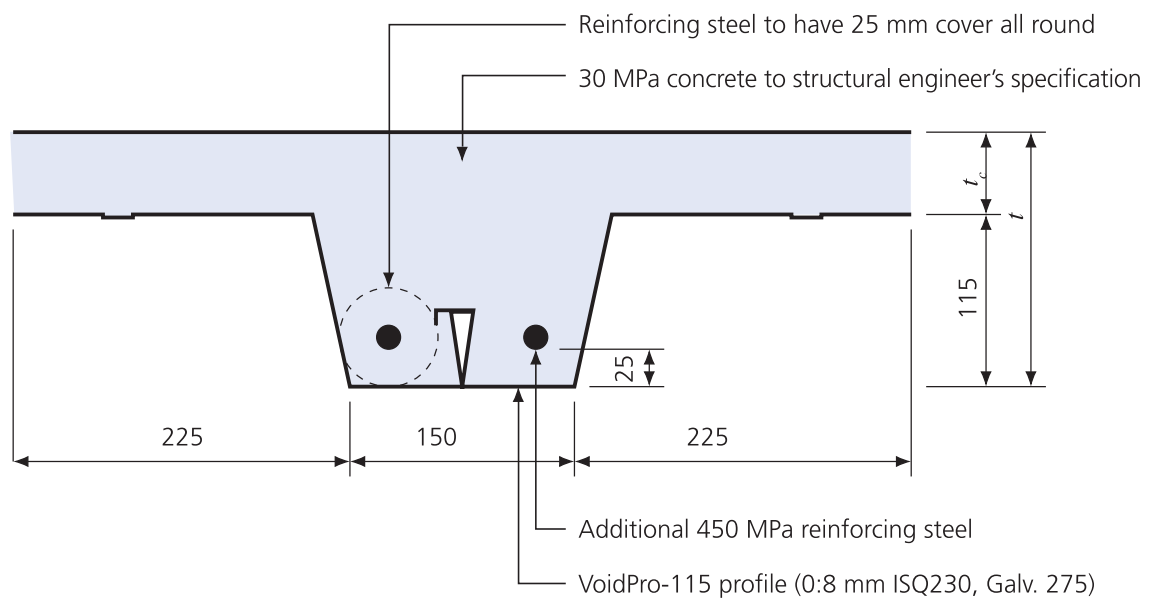


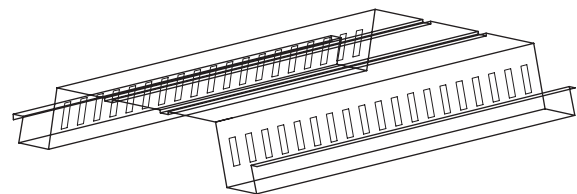
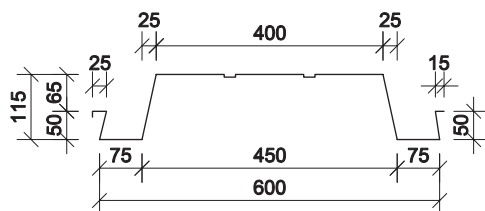
VP-115

The VoidPro-115 profile displaces 0.0815 m³ concrete per m² floor area. When calculating additional reinforcing requirements, it was assumed that the VoidPro-115 profile has an effective tension steel area of 320 mm².

Cross section through a typical VoidPro-115 T-beam



VoidPro-115: Front elevation and 3D view



VP-115

VOIDPRO-115 LOAD-SPAN TABLE

Additional reinforcing steel in [mm²] per beam at 600 mm spacing, for the VoidPro-115 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-115 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]	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50
Additional reinforcing steel in [mm ²] per beam 600 mm ^{c/c}																
1.50	2.150	6.06	170	0	20	40	60	<u>270</u>								
2.00	2.150	6.86	170	20	50	70	100	<u>860</u>								
2.50	2.150	7.66	170	50	70	100	<u>510</u>									
3.00	2.150	8.46	170	70	100	<u>240</u>										
4.00	2.150	10.06	170	120	<u>230</u>											
5.00	2.150	11.66	170	170	<u>790</u>											
7.50	2.150	15.66	170													
1.50	2.611	6.61	190	0	10	30	50	80	100	<u>220</u>	<u>720</u>					
2.00	2.611	7.41	190	10	40	60	80	110	130	<u>560</u>						
2.50	2.611	8.21	190	30	60	80	110	140	<u>400</u>	<u>1090</u>						
3.00	2.611	9.01	190	50	80	110	140	<u>230</u>	<u>730</u>							
4.00	2.611	10.61	190	100	130	160	<u>250</u>	<u>750</u>								
5.00	2.611	12.21	190	140	170	210	<u>650</u>									
7.50	2.611	16.21	190	240	<u>470</u>	<u>1200</u>										
1.50	2.842	6.89	200	0	10	30	50	70	100	120	<u>220</u>	<u>630</u>				
2.00	2.842	7.69	200	10	30	50	80	100	130	150	<u>520</u>	<u>1230</u>				
2.50	2.842	8.49	200	30	50	80	100	130	160	<u>380</u>	<u>930</u>					
3.00	2.842	9.29	200	50	70	100	130	160	<u>250</u>	<u>670</u>						
4.00	2.842	10.89	200	90	120	150	180	<u>270</u>	<u>700</u>							
5.00	2.842	12.49	200	130	160	200	240	<u>630</u>								
7.50	2.842	16.49	200	220	270	<u>500</u>	<u>1140</u>									
1.50	3.418	7.58	225	0	0	20	40	60	90	110	130	160	180	400	<u>770</u>	<u>1520</u>
2.00	3.418	8.38	225	0	20	40	70	90	110	140	170	190	350	<u>680</u>	<u>1310</u>	
2.50	3.418	9.18	225	20	40	60	90	110	140	170	200	270	570	<u>1070</u>		
3.00	3.418	9.98	225	40	60	80	110	140	170	200	230	450	<u>850</u>			
4.00	3.418	11.58	225	70	100	130	160	190	220	260	490	<u>920</u>				
5.00	3.418	13.18	225	100	130	170	200	240	280	470	<u>890</u>					
7.50	3.418	17.18	225	190	230	270	320	430	810	<u>1550</u>						
1.50	3.995	8.27	250	0	0	20	40	60	80	100	120	150	170	200	230	<u>340</u>
2.00	3.995	9.07	250	0	20	40	60	80	100	130	150	180	210	240	300	<u>530</u>
2.50	3.995	9.87	250	10	30	50	80	100	130	150	180	210	240	270	460	<u>770</u>
3.00	3.995	10.67	250	30	50	70	100	120	150	180	210	240	280	390	650	<u>1080</u>
4.00	3.995	12.27	250	60	80	110	140	170	200	230	270	310	430	<u>710</u>	<u>1170</u>	
5.00	3.995	13.87	250	90	110	150	180	210	250	290	330	430	<u>710</u>	<u>1170</u>		
7.50	3.995	17.87	250	160	200	240	280	330	380	430	710	<u>1160</u>				

^a Unfactored imposed (live) load.

^b Unfactored own-weight of the slab and the VoidPro-50 profile.

^c Total factored load using the SANS10160-1 STR load combination of $1.2G_n + 1.6Q_n$ where G_n is the total nominal permanent (dead) load and Q_n 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.

VP-115

REINFORCING REQUIREMENTS FOR A 60 MINUTE FIRE RATING

Additional reinforcing steel in [mm²] per beam at 600 mm spacing, for the VoidPro-115 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 2.1 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]	4.50	4.75	5.00	5.25	5.50	5.75	6.00	6.25	6.50	6.75	7.00	7.25	7.50
Additional reinforcing steel in [mm ²] per beam 600 mm ^{c/c}																
1.50	2.611	6.61	190	*110	*123	*136	*151	*165	*181	220	720					
2.00	2.611	7.41	190	*114	*128	*142	*156	*172	*188	560						
2.50	2.611	8.21	190	*119	*132	*147	*162	*178	400	1090						
3.00	2.611	9.01	190	*123	*137	*152	*168	230	730							
4.00	2.611	10.61	190	*131	*147	*163	250	750								
5.00	2.611	12.21	190	140	170	210	650									
7.50	2.611	16.21	190	240	470	1200										
1.50	2.842	6.89	200	*110	*122	*136	*150	*164	*180	*196	220	630				
2.00	2.842	7.69	200	*114	*127	*141	*155	*170	*187	*203	520	1230				
2.50	2.842	8.49	200	*118	*131	*145	*161	*176	*193	380	930					
3.00	2.842	9.29	200	*121	*136	*150	*166	*182	250	670						
4.00	2.842	10.89	200	*129	*144	*160	180	270	700							
5.00	2.842	12.49	200	*137	160	200	240	630								
7.50	2.842	16.49	200	220	270	500	1140									
1.50	3.418	7.58	225	*108	*121	*134	*148	*162	*178	*194	*210	*228	*246	400	770	1520
2.00	3.418	8.38	225	*112	*125	*138	*153	*168	*183	*200	*217	*235	350	680	1310	
2.50	3.418	9.18	225	*115	*128	*142	*157	*173	*189	*206	*224	270	570	1070		
3.00	3.418	9.98	225	*119	*132	*147	*162	*178	*195	*212	*231	450	850			
4.00	3.418	11.58	225	*125	*140	*155	*171	190	220	260	490	920				
5.00	3.418	13.18	225	*132	*148	170	200	240	280	470	890					
7.50	3.418	17.18	225	190	230	270	320	430	810	1550						
1.50	4.00	8.27	250	*107	*120	*133	*146	*161	*176	*192	*208	*226	*244	*262	*282	340
2.00	4.00	9.07	250	*110	*123	*136	*151	*165	*181	*197	*214	*232	*251	*270	300	530
2.50	4.00	9.87	250	*113	*126	*140	*155	*170	*186	*203	*220	*238	*257	*277	460	770
3.00	4.00	10.67	250	*116	*130	*144	*159	*175	*191	*208	*226	*245	280	390	650	1080
4.00	4.00	12.27	250	*122	*137	*151	*167	*184	*201	230	270	310	430	710	1170	
5.00	4.00	13.87	250	*129	*143	*159	180	210	250	290	330	430	710	1170		
7.50	4.00	17.87	250	160	200	240	280	330	380	430	710	1160				

^a Unfactored imposed (live) load.

^b Unfactored own-weight of the slab and the VoidPro-115 profile.

^c Total factored load using the SANS10160-1 ACC load combination of $1.0G_n + 0.3Q_n$ where G_n is the total nominal permanent (dead) load and Q_n 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.