7.35	7.57	7.85	8.25	8.49
1.50	2.50	5.73	6.68	6.90	7.24	7.45	7.73	8.11	8.34
1.50	3.00	5.58	6.58	6.80	7.13	7.34	7.61	7.98	8.21
1.50	3.50	5.44	6.49	6.71	7.03	7.23	7.50	7.86	8.09
1.50	4.00	5.31	6.41	6.62	6.93	7.13	7.39	7.75	7.97
1.50	4.50	5.19	6.33	6.54	6.84	7.04	7.29	7.64	7.86
1.50	5.00	5.08	6.17	6.45	6.75	6.94	7.19	7.53	7.75
1.50	5.50	4.97	6.01	6.38	6.67	6.86	7.10	7.44	7.64
1.50	6.00	4.84	5.86	6.30	6.59	6.77	7.01	7.34	7.54
1.50	6.50	4.73	5.72	6.23	6.51	6.69	6.92	7.25	7.45
1.50	7.00	4.62	5.59	6.13	6.44	6.61	6.84	7.16	7.36
1.50	8.00	4.43	5.36	5.88	6.30	6.47	6.69	7.00	7.19
1.50	9.00	4.26	5.15	5.65	6.15	6.33	6.55	6.85	7.03
1.50	10.00	4.10	4.97	5.33	5.93	6.18	6.42	6.70	6.88
1.50	12.50	3.78	4.58	4.67	5.27	5.65	6.00	6.38	6.56
1.50	15.00	3.52	4.27	4.19	4.70	5.03	5.45	5.96	6.19
1.50	20.00	3.13	3.80	3.51	3.92	4.18	4.52	5.00	5.30

Self weight of hollow core slab + jointfilling : 3.17 + 0.17 = 3.34 kN/m²

Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 2 hours

Deflection criteria :

- Long term deflection under self weight of the slab + total permanent load + 40% of the live load < L / 250
- Long term deflection under total permanent load + 40% of the live load < L / 500

Acoustic insulation R_w' : 52.7 dB

Thermal resistance R_e : 0.191 m²K/W

Concrete quality : C50/60

Concrete cover on lower reinforcement = 45mm

Prestressing of upper reinforcement = 40% of f_{pk}

Prestressing of lower reinforcement = 60% of f_{pk}

f_{pk} = 1770 N/mm² for wires φ5

f_{pk} = 1670 N/mm² for wires φ7

f_{pk} = 1660 N/mm² for strands φ9.3 and φ12.5

Echo Engineering is not responsible for direct or indirect damages as a result of imperfections in these data

B. Hendriks - 23-06-04

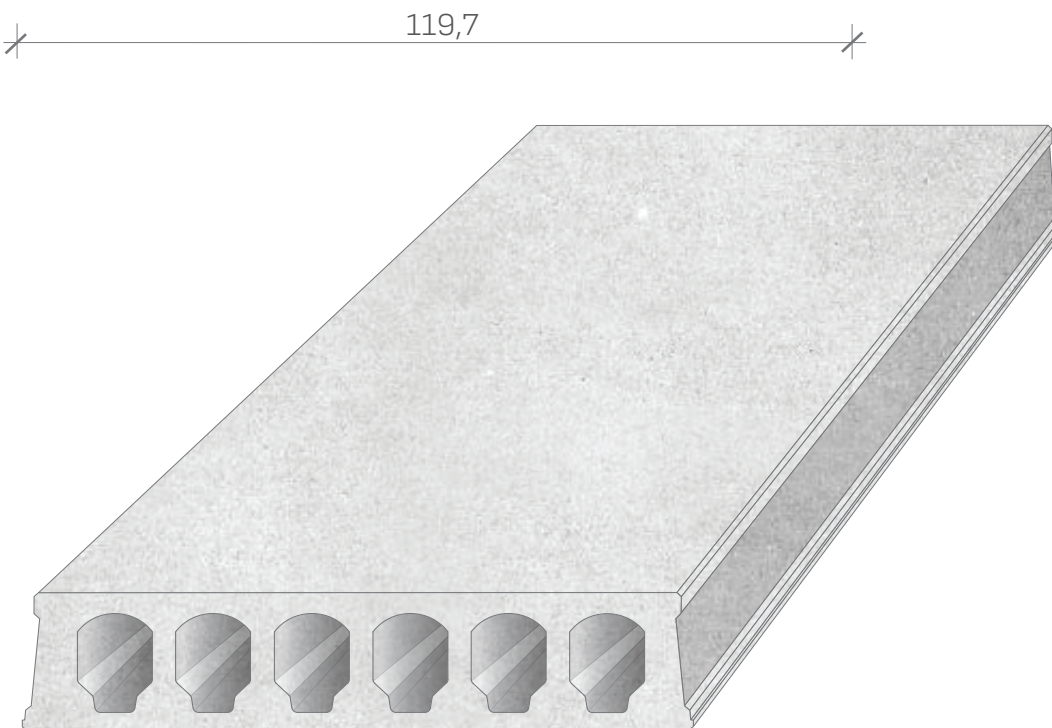
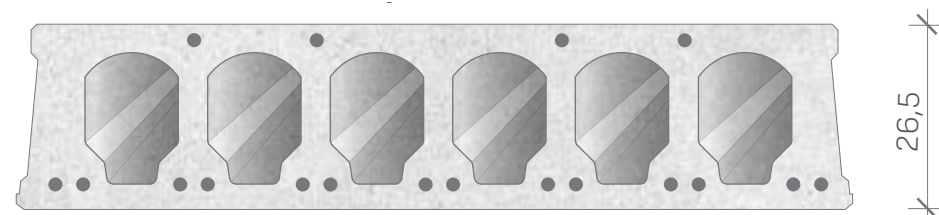
Hollow core slab SC 26,5/120 cm

MATERIAL

CHARACTERISTICS

Concrete C_{50/60}

Steel B500



ECHO ENGINEERING N.V.

Industrieterrein Centrum Zuid 1533
B-3530 Houthalen BELGIUM
Tel. +32 11 60 08 00 Fax. +32 11 52 20 93



SC 26,5x120 - 6 cores (drawing nr. 55/11105)

Topping = 0 cm

Reinforcement type	EFB	GFB	LFB	NFB	PFB	SFB	WFB	XFB		
Upper reinforcement	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7		
Lower reinforcement	7φ9.3 + 2φ12.5	5φ9.3 + 5φ12.5	2φ9.3 + 5φ12.5	7φ12.5	2φ9.3 + 7φ12.5	5φ9.3 + 7φ12.5	12φ12.5	13φ12.5		
Reinforcement (kg/m ²)	3.39	3.93	4.73	5.27	5.95	6.97	8.31	10.13		
Mrd (kNm/m)	105.6	127.8	160.4	181.9	209.2	249.3	298.8	356.1		

perm. load (kN/m ²)	live load (kN/m ²)	CLEAR SPAN ACCORDING TO EUROCODE								
1.00	1.00	9.46	9.86	10.42	10.77	11.21	11.80	12.45	13.18	
1.50	1.00	9.09	9.45	9.98	10.31	10.72	11.28	11.89	12.58	
1.50	1.50	8.91	9.31	9.83	10.15	10.55	11.09	11.69	12.36	
1.50	2.00	8.67	9.17	9.68	9.99	10.38	10.91	11.50	12.16	
1.50	2.50	8.45	9.04	9.53	9.84	10.23	10.75	11.32	11.96	
1.50	3.00	8.25	8.92	9.40	9.70	10.07	10.59	11.15	11.78	
1.50	3.50	8.05	8.80	9.27	9.57	9.93	10.43	10.98	11.60	
1.50	4.00	7.88	8.69	9.15	9.44	9.80	10.29	10.83	11.43	
1.50	4.50	7.69	8.47	9.03	9.32	9.67	10.15	10.68	11.28	
1.50	5.00	7.49	8.25	8.92	9.20	9.54	10.02	10.54	11.12	
1.50	5.50	7.30	8.04	8.81	9.09	9.43	9.89	10.40	10.98	
1.50	6.00	7.13	7.85	8.71	8.98	9.31	9.77	10.27	10.84	
1.50	6.50	6.97	7.67	8.61	8.88	9.20	9.65	10.15	10.70	
1.50	7.00	6.81	7.51	8.42	8.78	9.10	9.54	10.03	10.57	
1.50	8.00	6.54	7.20	8.08	8.59	8.90	9.33	9.80	10.33	
1.50	9.00	6.29	6.93	7.78	8.29	8.72	9.13	9.59	10.10	
1.50	10.00	6.07	6.69	7.51	8.00	8.55	8.95	9.39	9.90	
1.50	12.50	5.61	6.18	6.94	7.39	7.93	8.54	8.96	9.42	
1.50	15.00	5.24	5.77	6.48	6.90	7.41	8.07	8.58	9.02	
1.50	20.00	4.67	5.14	5.78	6.16	6.61	7.22	7.44	7.55	

Self weight of hollow core slab + jointfilling : **3.58 + 0.23 = 3.81 kN/m²**

Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 1 hour

Deflection criteria :

- Long term deflection under self weight of the slab + total permanent load + 40% of the live load < L / 250
- Long term deflection under total permanent load + 40% of the live load < L / 500

Acoustic insulation R_w' : **54.4 dB**

Thermal resistance R_s : **0.206 m²K/W**

Concrete quality : C50/60

Concrete cover on lower reinforcement = 30mm

Prestressing of upper reinforcement = 40% of f_{pk}

Prestressing of lower reinforcement = 60% of f_{pk}

f_{pk} = 1770 N/mm² for wires φ5

f_{pk} = 1670 N/mm² for wires φ7

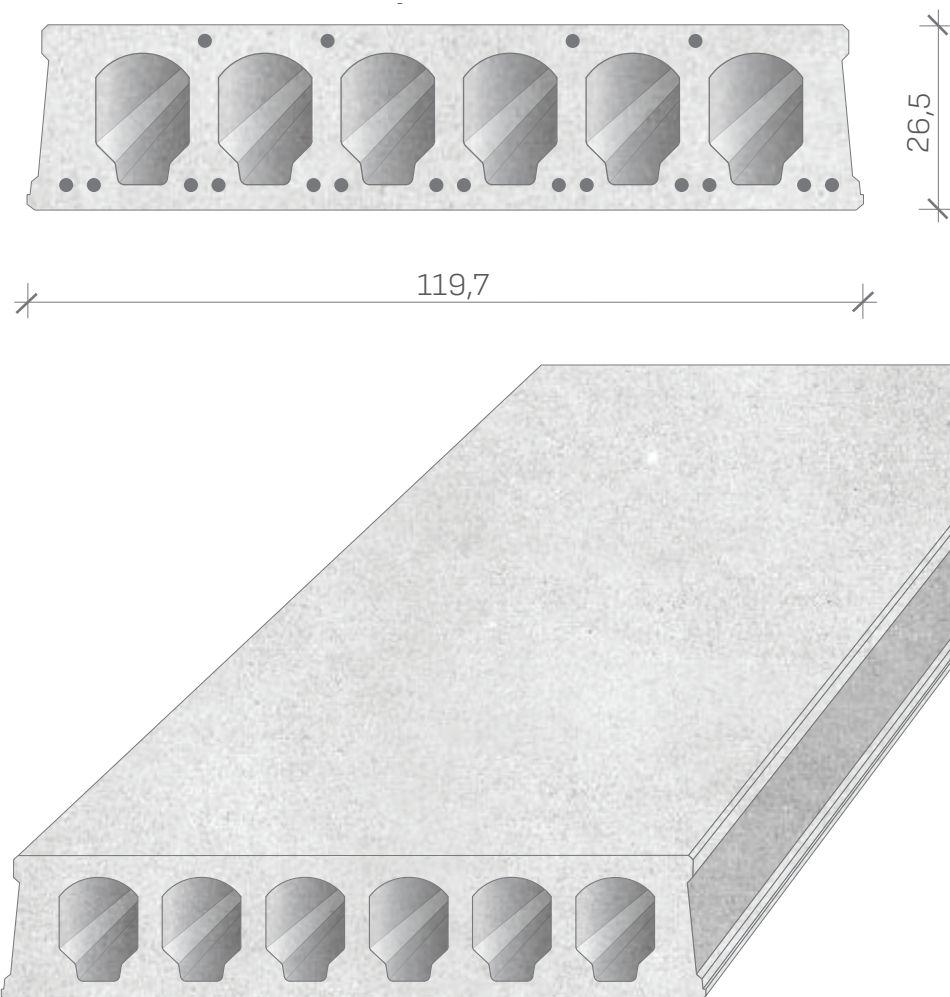
f_{pk} = 1860 N/mm² for strands φ9.3 and φ12.5

Echo Engineering is not responsible for direct or indirect damage as a result of imperfections in these data

B. Hendriks - 23-06-04

Hollow core slab SC 26,5/120 cm

MATERIAL	CHARACTERISTICS
Concrete	C≥50/60
Steel	B500



ECHO ENGINEERING N.V.

Industrieterrein Centrum Zuid 1533
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Tel. +32 11 60 08 00 Fax. +32 11 52 20 93



SC 26,5x120 - 6 cores (drawing nr. 55/11105)

Topping = 0 cm

Reinforcement type	EF6B	GF6B	LF6B	NF6B	PF6B	SF6B	WF6B	XF6B		
Upper reinforcement	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7		
Lower reinforcement	7φ9.3 + 2φ12.5	5φ9.3 + 5φ12.5	2φ9.3 + 5φ12.5	7φ12.5	2φ9.3 + 7φ12.5	5φ9.3 + 7φ12.5	12φ12.5	13φ12.5		
Reinforcement (kg/m²)	3.39	3.93	4.73	5.27	5.95	6.97	8.31	10.13		
Mrd (kNm/m)	98.6	119.2	149.5	169.4	194.6	231.7	276.4	329.1		

perm. load (kN/m²)	live load (kN/m²)	CLEAR SPAN ACCORDING TO EUROCODE									
1.00	1.00	9.13	9.48	9.97	10.27	10.67	11.21	11.81	12.52		
1.50	1.00	8.74	9.10	9.56	9.85	10.21	10.72	11.29	11.95		
1.50	1.50	8.49	8.86	9.41	9.69	10.05	10.55	11.10	11.75		
1.50	2.00	8.27	8.63	9.27	9.55	9.89	10.38	10.92	11.56		
1.50	2.50	8.06	8.71	9.14	9.41	9.75	10.22	10.75	11.38		
1.50	3.00	7.86	8.59	9.01	9.28	9.61	10.07	10.59	11.21		
1.50	3.50	7.68	8.48	8.89	9.15	9.48	9.93	10.44	11.04		
1.50	4.00	7.51	8.34	8.78	9.03	9.35	9.80	10.29	10.88		
1.50	4.50	7.35	8.16	8.67	8.92	9.23	9.67	10.16	10.73		
1.50	5.00	7.20	7.96	8.56	8.81	9.12	9.54	10.02	10.59		
1.50	5.50	7.05	7.76	8.46	8.70	9.00	9.43	9.90	10.45		
1.50	6.00	6.88	7.58	8.37	8.60	8.90	9.31	9.77	10.32		
1.50	6.50	6.73	7.41	8.27	8.50	8.80	9.20	9.66	10.20		
1.50	7.00	6.58	7.24	8.13	8.41	8.70	9.10	9.55	10.08		
1.50	8.00	6.31	6.95	7.80	8.23	8.52	8.90	9.33	9.85		
1.50	9.00	6.08	6.69	7.51	8.00	8.34	8.72	9.14	9.64		
1.50	10.00	5.86	6.46	7.24	7.72	8.18	8.55	8.95	9.44		
1.50	12.50	5.42	5.96	6.69	7.13	7.65	8.16	8.55	9.00		
1.50	15.00	5.06	5.57	6.25	6.66	7.14	7.80	8.19	8.62		
1.50	20.00	4.51	4.96	5.57	5.94	6.37	6.96	7.40	7.52		

Self weight of hollow core slab + jointfilling : 3.58 + 0.23 = 3.81 kN/m²

Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 2 hours

Deflection criteria :

- Long term deflection under self weight of the slab + total permanent load + 40% of the live load < L / 250
- Long term deflection under total permanent load + 40% of the live load < L / 500

Acoustic insulation R_w : 54.4 dB

Thermal resistance R_c : 0.206 m²K/W

Concrete quality : C50/60

Concrete cover on lower reinforcement = 45 mm

Prestressing of upper reinforcement = 40% of f_{pk}

Prestressing of lower reinforcement = 60% of f_{pk}

f_{ck} = 1770 N/mm² for wires $\phi 5$

f_{pk} = 1670 N/mm² for wires $\phi 7$

f_{ck} = 1860 N/mm² for strands $\phi 9.3$ and $\phi 12.5$

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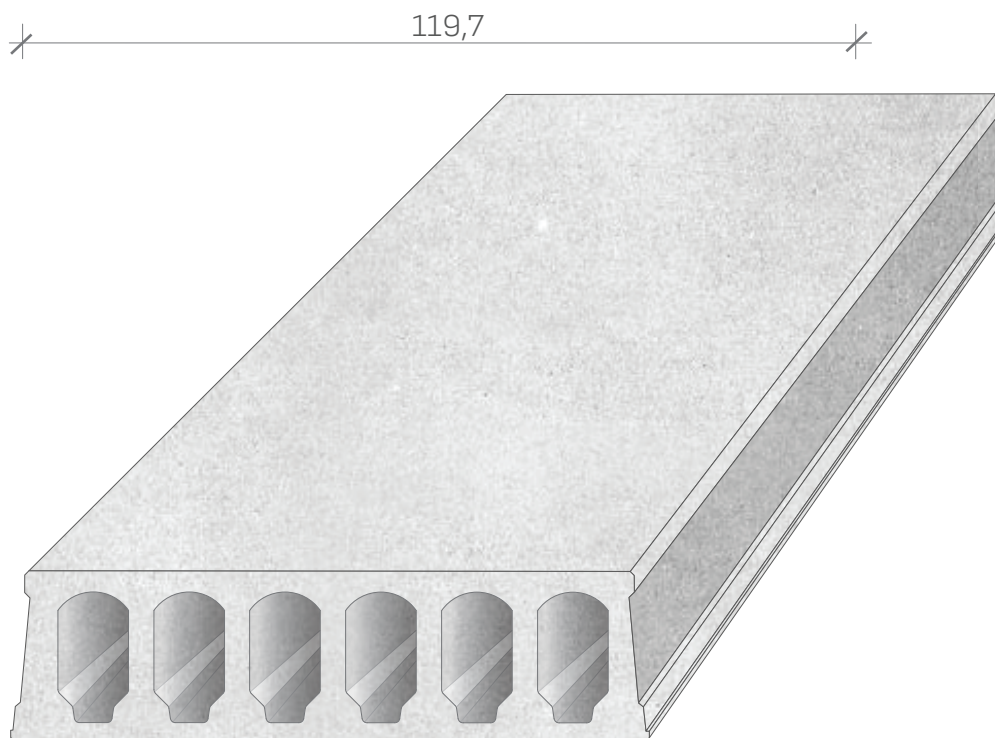
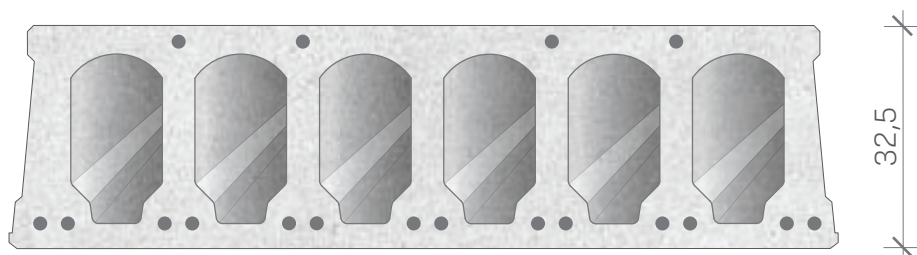
B. Hendriks - 23-06-04

Hollow core slab SC 32/120 cm

MATERIAL CHARACTERISTICS

Concrete C≥50/60

Steel B500



ECHO ENGINEERING N.V.

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SC 32x120 - 6 cores (drawing nr. 55/11008)

Topping = 0 cm

Reinforcement type	GF4B	LF4B	PF4B	RF4B	UF4B	WF4B	ZF4B			
Upper reinforcement	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7			
Lower reinforcement	5φ9.3 + 2φ12.5	2φ9.3 + 5φ12.5	2φ9.3 + 7φ12.5	4φ9.3 + 7φ12.5	7φ9.3 + 7φ12.5	12φ12.5	14φ12.5			
Reinforcement (kg/m²)	3.93	4.73	5.95	6.63	7.65	8.31	9.52			
Mrd (kNm/m)	156.4	197.0	257.9	291.6	341.2	371.3	425.5			

perm. load (kN/m²)	live load (kN/m²)	CLEAR SPAN ACCORDING TO EUROCODE								
1.00	1.00	11.08	11.67	12.50	12.93	13.52	13.85	14.43		
1.50	1.00	10.67	11.23	12.01	12.42	12.98	13.28	13.83		
1.50	1.50	10.52	11.07	11.83	12.23	12.78	13.08	13.62		
1.50	2.00	10.28	10.91	11.66	12.05	12.59	12.88	13.41		
1.50	2.50	10.04	10.77	11.50	11.88	12.41	12.70	13.21		
1.50	3.00	9.81	10.63	11.35	11.72	12.24	12.52	13.03		
1.50	3.50	9.60	10.49	11.20	11.57	12.07	12.35	12.85		
1.50	4.00	9.40	10.37	11.06	11.42	11.92	12.19	12.68		
1.50	4.50	9.15	10.25	10.92	11.28	11.77	12.03	12.52		
1.50	5.00	8.93	10.03	10.79	11.14	11.62	11.89	12.36		
1.50	5.50	8.71	9.79	10.67	11.01	11.48	11.74	12.21		
1.50	6.00	8.52	9.57	10.55	10.89	11.35	11.61	12.06		
1.50	6.50	8.33	9.36	10.44	10.77	11.22	11.48	11.92		
1.50	7.00	8.16	9.17	10.33	10.65	11.10	11.35	11.79		
1.50	8.00	7.84	8.81	10.09	10.43	10.87	11.11	11.54		
1.50	9.00	7.55	8.49	9.73	10.23	10.65	10.88	11.30		
1.50	10.00	7.30	8.20	9.40	10.00	10.45	10.68	11.08		
1.50	12.50	6.76	7.60	8.71	9.26	9.95	10.21	10.59		
1.50	15.00	6.32	7.10	8.14	8.67	9.32	9.60	10.07		
1.50	20.00	5.65	6.35	7.28	7.75	8.36	8.61	9.04		

Self weight of hollow core slab + jointfilling :

$$4.04 + 0.28 = 4.32 \text{ kN/m}^2$$

Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 1 hour

Deflection criteria :

- Long term deflection under self weight of the slab + total permanent load + 40% of the live load < $L / 250$
- Long term deflection under total permanent load + 40% of the live load < $L / 500$

Acoustic insulation R_w : 56.1 dB

Thermal resistance R_s : 0.216 m²K/W

Concrete quality : C50/60

Concrete cover on lower reinforcement = 35mm

Prestressing of upper reinforcement = 40% of f_{pk}

Prestressing of lower reinforcement = 60% of f_{pk}

$$f_{pk} = 1770 \text{ N/mm}^2 \text{ for wires } \phi 5$$

$$f_{pk} = 1670 \text{ N/mm}^2 \text{ for wires } \phi 7$$

$$f_{pk} = 1860 \text{ N/mm}^2 \text{ for strands } \phi 9.3 \text{ and } \phi 12.5$$

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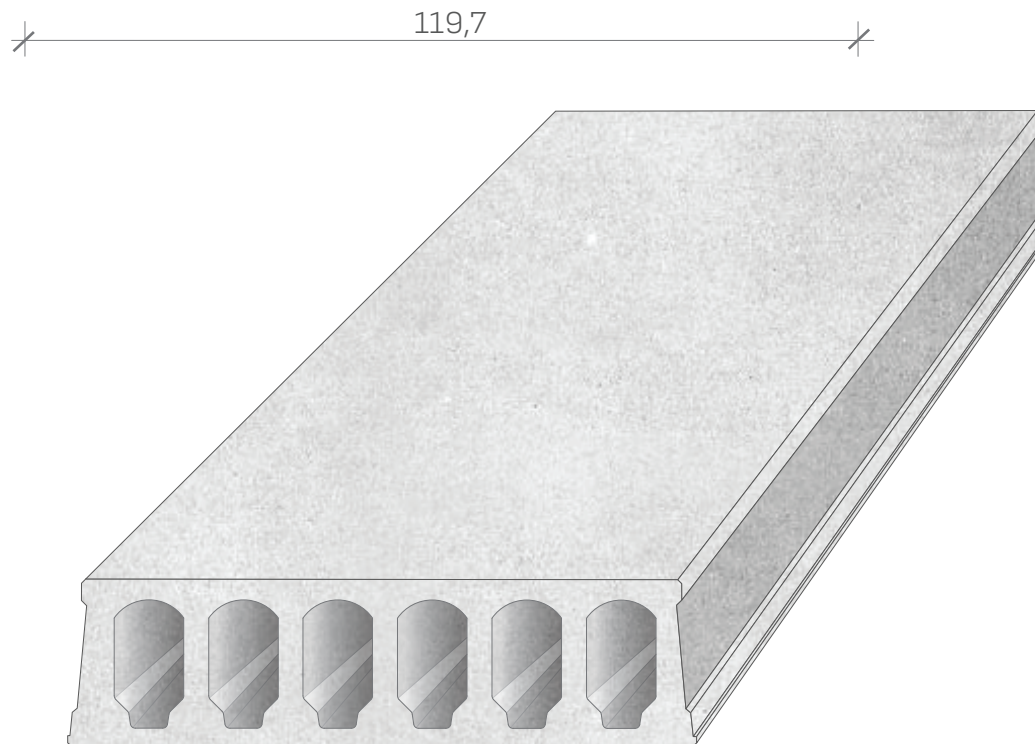
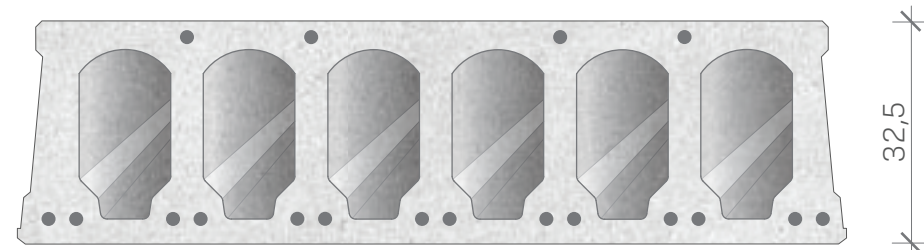
B. Hendriks - 23-06-04

Hollow core slab SC 32/120 cm

MATERIAL CHARACTERISTICS

Concrete C_{≥50/60}

Steel B500



ECHO ENGINEERING N.V.

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Tel. +32 11 60 08 00 Fax. +32 11 52 20 93



SC 32x120 - 6 cores (drawing nr. 55/11008)

Topping = 0 cm

Reinforcement type	GF6B	LF6B	PF6B	RF6B	UF6B	WF6B	ZF6B			
Upper reinforcement	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7			
Lower reinforcement	5φ9.3	2φ9.3	2φ9.3	4φ9.3	7φ9.3	12φ12.5	14φ12.5			
Reinforcement (kg/m ²)	3.93	4.73	5.95	6.63	7.65	8.31	9.52			
Mrd (kNm/m)	150.7	189.7	248.2	280.6	328.1	356.9	408.1			

perm. load (kN/m ²)	live load (kN/m ²)	CLEAR SPAN ACCORDING TO EUROCODE								
1.00	1.00	10.87	11.42	12.20	12.60	13.17	13.48	14.04		
1.50	1.00	10.45	10.99	11.72	12.11	12.64	12.93	13.47		
1.50	1.50	10.18	10.83	11.55	11.93	12.45	12.74	13.26		
1.50	2.00	9.93	10.68	11.38	11.75	12.27	12.55	13.06		
1.50	2.50	9.69	10.54	11.23	11.59	12.09	12.37	12.87		
1.50	3.00	9.48	10.41	11.08	11.43	11.93	12.20	12.69		
1.50	3.50	9.27	10.28	10.94	11.28	11.77	12.03	12.52		
1.50	4.00	9.08	10.15	10.80	11.14	11.62	11.88	12.35		
1.50	4.50	8.90	10.04	10.67	11.01	11.47	11.73	12.19		
1.50	5.00	8.73	9.84	10.55	10.87	11.33	11.59	12.04		
1.50	5.50	8.55	9.61	10.43	10.75	11.20	11.45	11.90		
1.50	6.00	8.36	9.39	10.31	10.63	11.07	11.32	11.76		
1.50	6.50	8.17	9.18	10.20	10.51	10.95	11.19	11.63		
1.50	7.00	8.00	8.99	10.09	10.40	10.83	11.07	11.50		
1.50	8.00	7.69	8.64	9.89	10.19	10.61	10.83	11.25		
1.50	9.00	7.41	8.33	9.54	9.99	10.40	10.62	11.02		
1.50	10.00	7.16	8.05	9.22	9.80	10.20	10.42	10.81		
1.50	12.50	6.63	7.45	8.54	9.08	9.76	9.96	10.33		
1.50	15.00	6.20	6.97	7.99	8.50	9.15	9.41	9.88		
1.50	20.00	5.54	6.23	7.14	7.60	8.20	8.44	8.86		

Self weight of hollow core slab + jointfilling : 4.04 + 0.28 = 4.32 kN/m²

Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 2 hours

Deflection criteria :

- Long term deflection under self weight of the slab + total permanent load + 40% of the live load < L / 250
- Long term deflection under total permanent load + 40% of the live load < L / 500

Acoustic insulation R_w' : 56.1 dB

Thermal resistance R_e : 0.216 m²K/W

Concrete quality : C50/60

Concrete cover on lower reinforcement = 45 mm

Prestressing of upper reinforcement = 40% of f_{pk}

Prestressing of lower reinforcement = 60% of f_{pk}

f_{pk} = 1770 N/mm² for wires φ5

f_{pk} = 1670 N/mm² for wires φ7

f_{pk} = 1860 N/mm² for strands φ9.3 and φ12.5

Echo Engineering is not responsible for direct or indirect damage as a result of imperfections in these data

B. Hendriks - 23-06-04

Hollow core slab SC 40/120 cm

MATERIAL

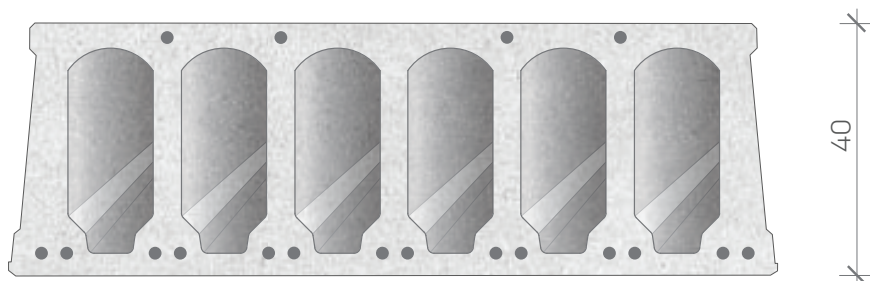
CHARACTERISTICS

Concrete

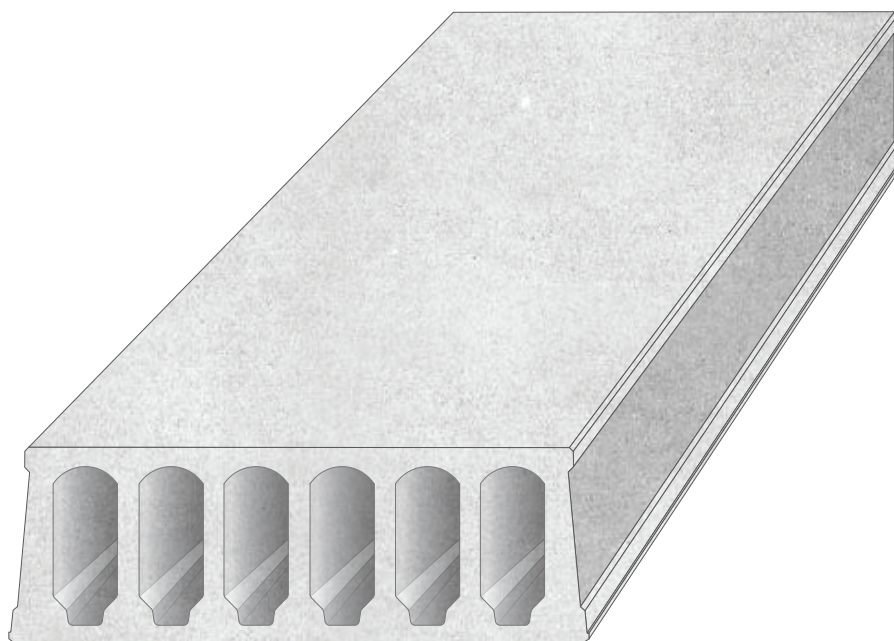
C $\geq$ 50/60

Steel

B500



119,7



ECHO ENGINEERING N.V.

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SC 40x120 - 6 cores

(drawing nr. 55/11009)

Topping = 0 cm

Reinforcement type	GF4B	LF4B	PF4B	RF4B	UF4B	WF4B	ZF4B			
Upper reinforcement	4 ϕ 7	4 ϕ 7	4 ϕ 7	4 ϕ 7	4 ϕ 7	4 ϕ 7	4 ϕ 7			
Lower reinforcement	5 ϕ 9.3 + 2 ϕ 12.5	2 ϕ 9.3 + 5 ϕ 12.5	2 ϕ 9.3 + 7 ϕ 12.5	4 ϕ 9.3 + 7 ϕ 12.5	7 ϕ 9.3 + 7 ϕ 12.5	12 ϕ 12.5	14 ϕ 12.5			
Reinforcement (kg/m ²)	3.93	4.73	5.95	6.63	7.65	8.31	9.52			
Mrd (kNm/m)	202.4	255.6	335.8	380.4	446.4	487.0	561.9			

perm. load (kN/m ²)	live load (kN/m ²)	CLEAR SPAN ACCORDING TO EUROCODE										
1.00	1.00	12.17	13.45	14.35	14.82	15.47	15.84	16.49				
1.50	1.00	11.73	12.99	13.85	14.29	14.91	15.26	15.88				
1.50	1.50	11.45	12.82	13.66	14.10	14.70	15.05	15.65				
1.50	2.00	11.19	12.66	13.48	13.91	14.51	14.84	15.44				
1.50	2.50	10.95	12.41	13.31	13.73	14.32	14.65	15.23				
1.50	3.00	10.72	12.15	13.15	13.56	14.14	14.46	15.04				
1.50	3.50	10.51	11.91	13.00	13.40	13.96	14.28	14.85				
1.50	4.00	10.30	11.64	12.85	13.24	13.80	14.11	14.67				
1.50	4.50	10.09	11.36	12.70	13.09	13.64	13.95	14.49				
1.50	5.00	9.85	11.09	12.56	12.95	13.49	13.79	14.33				
1.50	5.50	9.63	10.84	12.43	12.81	13.34	13.64	14.17				
1.50	6.00	9.42	10.60	12.17	12.68	13.19	13.49	14.01				
1.50	6.50	9.23	10.38	11.92	12.55	13.06	13.35	13.86				
1.50	7.00	9.04	10.18	11.68	12.42	12.93	13.21	13.72				
1.50	8.00	8.70	9.80	11.25	11.98	12.67	12.95	13.45				
1.50	9.00	8.40	9.46	10.86	11.57	12.27	12.65	13.19				
1.50	10.00	8.13	9.15	10.51	11.19	11.89	12.26	12.90				
1.50	12.50	7.54	8.49	9.75	10.39	11.07	11.41	12.01				
1.50	15.00	7.07	7.96	9.14	9.74	10.40	10.72	11.29				
1.50	20.00	6.33	7.13	8.20	8.73	9.35	9.64	10.15				

Self weight of hollow core slab + jointfilling :

4.61 + 0.36 = 4.98 kN/m²Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 1 hour

Deflection criteria :

- Long term deflection under self weight of the slab + total permanent load + 40% of the live load < L / 250
- Long term deflection under total permanent load + 40% of the live load < L / 500

Acoustic insulation R_w' : 57.9 dBThermal resistance R_e : 0.232 m²K/W

Concrete quality : C50/60

Concrete cover on lower reinforcement = 35mm

Prestressing of upper reinforcement = 40% of f_{pk}Prestressing of lower reinforcement = 60% of f_{pk}f_{pk} = 1770 N/mm² for wires ϕ 5f_{pk} = 1670 N/mm² for wires ϕ 7f_{pk} = 1860 N/mm² for strands ϕ 9.3 and ϕ 12.5

Echo Engineering is not responsible for direct or indirect damage as a result of imperfections in these data

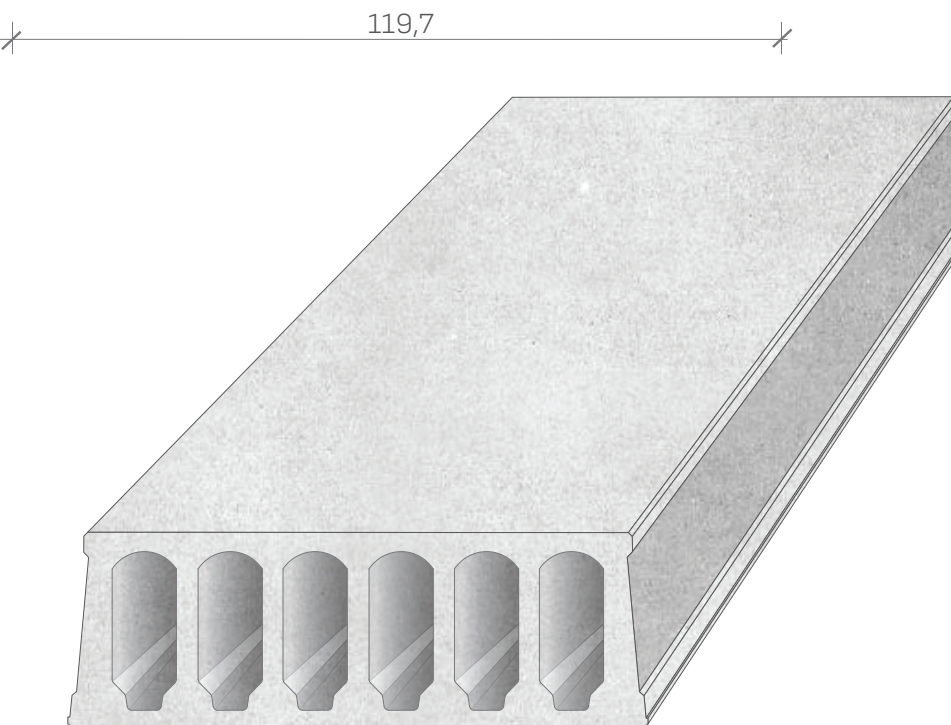
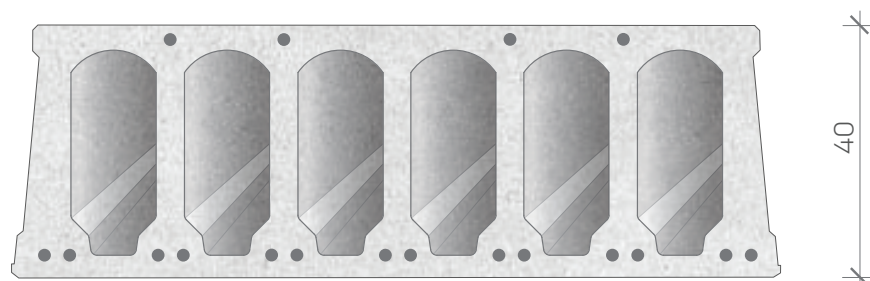
B. Hendriks - 23-06-04

Hollow core slab SC 40/120 cm

MATERIAL CHARACTERISTICS

Concrete C_{50/60}

Steel B500



ECHO ENGINEERING N.V.

Industrieterrein Centrum Zuid 1533

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Tel. +32 11 60 08 00 Fax. +32 11 52 20 93



SC 40x120 - 6 cores

(drawing nr. 55/11009)

Topping = 0 cm

Reinforcement type	GF6B	LF6B	PF6B	RF6B	UF6B	WF6B	ZF6B			
Upper reinforcement	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7	4φ7			
Lower reinforcement	5φ9.3 + 2φ12.5	2φ9.3 + 5φ12.5	2φ9.3 + 7φ12.5	4φ9.3 + 7φ12.5	7φ9.3 + 7φ12.5	12φ12.5	14φ12.5			
Reinforcement (kg/m ²)	3.93	4.73	5.95	6.63	7.65	8.31	9.52			
Mrd (kNm/m)	196.6	248.2	326.1	369.4	433.4	472.7	545.2			

perm. load (kN/m ²)	live load (kN/m ²)	CLEAR SPAN ACCORDING TO EUROCODE								
1.00	1.00	11.75	13.24	14.10	14.55	15.17	15.53	16.16		
1.50	1.00	11.33	12.79	13.61	14.03	14.63	14.96	15.57		
1.50	1.50	11.06	12.56	13.42	13.84	14.42	14.76	15.35		
1.50	2.00	10.81	12.27	13.25	13.66	14.23	14.56	15.14		
1.50	2.50	10.58	12.00	13.09	13.49	14.05	14.37	14.94		
1.50	3.00	10.36	11.75	12.93	13.32	13.88	14.19	14.75		
1.50	3.50	10.15	11.52	12.78	13.17	13.71	14.01	14.56		
1.50	4.00	9.95	11.30	12.63	13.01	13.54	13.85	14.39		
1.50	4.50	9.77	11.09	12.49	12.87	13.39	13.69	14.22		
1.50	5.00	9.59	10.89	12.35	12.72	13.24	13.53	14.06		
1.50	5.50	9.43	10.68	12.23	12.59	13.10	13.38	13.90		
1.50	6.00	9.27	10.45	11.99	12.46	12.96	13.24	13.75		
1.50	6.50	9.09	10.23	11.75	12.33	12.82	13.10	13.60		
1.50	7.00	8.91	10.03	11.51	12.21	12.70	12.97	13.46		
1.50	8.00	8.58	9.65	11.08	11.80	12.45	12.72	13.20		
1.50	9.00	8.28	9.32	10.70	11.39	12.08	12.46	12.95		
1.50	10.00	8.01	9.01	10.35	11.03	11.70	12.07	12.71		
1.50	12.50	7.43	8.37	9.61	10.24	10.90	11.24*	11.83		
1.50	15.00	6.96	7.84	9.01	9.59	10.24	10.55	11.11		
1.50	20.00	6.24	7.03	8.07	8.60	9.21	9.49	10.00		

Self weight of hollow core slab + jointfilling :

$$4.61 + 0.36 = 4.98 \text{ kN/m}^2$$

Density of concrete : 2500 kg/m³

Exposure class : 1 (dry environment)

Fire resistance : 2 hours

Deflection criteria :

* Long term deflection under self weight of the slab + total permanent load + 40% of the live load < L / 250

* Long term deflection under total permanent load + 40% of the live load < L / 500

Acoustic insulation R_w' : 57.9 dB

Thermal resistance R_c : 0.232 m²K/W

Concrete quality : C50/60

Concrete cover on lower reinforcement = 45mm

Prestressing of upper reinforcement = 40% of f_{pk}

Prestressing of lower reinforcement = 60% of f_{pk}

f_{pk} = 1770 N/mm² for wires φ5

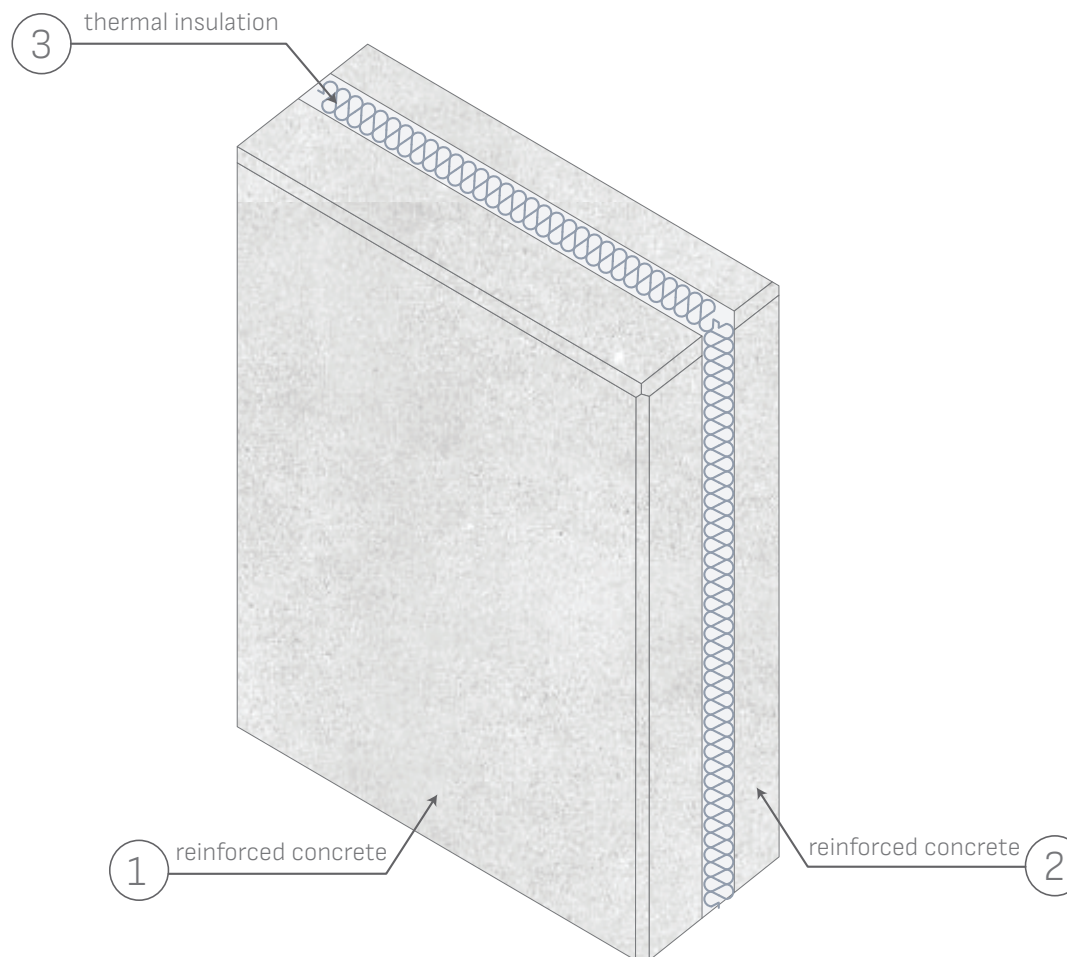
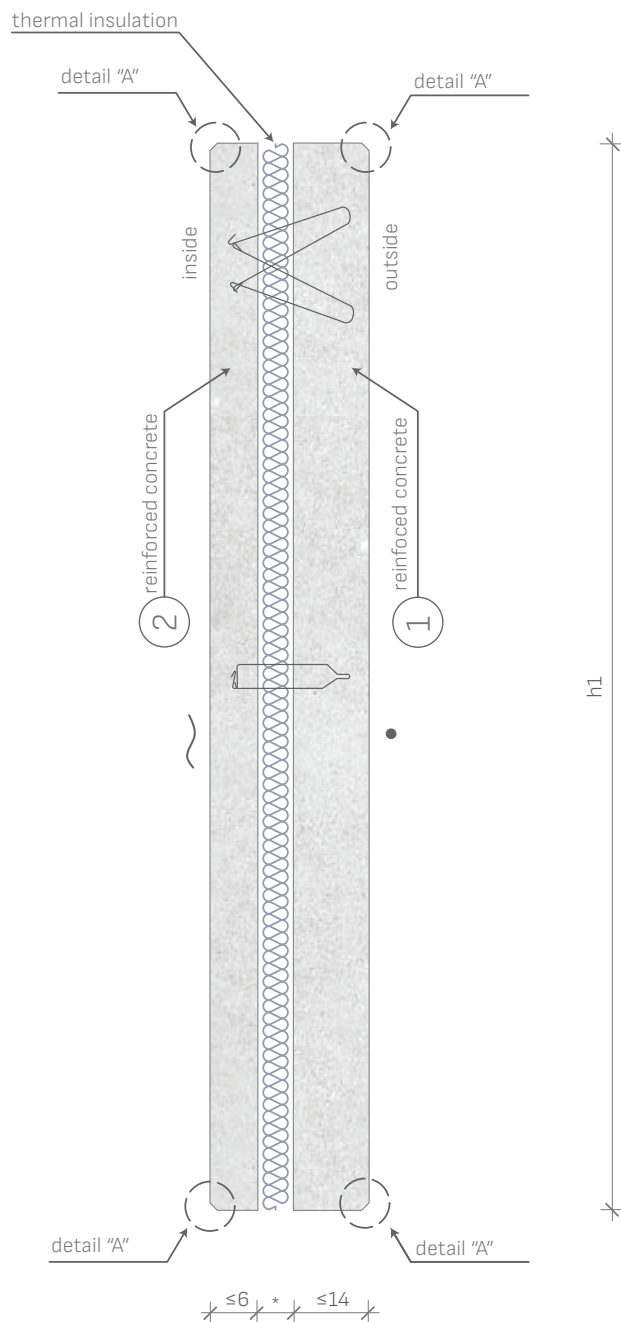
f_{pk} = 1670 N/mm² for wires φ7

f_{pk} = 1860 N/mm² for strands φ9.3 and φ12.5

Echo Engineering is not responsible for direct or indirect damage as a result of imperfections in these data

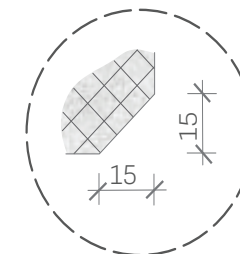
B. Hendriks - 23-06-04





Detail "A"

bevel 15 mm



MATERIAL

CHARACTERISTICS

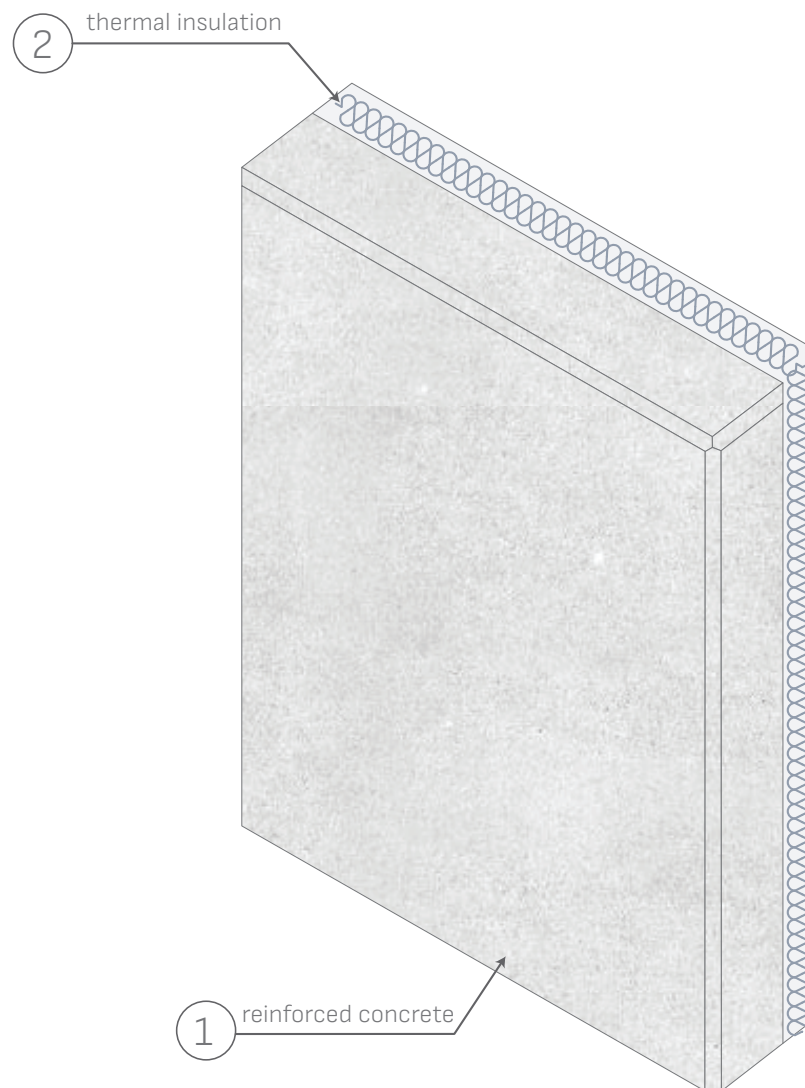
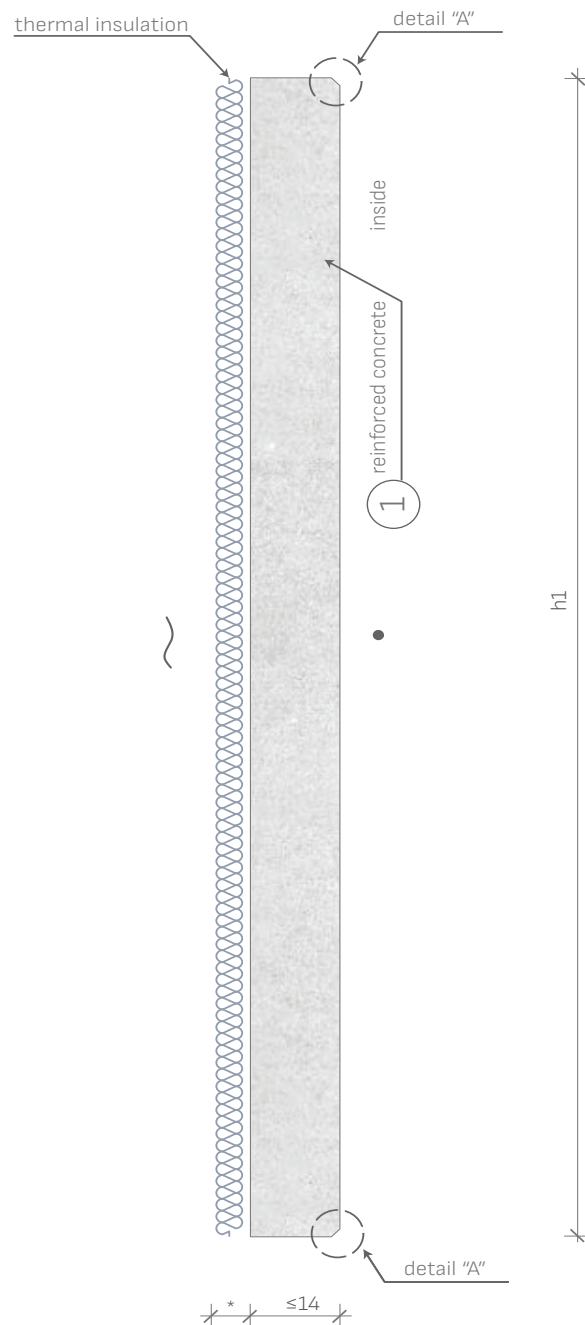
Concrete

C $\geq$ 30/37

Steel

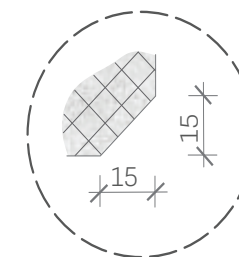
B500

- a** - full bearing
- b** - reduced bearing
- *** - according to calculation
- - formwork
- ~** - free surface



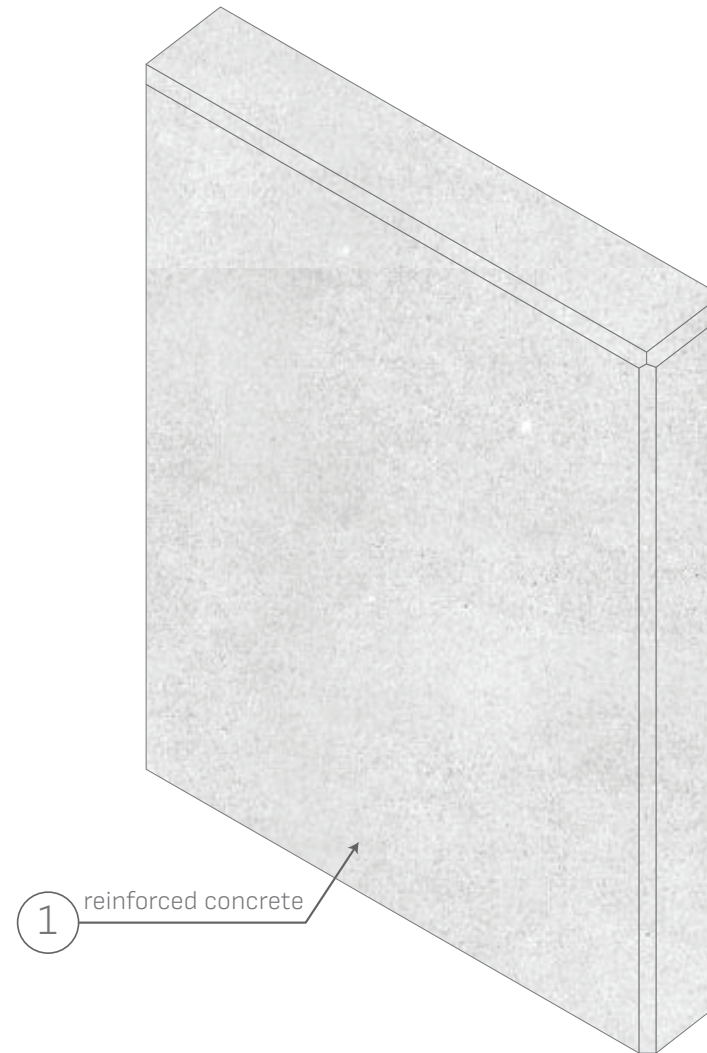
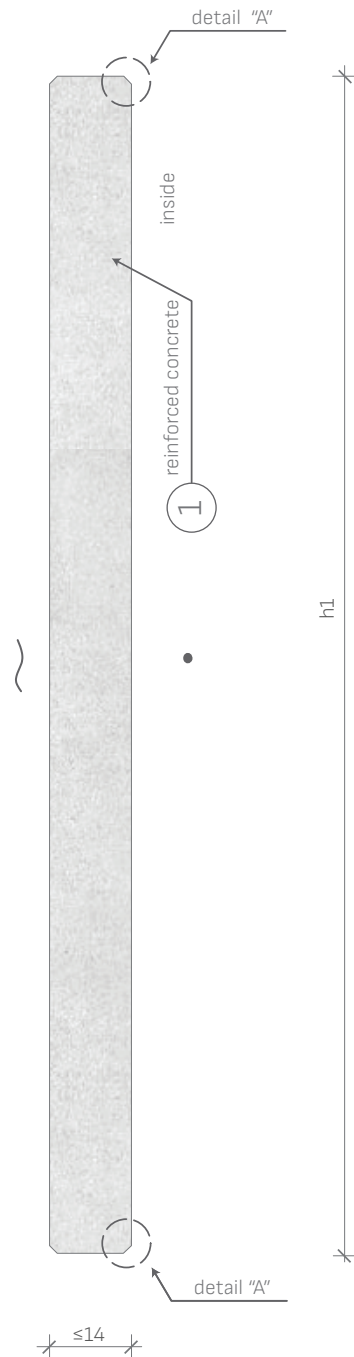
Detail "A"

bevel 15 mm



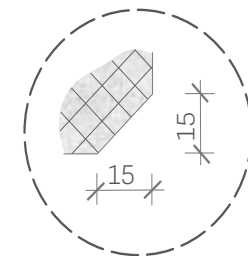
MATERIAL	CHARACTERISTICS
Concrete	C≥30/37
Steel	B500

- a** – full bearing
- b** – reduced bearing
- *** – according to calculation
- – formwork
- ~** – free surface



Detail "A"

bevel 15 mm



MATERIAL

CHARACTERISTICS

Concrete

C≥30/37

Steel

B500

- a** – full bearing
- b** – reduced bearing
- *** – according to calculation
- – formwork
- ~** – free surface

