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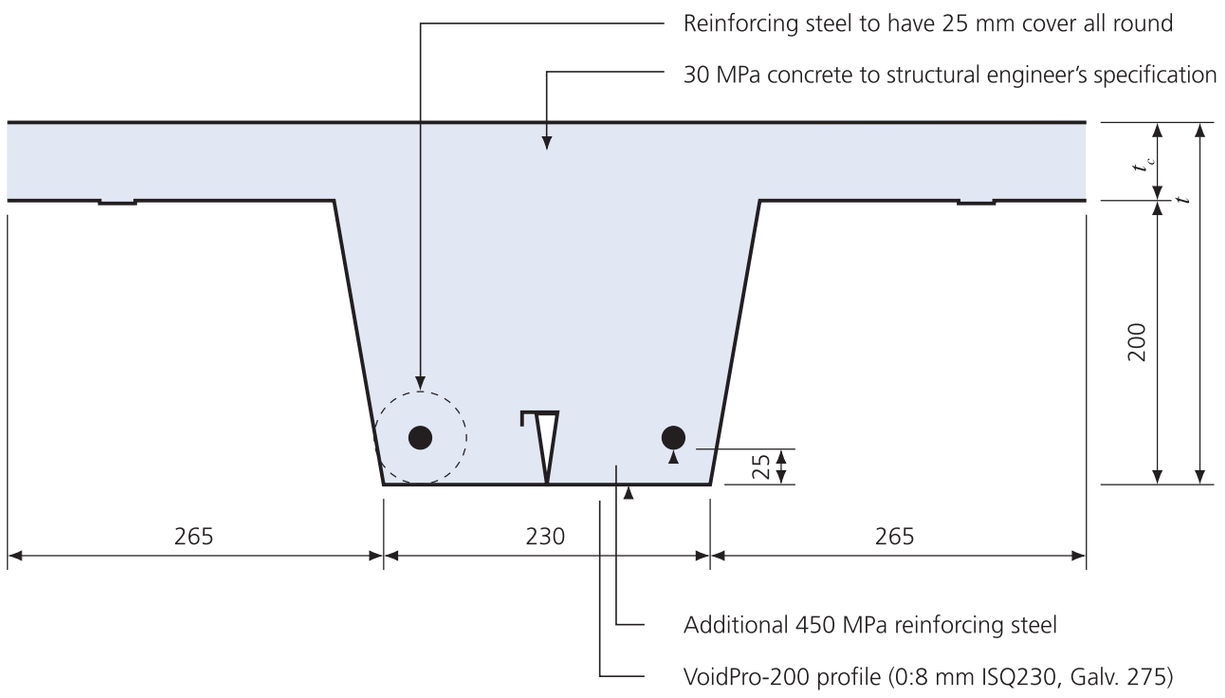
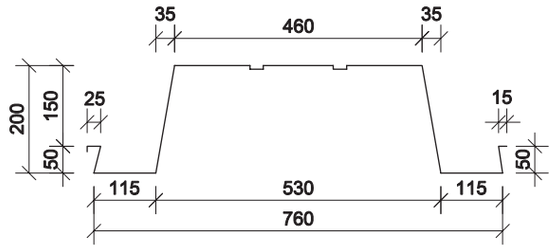
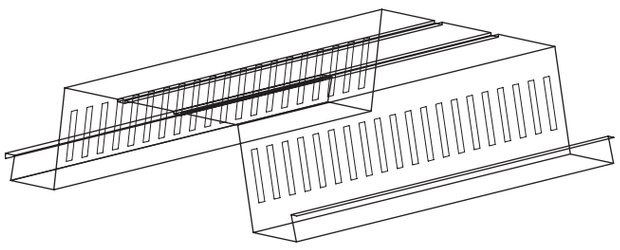
The VoidPro-200 profile displaces 0:130 m3 concrete per m² floor area. When calculating additional reinforcing requirements, it was assumed that the VoidPro-200 profile has an effective tension steel area of 384 mm².

Cross section through a typical VoidPro-200 T-beam



VoidPro-200: Front elevation and 3D view





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VOIDPRO-200 LOAD-SPAN TABLE

Additional reinforcing steel in [mm²] per beam at 760 mm spacing, for the VoidPro-200 system used in a single span simply supported configuration. Calculations are based on a characteristic concrete cube strength of 30 MPa and a characteristic deck steel yield strength of 230 MPa. Additional reinforcing should be high strength steel with a yield stress of 450 MPa. Additional reinforcing steel is limited to a maximum diameter of 20 mm. Cover of 25 mm above the deck soffit should be provided in all cases. Where values are listed as zero, no additional reinforcing is required as the VoidPro-200 profile provides sufficient tensile reinforcing. Where no value is listed, the span length is governed by either deflection considerations or the depth of the concrete compression block exceeds the limits imposed to prevent failure by concrete crushing. Underlined-values are for cases where serviceability considerations govern, but the allowable span can be increased by providing the indicated amount of reinforcing steel.

Reinforcing requirements for ultimate and serviceability limit states

Q_n [a]	G_n [b]	TL_f [c]	t [d]	Floor span in [m]											
[kPa]	[kPa]	[kPa]	[mm]	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50
				Additional reinforcing steel in [mm²] per beam 760 mm $^{c}/_{c}$											
1.50	2.962	7.03	255	0	0	0	30	80	130	180	240	400	1080		
2.00	2.962	7.83	255	0	0	10	60	110	170	230	290	670			
2.50	2.962	8.63	255	0	0	40	90	140	200	270	370	1030			
3.00	2.962	9.43	255	0	10	60	110	180	240	320	580				
4.00	2.962	11.03	255	0	40	100	170	240	320	420	1130				
5.00	2.962	12.63	255	20	80	150	220	310	400	760					
7.50	2.962	16.63	255	90	170	260	360	480	860						
1.50	3.423	7.59	275	0	0	0	30	80	130	180	240	300	490	1110	
2.00	3.423	8.39	275	0	0	10	60	110	160	220	280	350	740	1690	
2.50	3.423	9.19	275	0	0	30	80	140	200	260	330	470	1070		
3.00	3.423	9.99	275	0	0	50	110	170	230	300	380	660	1500		
4.00	3.423	11.59	275	0	40	90	160	230	300	380	520	1180			
5.00	3.423	13.19	275	10	70	130	210	290	370	470	860				
7.50	3.423	17.19	275	80	150	240	330	440	560	990					
1.50	3.999	8.28	300	0	0	0	30	70	120	180	230	290	360	510	1000
2.00	3.999	9.08	300	0	0	10	50	100	160	210	280	340	410	720	1420
2.50	3.999	9.88	300	0	0	30	80	130	190	250	320	390	490	980	1980
3.00	3.999	10.68	300	0	0	50	100	160	220	290	360	440	660	1290	
4.00	3.999	12.28	300	0	30	80	140	210	280	360	450	540	1080	2200	
5.00	3.999	13.88	300	0	60	120	190	270	350	440	540	840	1650		
7.50	3.999	17.88	300	60	130	220	300	400	510	630	980	1940			
1.50	4.460	8.83	320	0	0	0	30	70	120	170	230	290	360	420	610
2.00	4.460	9.63	320	0	0	10	50	100	150	210	270	340	410	480	820
2.50	4.460	10.43	320	0	0	20	70	120	180	240	310	380	460	590	1080
3.00	4.460	11.23	320	0	0	40	90	150	210	280	350	430	510	760	1380
4.00	4.460	12.83	320	0	20	80	130	200	270	350	430	520	650	1180	2230
5.00	4.460	14.43	320	0	50	110	180	250	330	420	510	610	950	1740	
7.50	4.460	18.43	320	50	120	200	280	380	480	590	720	1120	2070		
1.50	4.921	9.39	340	0	0	0	30	70	120	170	230	290	350	420	490
2.00	4.921	10.19	340	0	0	0	50	100	150	210	270	330	400	480	550
2.50	4.921	10.99	340	0	0	20	70	120	180	240	300	370	450	530	700
3.00	4.921	11.79	340	0	0	40	90	140	200	270	340	420	500	580	880
4.00	4.921	13.39	340	0	20	70	130	190	260	340	420	500	590	770	1300
5.00	4.921	14.99	340	0	40	100	170	240	320	400	490	590	700	1080	1860
7.50	4.921	18.99	340	40	110	180	270	360	460	560	680	810	1270	2220	

[a] Unfactored imposed (live) load.
[b] Unfactored own-weight of the slab and the VoidPro-200 profile.
[c] Total factored load using the SANS10160-1 STR load combination of 1:2Gn + 1:6Qn where Gn is the total nominal permanent (dead) load and Qn is the total imposed (live) load. Note that in calculating the total factored load, an allowance was made for the additional permanent load of 0:9 kPa accounting for services and finishes. Concrete own weight was calculated based on a mass of 2350 kg/m³ .
[d] Total thickness of the slab.

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REINFORCING REQUIREMENTS FOR A 60 MINUTE FIRE RATING

Additional reinforcing steel in [mm²] per beam at 760 mm spacing, for the VoidPro-200 system used in a single span simply supported configuration. The minimum slab thickness required to attain a 60 minute fire rating is 190 mm. Those values with * next to them are governed by fire requirements, whilst the remainder are governed by serviceability or ultimate limit state requirements. The steel decking has been assumed to lose all its strength in fire. Additional reinforcing steel is limited to a maximum diameter of 20 mm. Cover of 25 mm above the deck soffit should be provided in all cases. Refer to Table 3.1 for additional design assumptions. The reinforcement is suitable for the following occupancies according to SANS 10160-1: (A) Domestic and residential areas, (B) Public areas not susceptible to crowding, (C) Public areas where people may congregate, (D) Shopping areas, and (J/K) Accessible flat roofs. For other occupancy categories (industrial usage, storage etc.) refer to the Voidcon fire design guideline document.

Reinforcing requirements for a 60 minute fire rating

Q_n[a]	G_n[b]	TL_f[c]	t[d]	Floor span in [m]											
[kPa]	[kPa]	[kPa]	[mm]	4.00	4.50	5.00	5.50	6.00	6.50	7.00	7.50	8.00	8.50	9.00	9.50
				Additional reinforcing steel in [mm²] per beam 760 mm $^{c}/_{c}$											
1.50	3.423	7.59	275	*86	*109	*134	*163	*194	*228	*265	*304	*347	490	1110	
2.00	3.423	8.39	275	*88	*112	*139	*168	*200	*235	*273	*314	*358	740	1690	
2.50	3.423	9.19	275	*91	*115	*143	*173	*206	*242	*282	330	470	1070		
3.00	3.423	9.99	275	*94	*119	*147	*178	*212	*250	300	380	660	1500		
4.00	3.423	11.59	275	*99	*126	*156	*188	230	300	380	520	1180			
5.00	3.423	13.19	275	*105	*133	*164	210	290	370	470	860				
7.50	3.423	17.19	275	*118	150	240	330	440	560	990					
1.50	4.00	8.28	300	*87	*110	*136	*165	*197	*231	*269	*309	*352	*398	510	1000
2.00	4.00	9.08	300	*90	*113	*140	*170	*202	*238	*276	*318	*362	410	720	1420
2.50	4.00	9.88	300	*92	*117	*144	*174	*208	*244	*284	*326	390	490	980	1980
3.00	4.00	10.68	300	*94	*120	*148	*179	*213	*251	*291	360	440	660	1290	
4.00	4.00	12.28	300	*99	*126	*156	*188	*225	280	360	450	540	1080	2200	
5.00	4.00	13.88	300	*104	*132	*163	*198	270	350	440	540	840	1650		
7.50	4.00	17.88	300	*117	*148	220	300	400	510	630	980	1940			
1.50	4.46	8.83	320	*88	*111	*138	*167	*199	*234	*271	*312	*355	*402	*452	610
2.00	4.46	9.63	320	*90	*114	*141	*171	*204	*240	*278	*320	*365	*413	480	820
2.50	4.46	10.43	320	*93	*117	*145	*175	*209	*246	*285	*328	380	460	590	1080
3.00	4.46	11.23	320	*95	*120	*148	*180	*214	*252	*293	350	430	510	760	1380
4.00	4.46	12.83	320	*99	*126	*156	*188	*225	270	350	430	520	650	1180	2230
5.00	4.46	14.43	320	*104	*132	*163	*197	250	330	420	510	610	950	1740	
7.50	4.46	18.43	320	*115	*146	200	280	380	480	590	720	1120	2070		
1.50	4.921	9.39	340	*89	*112	*139	*168	*200	*236	*274	*314	*358	*405	*455	*508
2.00	4.921	10.19	340	*91	*115	*142	*172	*205	*241	*280	*322	*367	*415	480	550
2.50	4.921	10.99	340	*93	*118	*146	*176	*210	*247	*287	*330	*376	450	530	700
3.00	4.921	11.79	340	*95	*121	*149	*180	*215	*253	*293	340	420	500	580	880
4.00	4.921	13.39	340	*99	*126	*156	*188	*225	*264	340	420	500	590	770	1300
5.00	4.921	14.99	340	*104	*131	*162	*197	240	320	400	490	590	700	1080	1860
7.50	4.921	18.99	340	*114	*145	180	270	360	460	560	680	810	1270	2220	

[a] Unfactored imposed (live) load.
[b] Unfactored own-weight of the slab and the VoidPro-200 profile.
[c] Total factored load using the SANS10160-1 ACC load combination of 1:0Gn + 0:3Qn where Gn is the total nominal permanent (dead) load and Qn is the total imposed (live) load. Note that in calculating the total factored load, an allowance was made for the additional permanent load of 0:9 kPa accounting for services and finishes.
[d] Total thickness of the slab.