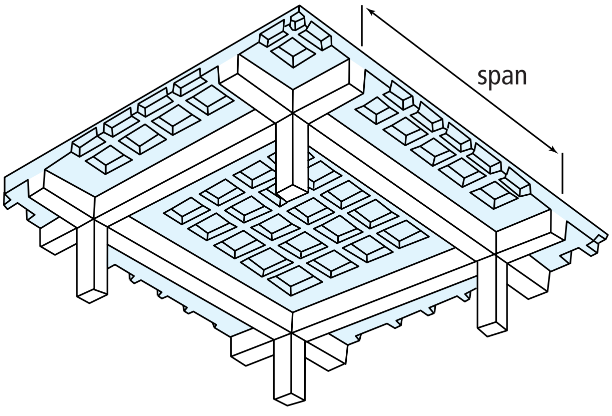
Waffle slabs *designed as two-way slabs (standard moulds)*



Introducing voids to the soffit reduces dead weight and these deeper, stiffer floors permit longer spans which are economic for spans between 9 and 14 m. The saving of materials tends to be offset by complication in site operations.

Standard moulds are 225, 325 and 425 mm deep and are used to make ribs 125 mm wide on a 900 mm grid. Toppings are between 50 and 150 mm thick.

The chart and data assume surrounding and supporting downstand beams, which should be subject to separate consideration, and solid margins. Both waffles and downstand beams complicate formwork.

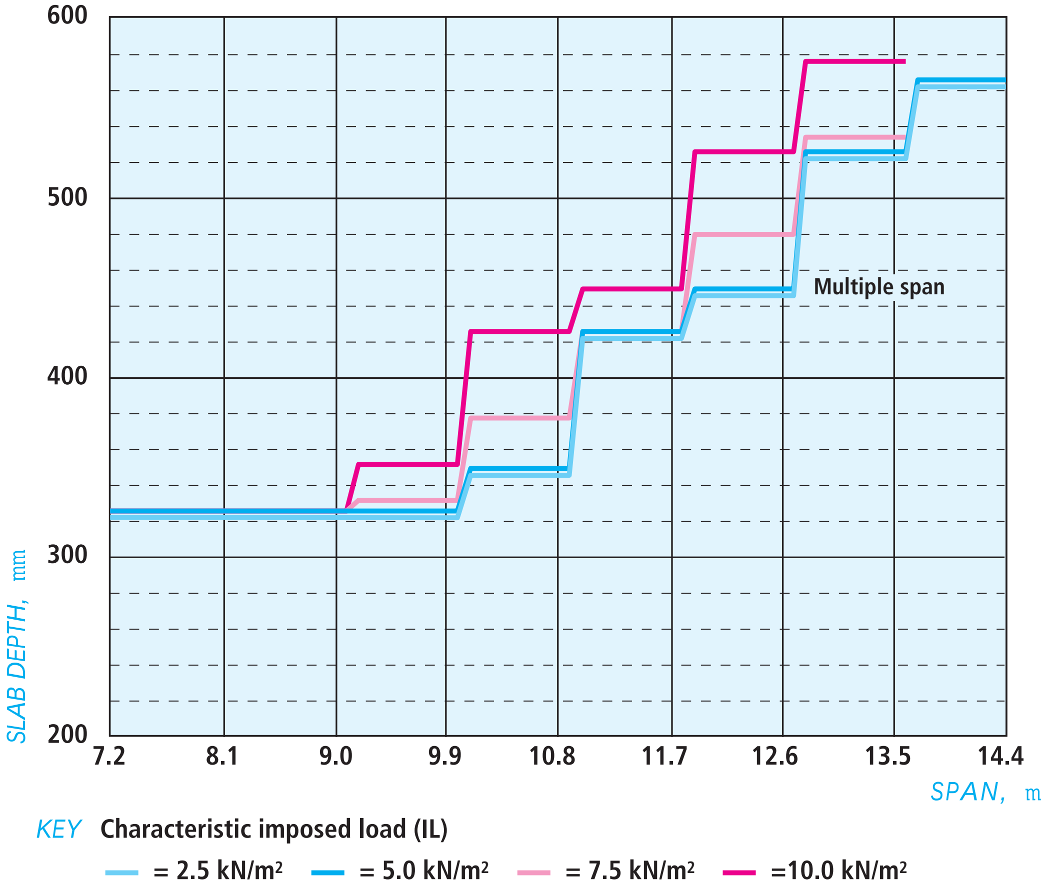
ADVANTAGES

- Medium to long spans
- Lightweight
- Profiles may be expressed architecturally, or used for heat transfer

DISADVANTAGES

- Higher formwork costs than for other slab systems
- Slightly deeper members result in greater floor heights
- Slow. Difficult to prefabricate reinforcement

SPAN:DEPTH CHART



DESIGN ASSUMPTIONS

SUPPORTED BY	BEAMS in two orthogonal directions. Refer to beam charts and data to estimate sizes, etc.
DIMENSIONS	Square panels, minimum of two spans x two bays. Ribs 125 mm wide @ 900 mm cc. Moulds 225, 325 or 425 mm deep. Topping 100 to 150 mm. Rib/solid intersection at 900 + 125/2 from centreline of support.
REINFORCEMENT	Maximum bar sizes in ribs: 2T25B, 2T20T (in top of web) and R8 links. 25 mm allowed for A142 or A193 mesh (@ 0.12%) in topping. 10% allowed for wastage and laps. f_s may have been reduced.
LOADS	SDL of 1.50 kN/m² (finishes etc) included. Ultimate loads to internal beams assume two adjacent corner panels. Loads are applicable as a udl over 75% of the beam's length. Self weight used accounts for 5:1 slope to ribs, solid edges as described above and topping as inferred.
CONCRETE	C35, 24 kN/m³, 20 mm aggregate.
FIRE & DURABILITY	Fire resistance 1 hour; mild exposure.
DESIGN	Design based on corner panels. Single span (both ways) assumes torsional restraint.

SINGLE SPAN, m	**7.2**	**8.1**	**9.0**	**9.9**	**10.8**	**11.7**	**12.6**	**13.5**	**14.4**
THICKNESS, mm									
IL = 2.5 kN/m²	325	325	350	375	435	525	565		
IL = 5.0 kN/m²	325	325	365	425	470	535			
IL = 7.5 kN/m²	325	350	425	440	525				
IL = 10.0 kN/m²	325	375	425	470	540				
ULTIMATE LOAD TO SUPPORTING BEAMS, INTERNAL (END), kN/m									
IL = 2.5 kN/m²	n/a (29)	n/a (32)	n/a (38)	n/a (45)	n/a (49)	n/a (59)	n/a (69)		
IL = 5.0 kN/m²	n/a (38)	n/a (43)	n/a (52)	n/a (58)	n/a (68)	n/a (76)			
IL = 7.5 kN/m²	n/a (48)	n/a (56)	n/a (64)	n/a (72)	n/a (83)				
IL = 10.0 kN/m²	n/a (57)	n/a (69)	n/a (76)	n/a (89)	n/a (99)				
REINFORCEMENT, kg/m² (kg/m³)									
IL = 2.5 kN/m²	8 (24)	12 (35)	15 (44)	19 (51)	18 (42)	16 (31)	21 (38)		
IL = 5.0 kN/m²	11 (33)	18 (56)	20 (53)	17 (40)	21 (45)	22 (40)			
IL = 7.5 kN/m²	15 (45)	19 (55)	16 (37)	21 (48)	20 (37)				
IL = 10.0 kN/m²	19 (57)	20 (53)	20 (46)	22 (47)	23 (42)				

MULTIPLE/TWO SPAN, m	**7.2**	**8.1**	**9.0**	**9.9**	**10.8**	**11.7**	**12.6**	**13.5**	**14.4**
THICKNESS, mm									
IL = 2.5 kN/m²	325	325	325	325	350	425	450	525	565
IL = 5.0 kN/m²	325	325	325	325	350	425	450	525	565
IL = 7.5 kN/m²	325	325	325	335	375	425	475	535	
IL = 10.0 kN/m²	325	325	325	350	425	450	525	575	
ULTIMATE LOAD TO SUPPORTING BEAMS, INTERNAL (END), kN/m									
IL = 2.5 kN/m²	66 (23)	75 (26)	83 (29)	91 (32)	106 (37)	122 (43)	139 (49)	158 (56)	184 (65)
IL = 5.0 kN/m²	89 (31)	100 (35)	111 (39)	122 (43)	139 (49)	158 (55)	177 (62)	200 (70)	228 (80)
IL = 7.5 kN/m²	111 (39)	124 (44)	138 (49)	154 (54)	180 (63)	193 (68)	226 (79)	244 (86)	
IL = 10.0 kN/m²	133 (47)	149 (52)	166 (58)	189 (66)	212 (74)	237 (83)	264 (93)	300 (105)	
REINFORCEMENT, kg/m² (kg/m³)									
IL = 2.5 kN/m²	5 (16)	7 (20)	8 (25)	10 (32)	13 (37)	12 (27)	15 (32)	14 (27)	17 (30)
IL = 5.0 kN/m²	7 (21)	9 (26)	11 (34)	15 (46)	19 (55)	16 (37)	20 (44)	19 (36)	22 (39)
IL = 7.5 kN/m²	8 (26)	11 (33)	14 (44)	19 (58)	21 (55)	20 (48)	22 (47)	23 (43)	
IL = 10.0 kN/m²	10 (31)	13 (40)	18 (55)	21 (59)	18 (43)	22 (50)	21 (41)	24 (42)	

DESIGN NOTES *a = q_k > 1.25 g_k b = q_k > 5 kN/m² e = designed links may be required in ribs*

	7.2	8.1	9.0	9.9	10.8	11.7	12.6	13.5	14.4
IL = 2.5 kN/m²					e	e	e	e	e
IL = 5.0 kN/m²			e	e	e	e	e	e	e
IL = 7.5 kN/m²	ab	abe	abe	abe	be	be	be	be	
IL = 10.0 kN/m²	abe	abe	abe	abe	abe	abe	be	be	

VARIATIONS TO DESIGN ASSUMPTIONS: differences in slab thickness for a characteristic imposed load (IL) of 5.0 kN/m²

Thickness, mm

Span, m	**7.2**	**8.1**	**9.0**	**9.9**	**10.8**	**11.7**	**12.6**
2 hrs fire, 115 topping	340	340	340	340	440	440	540
4 hrs 150 rib & topping	375	375	475	475	475	575	575
Moderate exposure	325	325	339	425	435	525	
Severe exposure (C40)	325	325	345	425	440	535	

Rectangular panels: economic thickness, mm

Long span, m	**12.6**	**13.5**	**14.4**	**15.3**	**16.2**	**17.1**	**18.0**
Short span = 9.0 m	325	325	325	325	325	325	325
Short span = 9.9 m	325	325	335	345	350	355	360
Short span = 10.8 m	355	365	375	425	425	425	425
Short span = 11.7 m	425	425	425	425	435	450	460
Short span = 12.6 m	450	450	455	475	525	525	525
Short span = 13.5 m		525	525	525	535	550	575