

Practical, Effective and Strong

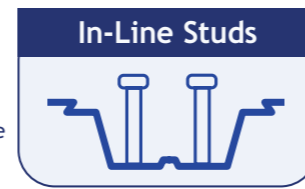
Designing a steel decking profile for composite action is a delicate balance between conflicting ideals. Ribdeck AL has been proportioned so that the concrete is used effectively to satisfy the demand for lightweight construction whilst optimising the amount of concrete in those areas where it is most needed.

Design for Fire

Ribdeck AL has been designed to minimise the intrusion of the profile into the slab whilst still providing a practical level of stiffness during the critical construction stage. At only 50mm high, and with a relatively high trough to peak width ratio, composite floor slabs utilising Ribdeck AL can achieve the level of thermal insulation required for fire ratings of up to 4 hours. This is accomplished with shallower overall slab depths than can be realised using most other trapezoidal decking profiles available around the world.

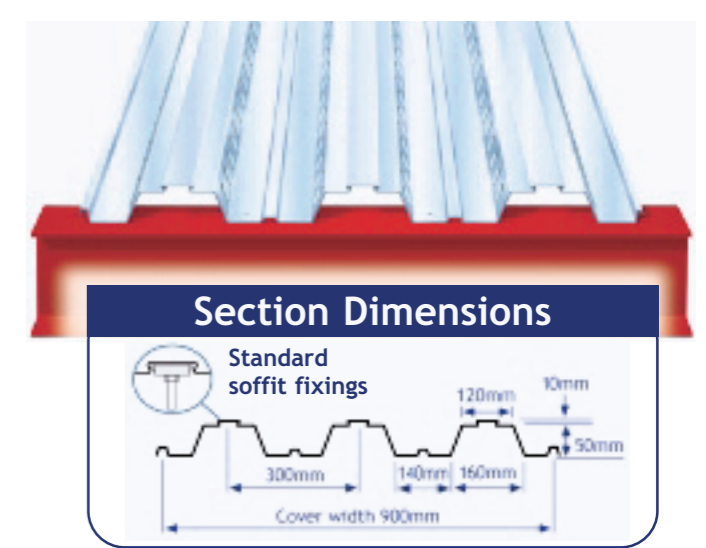
Composite Beam Design

For beams to be designed compositely it is necessary to provide a means of transferring shear forces between the steel support beams and concrete floor slabs. This shear transfer is most commonly achieved using through-deck welded shear studs. Ribdeck AL has been designed to allow shear studs welded individually or in pairs in each trough of the profile to achieve the maximum strength permitted by both British and European design codes. The proportions of the decking allow two studs to be welded in-line in each trough, a distinct advantage over other profiles. This is important when considering the design of narrow flange support beams that are commonly found where modern long span, fabricated steel sections are used.



Services Suspension

Ribdeck AL was the first of the modern generation of trapezoidal composite floor deck profiles to incorporate a suspension fixing system in the top flange. The flange is shaped to receive simple-to-fit suspension nuts that can be installed or removed at any time during the life of the structure. The wedge shaped nut used in Ribdeck AL is fully interchangeable with those provided for the other Richard Lees Steel Decking trapezoidal profiles, Ribdeck 80 and Ribdeck E60.



Section Properties (per metre width)					
Gauge mm	Self Weight		Area mm ²	Inertia cm ⁴	Y _{NA} mm
	kg/m ²	kN/m ²			
0.9	9.5	0.093	1,171	67.4	28.0
1.0	10.5	0.103	1,301	75.2	28.0
1.2	12.6	0.124	1,570	90.9	28.0

Ribdeck AL Span/Load table - Normal weight concrete

Support Condition	Slab Depth (mm)	Concrete Volume (m ³ /m ²)	Maximum Permissible Spans (m)												
			0.9mm GAUGE IMPOSED LOAD (kN/m ²)				1.0mm GAUGE IMPOSED LOAD (kN/m ²)				1.2mm GAUGE IMPOSED LOAD (kN/m ²)				
			*	5.0	6.7	10.0	*	5.0	6.7	10.0	*	5.0	6.7	10.0	
SINGLE	120	0.095	2.96	2.96	2.96	2.95	3.06	3.06	3.06	3.06	3.23	3.23	3.23	3.23	SINGLE
	130	0.105	2.89	2.89	2.89	2.89	2.98	2.98	2.98	2.98	3.15	3.15	3.15	3.15	
	140	0.115	2.81	2.81	2.81	2.81	2.91	2.91	2.91	2.91	3.07	3.07	3.07	3.07	
	150	0.125	2.75	2.75	2.75	2.75	2.84	2.84	2.84	2.84	3.00	3.00	3.00	3.00	
	175	0.150	2.61	2.61	2.61	2.61	2.70	2.70	2.70	2.70	2.85	2.85	2.85	2.85	
MULTIPLE	120	0.095	3.28	3.28	3.28	2.95	3.54	3.54	3.54	3.08	3.81	3.81	3.81	3.32	MULTIPLE
	130	0.105	3.20	3.20	3.20	3.14	3.44	3.44	3.44	3.27	3.72	3.72	3.72	3.52	
	140	0.115	3.12	3.12	3.12	3.12	3.36	3.36	3.36	3.36	3.63	3.63	3.63	3.63	
	150	0.125	3.05	3.05	3.05	3.05	3.29	3.29	3.29	3.29	3.55	3.55	3.55	3.55	
	175	0.150	2.88	2.88	2.88	2.88	3.12	3.12	3.12	3.12	3.37	3.37	3.37	3.37	
PROPPED	120	0.095	4.20	3.94	3.40	2.75	4.20	4.10	3.54	2.87	4.20	4.20	3.80	3.10	PROPPED
	130	0.105	4.55	4.14	3.58	2.90	4.55	4.30	3.72	3.02	4.55	4.55	4.00	3.26	
	140	0.115	4.90	4.34	3.75	3.05	4.90	4.51	3.90	3.18	4.90	4.83	4.19	3.42	
	150	0.125	5.25	4.53	3.92	3.19	5.25	4.70	4.08	3.32	5.25	5.02	4.37	3.58	
	175	0.150	5.74	4.94	4.31	3.52	6.13	5.12	4.47	3.66	6.13	5.47	4.79	3.94	
200	0.175	5.47	5.30	4.65	3.82	5.92	5.49	4.82	3.97	6.41	5.86	5.16	4.26		

* Denotes decking used as shuttering only.

Notes:

- Spans shown assume clear span +100mm to the centreline of supports.
- Designs are fully in accordance with BS 5950: Parts 4 & 6.
- The dead weight of the slab has been included in the development of the spans shown. However, consideration should be given to finishes, partitions, walls, etc. when reading from the table.
- Based upon concrete densities at wet stage: normal weight concrete 2400 kg/m³, lightweight concrete 1900 kg/m³.

Ribdeck AL Span/Load table - Lightweight concrete

Support Condition	Slab Depth (mm)	Concrete Volume (m ³ /m ²)	Maximum Permissible Spans (m)												
			0.9mm GAUGE IMPOSED LOAD (kN/m ²)				1.0mm GAUGE IMPOSED LOAD (kN/m ²)				1.2mm GAUGE IMPOSED LOAD (kN/m ²)				
			*	5.0	6.7	10.0	*	5.0	6.7	10.0	*	5.0	6.7	10.0	
SINGLE	110	0.085	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75	SINGLE
	120	0.095	3.00	3.00	3.00	2.95	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	
	130	0.105	3.10	3.10	3.10	3.10	3.20	3.20	3.20	3.20	3.25	3.25	3.25	3.25	
	150	0.125	2.95	2.95	2.95	2.95	3.05	3.05	3.05	3.05	3.23	3.23	3.23	3.23	
	175	0.150	2.81	2.81	2.81	2.81	2.90	2.90	2.90	2.90	3.07	3.07	3.07	3.07	
MULTIPLE	110	0.085	3.30	3.30	3.30	2.77	3.30	3.30	3.30	2.89	3.30	3.30	3.30	3.11	MULTIPLE
	120	0.095	3.49	3.49	3.49	2.95	3.60	3.60	3.60	3.08	3.60	3.60	3.60	3.32	
	130	0.105	3.41	3.41	3.41	3.14	3.70	3.70	3.70	3.27	3.90	3.90	3.90	3.52	
	150	0.125	3.27	3.27	3.27	3.27	3.53	3.53	3.53	3.53	3.81	3.81	3.81	3.81	
	175	0.150	3.12	3.12	3.12	3.12	3.36	3.36	3.36	3.36	3.63	3.63	3.63	3.63	
PROPPED	110	0.085	3.30	3.30	3.27	2.63	3.30	3.30	3.30	2.75	3.30	3.30	3.30	2.96	PROPPED
	120	0.095	3.60	3.60	3.47	2.79	3.60	3.60	3.60	2.91	3.60	3.60	3.60	3.14	
	130	0.105	3.90	3.90	3.66	2.95	3.90	3.90	3.81	3.07	3.90	3.90	3.90	3.31	
	150	0.125	4.50	4.50	4.04	3.25	4.50	4.50	4.19	3.39	4.50	4.50	4.50	3.65	
	175	0.150	5.25	5.17	4.46	3.60	5.25	5.25	4.63	3.75	5.25	5.25	4.95	4.03	
200	0.175	5.91	5.58	4.84	3.92	6.00	5.78	5.02	4.08	6.00	6.00	5.36	4.38		

- Concrete volumes: Figures shown in the tables are nominal values based on constant slab thickness. As with all steel decks, when ordering concrete an allowance should be made for the deflected form of the soffit and for this we suggest, as guidance, -25 mm allowance for voids +span/250 for ponding.
- A span to depth ratio of 35:1 for normal weight and 30:1 for lightweight concrete is imposed in deriving the spans.
- Maximum deflections are limited to span/130 after taking account of ponding.
- Construction stage design includes a minimum allowance of 1.5kN/m² for construction loading.
- Composite slabs are designed as simply supported irrespective of the deck support configuration. A minimum crack control and distribution mesh is required over the supports in accordance with clauses 6.7, 6.8 and 6.9 of BS5950: Part 4.
- Decking is manufactured from material meeting the following specification: BS EN 10147-S350GD+Z275-N-A-C, i.e. yield strength = 350 N/mm².

Mesh sizes for Simplified Fire Designs - Normal weight concrete

Fire Rating (Hrs)	Slab Depth (mm)	Span (m) for given Imposed Load (kN/m ²)									
		A142			A193			A252			
		5.0	6.7	10.0	5.0	6.7	10.0	5.0	6.7	10.0	
1.0	120	3.57	3.23	2.79	3.85	3.48	3.01	4.14	3.75	3.23	NORMAL WEIGHT CONCRETE
	130	3.73	3.38	2.93	4.03	3.66	3.16	4.34	3.94	3.40	
	140	3.80	3.46	3.01	4.12	3.75	3.25	4.44	4.04	3.50	
	150	3.87	3.53	3.07	4.18	3.81	3.32	4.50	4.11	3.57	
	175	--	--	--	4.32	3.96	3.47	4.65	4.26	3.73	
1.5	120	--	--	--	4.44	4.09	3.61	4.78	4.40	3.88	NORMAL WEIGHT CONCRETE
	130	3.26	2.96	2.57	3.56	3.24	2.80	3.87	3.51	3.04	
	140	3.40	3.09	2.69	3.72	3.39	2.94	4.05	3.69	3.20	
	150	3.46	3.16	2.75	3.80	3.47	3.02	4.14	3.77	3.07	
	175	--	--	--	3.92	3.59	3.15	4.26	3.91	3.42	
2.0	120	--	--	--	4.02	3.70	3.26	4.37	4.03	3.55	NORMAL WEIGHT CONCRETE
	140	3.01	2.74	2.38	3.34	3.05	2.65	3.67	3.34	2.90	
	150	3.12	2.85	2.49	3.48	3.17	2.76	3.83	3.49	3.04	
	175	--	--	--	3.58	3.28	2.88	3.95	3.62	3.17	
200	--	--	--	3.66	3.38	2.98	4.04	3.72	3.28		

Notes:

- Table is applicable for any construction where the mesh may act in tension over a supporting beam or wall (negative bending). This includes end bay conditions i.e. the concrete slab is continuous over more than one span.
- Loads shown are unfactored working loads and should include all imposed live and dead loads, excluding only the self-weight of the slab.
- An ultimate load factor of 1.0 is assumed throughout.
- indicates that the area of mesh is less than the minimum for crack control recommended in BS5950: Part 4

Mesh sizes for Simplified Fire Designs - Lightweight concrete

Fire Rating (Hrs)	Slab Depth (mm)	Span (m) for given Imposed Load (kN/m ²)									
		A142			A193			A252			
		5.0	6.7	10.0	5.0	6.7	10.0	5.0	6.7	10.0	
1.0	110	3.30	3.18	2.72	3.30	3.30	2.94	3.30	3.30	3.15	LIGHTWEIGHT CONCRETE
	120	3.60	3.37	2.88	3.60	3.60	3.12	3.60	3.60	3.36	
	130	3.88	3.50	3.01	3.90	3.80	3.26	3.90	3.90	3.52	
	150	4.03	3.65	3.15	4.37	3.96	3.41	4.50	4.27	3.68	
	175	--	--	--	4.54	4.13	3.58	4.89	4.45	3.86	
1.5	120	--	--	--	4.68	4.28	3.73	5.04	4.61	4.02	LIGHTWEIGHT CONCRETE
	130	3.35	3.01	2.58	3.60	3.31	2.83	3.60	3.60	3.08	
	140	3.52	3.17	2.73	3.87	3.49	3.00	3.90	3.81	3.27	
	150	3.64	3.30	2.85	4.01	3.63	3.13	4.38	3.96	3.42	
	175	--	--	--	4.14	3.77	3.27	4.52	4.12	3.57	
2.0	120	--	--	--	4.26	3.89	3.40	4.65	4.25	3.71	LIGHTWEIGHT CONCRETE
	130	3.18	2.87	2.47	3.55	3.20	2.75	3.90	3.53	3.03	
	150	3.33	3.02	2.61	3.73	3.38	2.91	4.12	3.73	3.22	
	175	--	--	--	3.84	3.49	3.03	4.24	3.86	3.35	
200	--	--	--	3.93	3.59	3.14	4.34	3.97	3.46		

- Mesh should satisfy the minimum elongation requirement given in BS4449: 1988.
- For conditions outside the scope of the simplified tables, including all isolated spans, consult SCI publication 56 (2nd edition) or RLS's Deckspan software.