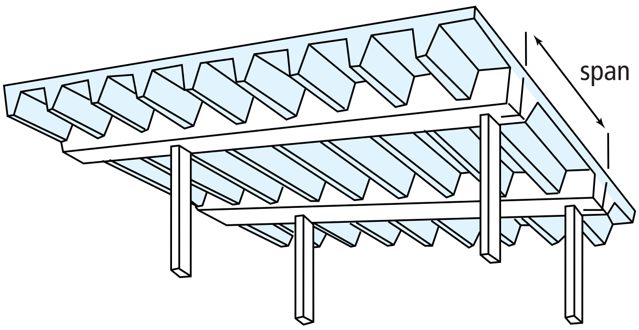
Ribbed slabs

(One-way joists)



Introducing voids to the soffit of a slab reduces dead weight and increases the efficiency of the concrete section. A slightly deeper section is required but these stiffer floors facilitate longer spans and provision of holes. Economic in the range 8 to 12 m.

The saving of materials tends to be offset by some complication in formwork. The advent of expanded polystyrene moulds has made the choice of trough profile infinite and largely superseded the use of standard T moulds. Ribs should be at least 125 mm wide to suit reinforcement detailing.

The chart and data assume line support (ie. beam or wall) and bespoke moulds.

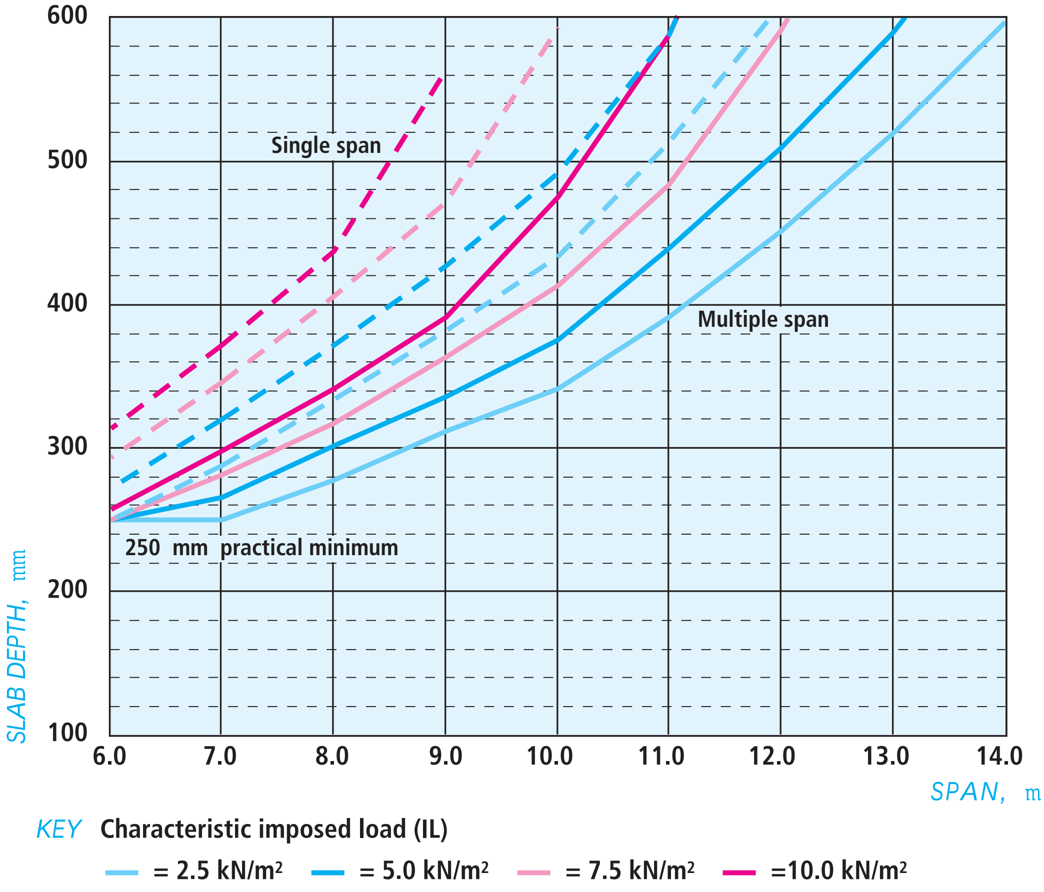
ADVANTAGES

- Medium to long spans
- Lightweight
- Holes in topping easily accommodated
- Large holes can be accommodated
- Profile may be expressed architecturally, or used for heat transfer in passive cooling

DISADVANTAGES

- Higher formwork costs than for other slab systems
- Slightly greater floor thicknesses
- Slower

SPAN:DEPTH CHART



DESIGN ASSUMPTIONS

SUPPORTED BY	BEAMS. Refer to beam charts and data to estimate beam sizes and reinforcement.
DIMENSIONS	Square panels, minimum of three slab spans. Ribs 150 mm wide @ 750 mm cc. Topping 100 mm. Moulds of bespoke depth. Rib/solid intersection at beam span/7 from centreline of internal support, and at span/9 from end support.
REINFORCEMENT	Maximum bar sizes in ribs: 2T25B, 2T20T (in top of web) and R8 links. 25 mm allowed for A142 mesh (@ 0.12%) in topping. 10% allowed for wastage and laps. f_s may have been reduced.
LOADS	A superimposed dead load (SDL) of 1.50 kN/m² (for finishes, services, etc.) is included. Ultimate loads assume elastic reaction factors of 1.1 to internal beams and 0.5 to end beams. Self weight used accounts for 10 degree slope to ribs and solid ends as described above.
CONCRETE	C35, 24 kN/m³, 20 mm aggregate.
FIRE & DURABILITY	Fire resistance 1 hour; mild exposure.

SINGLE SPAN, m	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**	**13.0**	**14.0**
THICKNESS, mm									
IL = 2.5 kN/m²	250	288	334	382	434	514	610	722	
IL = 5.0 kN/m²	272	320	372	428	492	588	772		
IL = 7.5 kN/m²	294	346	406	472	594				
IL = 10.0 kN/m²	314	372	438	564					
ULTIMATE LOAD TO SUPPORTING BEAMS, INTERNAL (END), kN/m									
IL = 2.5 kN/m²	n/a (35)	n/a (43)	n/a (52)	n/a (61)	n/a (72)	n/a (87)	n/a (105)	n/a (126)	
IL = 5.0 kN/m²	n/a (48)	n/a (58)	n/a (70)	n/a (83)	n/a (97)	n/a (116)	n/a (146)		
IL = 7.5 kN/m²	n/a (61)	n/a (74)	n/a (88)	n/a (104)	n/a (126)				
IL = 10.0 kN/m²	n/a (74)	n/a (89)	n/a (106)	n/a (129)					
REINFORCEMENT, kg/m² (kg/m³)					*Slab only, add mesh and beam reinforcement*				
IL = 2.5 kN/m²	11 (42)	12 (41)	11 (34)	11 (30)	12 (27)	12 (23)	12 (20)	12 (17)	
IL = 5.0 kN/m²	11 (42)	11 (36)	11 (31)	12 (27)	12 (24)	12 (20)	12 (16)		
IL = 7.5 kN/m²	11 (39)	12 (34)	12 (29)	12 (25)	12 (20)				
IL = 10.0 kN/m²	11 (36)	12 (31)	12 (27)	12 (21)					

MULTIPLE SPAN, m	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**	**13.0**	**14.0**
THICKNESS, mm									
IL = 2.5 kN/m²		250	278	312	342	392	452	520	598
IL = 5.0 kN/m²	250	266	302	336	376	440	510	590	688
IL = 7.5 kN/m²	250	282	318	364	414	484	592	732	
IL = 10.0 kN/m²	258	298	342	392	476	588	730		
ULTIMATE LOAD TO SUPPORTING BEAMS, INTERNAL (END), kN/m²									
IL = 2.5 kN/m²		89 (40)	105 (48)	123 (56)	142 (65)	165 (75)	193 (88)	224 (102)	261 (119)
IL = 5.0 kN/m²	101 (46)	122 (55)	144 (65)	167 (76)	192 (87)	223 (101)	257 (117)	297 (135)	346 (157)
IL = 7.5 kN/m²	129 (59)	154 (70)	181 (82)	210 (96)	242 (110)	279 (127)	328 (149)	389 (177)	
IL = 10.0 kN/m²	156 (71)	187 (85)	219 (100)	254 (115)	297 (135)	348 (158)	411 (187)		
REINFORCEMENT, kg/m² (kg/m³)					*Slab only, add mesh and beam reinforcement*				
IL = 2.5 kN/m²		11 (45)	12 (44)	16 (51)	17 (51)	18 (46)	18 (40)	18 (35)	18 (31)
IL = 5.0 kN/m²	12 (53)	16 (59)	16 (54)	18 (53)	18 (48)	18 (41)	18 (36)	18 (31)	18 (27)
IL = 7.5 kN/m²	16 (64)	17 (60)	18 (57)	18 (50)	18 (44)	18 (38)	18 (31)	18 (25)	
IL = 10.0 kN/m²	17 (64)	17 (59)	18 (53)	18 (46)	18 (38)	18 (31)	18 (25)		

DESIGN NOTES *a = q_k > 1.25 g_k* *b = q_k > 5 kN/m²* *c = 2T20B* *d = deflection critical* *e = designed links in ribs*

	6.0	7.0	8.0	9.0	10.0	11.0	12.0	13.0	14.0
IL = 2.5 kN/m²									e
IL = 5.0 kN/m²	e			e	de	de	de	e	e
IL = 7.5 kN/m²	abe	abe	abde	abde	abe	bde	be	be	
IL = 10.0 kN/m²	abe	abe	abde	abde	abe	abe	be		

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

Fire resistance	2 hours, 150 rib & 115 topping	+5 mm	4 hours, 150 rib & topping	see below
Exposure	Moderate	+15 mm	Severe, C40 concrete	see below
Standard moulds	T moulds	see below	NB: T moulds 125 mm ribs @ 600 cc	

Thickness, mm	**Span, m**	**6.0**	**7.0**	**8.0**	**9.0**	**10.0**	**11.0**	**12.0**
	4 hrs,150 rib & topping	258	300	338	386	442	534	600
	Severe, C40 concrete	248	288	326	366	416	494	576
	T2 mould, 175 deep	265	291	305	347			
	T3 mould, 250 deep			340	340	382		
	T4 mould, 325 deep				415	415	450	
	T5 mould, 400 deep					490	490	524