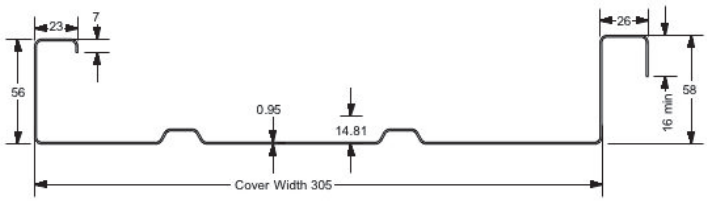
Tray-dec 300 0.95 t

Composite Slab Design Information

Tray-dec 300 - Volume and Weight		Table 22	
	Concrete	Weight of concrete (kN/m²)	
Slab Depth	Volume	Normal Weight Concrete	
(mm)	(m³/m²)	Wet	Dry
100	0.10	2.40	2.35
110	0.11	2.64	2.59
120	0.12	2.88	2.82
130	0.13	3.12	3.06
140	0.14	3.36	3.29
150	0.15	3.60	3.53
160	0.16	3.84	3.76
170	0.17	4.08	4.00
180	0.18	4.32	4.23
190	0.19	4.56	4.47
200	0.20	4.80	4.70



PLEASE NOTE:
The calculations for Tray-dec 300 in this document have been updated to the latest 'Standard' and replace those from the Tray-dec publication titled "Tray-dec 300 Specification and Design Manual".

THE TRAY-DEC 300 SYSTEM INTRODUCTION

Tray-dec NZ Ltd 'Tray-dec 300' is a specially shaped galvanised steel tray which interlocks with adjacent trays to act both as tensile reinforcement and permanent form work for concrete floor slab. The composite action of the steel and concrete produces a floor which is very strong but also light in weight.

Tray-dec 300 Section Properties (per metre width)						Table 23
Section Thickness (mm)	Design Mass (kg/m²)	Profile Weight (kN/m²)	Cross Sect Area (mm²/m	Height to Neutral Axis (mm)	Moment of Inertia (cm⁴/m)	Ultimate Moment Capacity (kNm/m)
0.75	9.90	0.097	1219.69	14.70	51.99	7.08
0.95	12.54	0.123	1545.74	14.81	65.96	9.19

Note :- The height of the neutral axis is taken from the under side of the steel deck.

Tray-dec 300' retains all the features which made the original 'Tray-dec' so attractive.

- Flat soffit - aesthetically pleasing appearance.
- Approved 3 hour fire rating.
- Suitable for use in buildings constructed of steel, concrete or masonry.

with these unique cost saving features:

- uniform slab thickness
  - minimum quantity of concrete required for given floor loading and fire rating.
  - minimises total height of structure.
- No end closures required.
- No crimping, drilling or riveting required.
- Easily manhandled - saves crane time.

In addition, 'Tray-dec 300' *now offers further cost saving features:*

- Increased strength and span capability.
- Temporary propping centres greatly increased.
- Up to 3.0 metre intermediate beam spacing with no props.

MATERIAL SPECIFICATIONS

Tray-dec 300 is cold rolled from high strength zinc coated steel coil conforming to NZS 3441:1978, base grade G500 and coating class Z275. This steel has a minimum tensile strength of 550 MPa and a minimum coating mass of 275 g/m^2. The standard base metal thickness is 0.75 mm.

Tray-dec 300 can be supplied in any length, subject to the limitations of available transport. The maximum recommended length is 12 m. The length tolerances are -0, +10 mm.
Thus with Tray-dec 300, an extremely cost-effective means is available of achieving any desired fire rating. The conventional options remain open to the designer of applying a fire resistant spray to the under side of the Tray-dec 300 or installing a suspended fire resistant ceiling

TRAY-DEC 300 INSTALLATION

Temporary propping

Where the designed span for the composite slab exceeds the limits for the steel trays, temporary propping must be installed, at the construction stages. Note that temporary propping is considered as scaffolding. Ref. ***Dept of Labour Guidelines***
The propping requirements specified in this design manual assume unsupported areas of Tray-dec are not overloaded e.g. by impact or heaping of concrete. Some degree of deflection is expected between propping lines . Where a fairer ceiling finish is required, it is recommended that additional propping lines are installed. For specific recommendations concerning propping for your project, please consult Tray-dec NZ Ltd. The trays should be supported on stiff timber or steel bearers with minimum 100 mm width on the upper face to avoid damage to the trays when concrete is poured.

The temporary props to support these bearers must be designed to be strong enough and sufficiently stiff to support in a stable manner both the weight of wet concrete and temporary construction loads. An engineer should be consulted on the appropriate sizes.

REMOVAL OF TEMPORARY PROPPING

Do not remove temporary propping until the concrete has reached at least 70% of its design strength. (Approx 28 days)

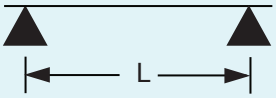
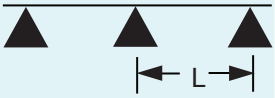
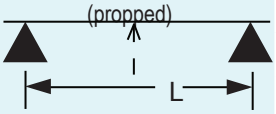
TRAY-DEC LAYING

The ends of the trays must overlap their bearing supports by at least 50 mm in every case. Note that the end bearing length may have to be increased above this figure if there will be heavy construction loads. The trays must be laid carefully in accordance with this manual and the design engineer's drawings.
Place the full width tray at one side of the area to be covered so that it overlaps by at least 50 mm on to both side end supports.
The punched web side of the tray must be laid on the side support. Now hold the next tray by its plain web so that it hangs vertically at right angles to the first tray.
Engage the punched fixing tabs with the plain web of the first tray, then rotate through 90 degrees away from the first tray until the two lie neatly side by side.
Check all punched tabs are engaged with the lip of the plain web of the first tray.

Repeat the process for the third and subsequent trays. The last tray to be to be laid may be a part tray width tray ("B" section) but should still overlap the end support by 50 mm. Never start laying with a B section. Where slab widths are not an exact multiple of the 305 width of a tray a special section is fabricated to complete the coverage.
Where trays are to be joined end to end, the joint must be over a beam support. Where practicable, the ends of the trays should be butted up hard against one another. The webs must be carefully aligned across the joint.
In this situation it is recommended the trays are secured immediately after installation by fastening them to the support.
In steel frame construction use 4 mm dia, power actuated drive pins, self tapping screws or shear connectors where the latter are required by the design engineer. Nailing direct to the support is an alternative for concrete or masonry beams.

Tray-dec 300 *Composite Properties per metre width of slab* **t = 0.95 mm** Table 24

Modular Ratio	Slab Depth	Composite Slab Weight	Moment Capacity	Effective Depth					Ic + Iuc/2
	D		Mcs	ds	jd	a	Ic	Iuc	Ina
n	mm	kPa	kNm	mm	mm	mm	10^6 x mm^4	10^6 x mm^4	10^6 x mm^4
10	100	2.43	53.07	85.19	66.02	38.34	5.64	9.78	7.71
	110	2.71	59.30	95.19	73.77	42.84	7.29	12.81	10.05
	120	2.95	65.53	105.19	81.52	47.34	9.30	16.43	12.86
	130	3.18	71.76	115.19	89.27	51.84	11.63	20.66	16.15
	140	3.42	77.98	125.19	97.02	56.34	14.59	25.57	20.08
	150	3.65	84.73	135.19	105.42	59.54	17.98	31.20	24.59
	160	3.89	92.77	145.19	115.42	59.54	21.91	37.59	29.75
	170	4.03	100.81	155.19	125.42	59.54	26.44	44.80	35.62
	180	4.36	108.85	165.19	135.42	59.54	31.62	52.86	42.24
	190	4.50	116.89	175.19	145.42	59.54	37.49	61.83	49.66
	200	4.83	124.92	185.19	155.42	59.54	44.10	71.75	57.93
18	100	2.43	53.07	85.19	66.02	38.34	4.54	6.26	5.40
	110	2.71	59.30	95.19	73.77	42.84	5.79	8.13	6.96
	120	2.95	65.53	105.19	81.52	47.34	7.29	10.36	8.82
	130	3.18	71.76	115.19	89.27	51.84	9.05	12.96	11.01
	140	3.42	77.98	125.19	97.02	56.34	11.11	15.97	13.54
	150	3.65	84.73	135.19	105.42	59.54	13.49	19.41	16.45
	160	3.89	92.77	145.19	115.42	59.54	16.21	23.30	19.76
	170	4.03	100.81	155.19	125.42	59.54	19.30	27.68	23.49
	180	4.36	108.85	165.19	135.42	59.54	22.79	32.56	27.68
	190	4.50	116.89	175.19	145.42	59.54	26.71	37.98	32.34
	200	4.83	124.92	185.19	155.42	59.54	31.07	43.96	37.51

Span (n10) Clear span + 100 mm	Props	Slab Depth (mm)	Max Span (m)	Max Defl (mm)	Span (m)	Defl (mm)	Span (m)	Defl (mm)	Span (m)	Defl (mm)	Limit B&C 1.5	Span Ratio	L/130 (mm)
Single span 		100	3.00	21	2.30	7	2.00	4	2.00	4		30.0	23
		110	3.10	27	2.30	8	1.90	4	1.90	4		28.2	24
		120	3.10	29	2.30	8	1.90	4	1.90	4		25.8	24
		130	3.00	27	2.20	7	1.90	4	1.90	4		23.1	23
		140	3.00	29	2.20	8	1.90	4	1.90	4		21.4	23
		150	2.90	27	2.20	9	1.80	4	1.80	4		19.3	22
		160	2.90	28	2.10	7	1.80	4	1.80	4		18.1	22
		170	2.90	30	2.10	8	1.80	4	1.80	4		17.1	22
		180	2.80	27	2.00	7	1.70	4	1.70	4		15.6	22
		190	2.80	29	2.00	7	1.70	4	1.70	4		14.7	22
		200	2.80	30	2.00	8	1.70	4	1.70	4		14.0	22
Multiple span 		100	3.50	16	3.00	9	2.50	4	2.50	4	1.22	35.0	27
		110	3.70	22	2.80	7	2.50	4	2.50	4	1.42	33.6	28
		120	3.60	22	2.80	8	2.40	4	2.40	4	1.42	30.0	28
		130	3.50	21	2.70	7	2.40	4	2.40	4	1.42	26.9	27
		140	3.40	19	2.70	8	2.30	4	2.30	4	1.42	24.3	26
		150	3.30	18	2.70	8	2.30	4	2.30	4	1.41	22.0	25
		160	3.30	19	2.62	8	2.26	4	2.20	4	1.48	20.6	25
		170	3.20	18	2.60	8	2.20	4	2.20	4	1.46	18.8	25
		180	3.10	17	2.60	8	2.20	4	2.20	4	1.44	17.2	24
		190	3.00	15	2.50	7	2.10	4	2.10	4	1.42	15.8	23
		200	3.00	16	2.50	8	2.10	4	2.10	4	1.47	15.0	23
Single span (propped) 	1	100	3.50	1							0.49	35.0	27
	1	110	3.80	2							0.59	34.5	29
	1	120	4.20	3							0.72	35.0	16
	1	130	4.60	4							0.87	35.4	18
	1	140	4.90	5							1.01	35.0	19
	1	150	5.20	7							1.16	34.7	20
	1	160	5.60	11							1.36	35.0	22
	1	170	5.90	14							1.54	34.7	23
	2	180	6.30	4							0.97	35.0	24
	2	190	6.60	5							1.08	34.7	25
	2	200	6.90	6							1.20	34.5	27

** Clear span + 100*

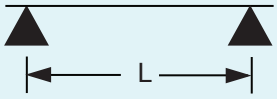
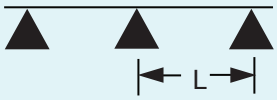
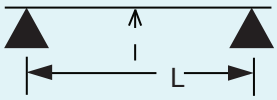
At end supports, fasteners as described above, should be placed in each tray adjacent to the rib.
Where the trays are used as a work platform during construction, care must be taken not to overload them. Timber boards should be used to distribute loads for walkways and work areas, especially when placing wet concrete. Penetration for vertical piping shafts etc. are made at his stage.

Reinforcement around openings in the floor must be placed in accordance with the detail provided by the design engineer. Secondary and fire emergency reinforcement is easily installed by laying the appropriate mesh or bars on the top of the ribs.
The sheets of mesh should be overlapped and tied to ensure continuity in all directions.

cont. page 27

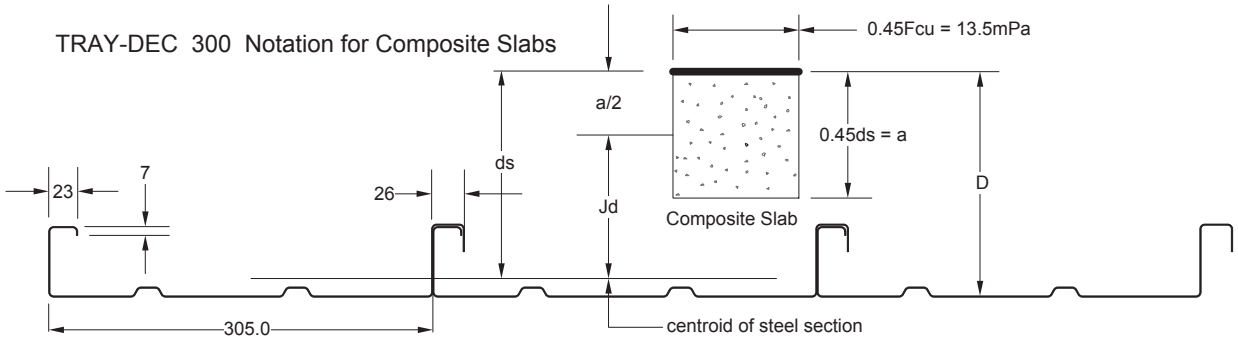
Tray-dec 300 Composite Span tables

t = 0.95 | Table 26

Support Condition	Slab Depth (mm)	30 Mpa concrete n=10 Imposed Load (kPa) 0 m	3.5 m	5 m	10 m	30 Mpa concrete n=18 Imposed Load (kPa) 0 m	3.5 m	5 m	10 m	BM kNm	L/300	n=10 Span Ratio	n=18 Span Ratio
Single span 	100	3.00	3.00	3.00	2.90	2.90	2.90	2.90	2.60	19.2	10.0	30.0	29.0
	110	3.10	3.10	3.10	2.80	3.10	3.10	3.10	2.90	18.1	10.3	28.2	28.2
	120	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.00	22.6	10.3	25.8	25.8
	130	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	21.4	10.0	23.1	23.1
	140	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	21.7	10.0	21.4	21.4
	150	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	20.6	9.7	19.3	19.3
	160	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	20.9	9.7	18.1	18.1
	170	2.90	2.90	2.90	2.90	2.90	2.90	2.90	2.90	21.2	9.7	17.1	17.1
	180	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	20.0	9.3	15.6	15.6
	190	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	20.3	9.3	14.7	14.7
	200	2.80	2.80	2.80	2.80	2.80	2.80	2.80	2.80	20.5	9.3	14.0	14.0
Multiple span 	100	3.50	3.50	3.50	3.00	3.50	3.50	3.50	3.00	20.6	11.7	35.0	35.0
	110	3.70	3.70	3.70	3.30	3.70	3.70	3.70	3.30	25.3	12.3	33.6	33.6
	120	3.60	3.60	3.60	3.60	3.60	3.60	3.60	3.60	30.5	12.0	30.0	30.0
	130	3.50	3.50	3.50	3.50	3.50	3.50	3.50	3.50	29.3	11.7	26.9	26.9
	140	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	28.0	11.3	24.3	24.3
	150	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	26.7	11.0	22.0	22.0
	160	3.30	3.30	3.30	3.30	3.30	3.30	3.30	3.30	27.1	11.0	20.6	20.6
	170	3.20	3.20	3.20	3.20	3.20	3.20	3.20	3.20	25.8	10.7	18.8	18.8
	180	3.10	3.10	3.10	3.10	3.10	3.10	3.10	3.10	24.6	10.3	17.2	17.2
	190	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	23.3	10.0	15.8	15.8
	200	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	23.6	10.0	15.0	15.0
Single span (props removed) 	100	3.50	3.50	3.50	3.00	3.50	3.50	3.50	3.00	20.6	11.7	35.0	35.0
	110	3.85	3.85	3.85	3.30	3.85	3.80	3.80	3.30	25.3	12.8	35.0	35.0
	120	4.20	4.20	4.20	3.60	4.20	4.10	4.00	3.50	30.6	14.0	35.0	35.0
	130	4.55	4.55	4.55	4.00	4.20	4.20	4.20	4.00	38.4	15.2	35.0	32.3
	140	4.90	4.90	4.90	4.30	4.90	4.60	4.50	4.20	45.1	16.3	35.0	35.0
	150	5.30	5.30	5.30	4.60	5.10	4.80	4.70	4.40	52.5	17.7	35.3	34.0
	160	5.60	5.60	5.60	4.80	5.30	5.00	4.90	4.60	58.1	18.7	35.0	33.1
	170	6.00	6.00	5.90	4.90	5.40	5.20	5.00	4.80	61.5	20.0	35.3	31.8
	180	6.30	6.30	6.10	5.10	5.70	5.50	5.30	5.10	67.6	21.0	35.0	31.7
	190	6.70	6.50	6.40	5.30	5.50	5.00	4.80	5.40	74.1	22.3	35.3	28.9
	200	7.00	6.80	6.60	5.40	5.70	5.60	5.60	5.50	78.1	23.3	35.0	28.5

* clear span + 100 mm

TRAY-DEC 300 Notation for Composite Slabs



Negative reinforcing should be placed in accordance with the requirements of the design engineer. However, such reinforcing must extend past one quarter of the clear span on both sides of interior supports.
Prior to placing the concrete, the trays are to be clean, dry, free of contaminants such as oil or grease and cleared of miscellaneous construction debris.

The concrete used must be ready mixed HIGH GRADE made and placed in accordance with NZS 3109:1987. Concrete must not be dumped on the trays in a heap as this will cause overloading and may result in buckling of the trays. Pour the concrete on progressively, spreading it at the same time. Compact the concrete using a vibrator.

(*Compacting by hand is not recommended)*

TRAY-DEC 300 FEATURES

Tray-dec 300 continues the unique feature of a flat under side where a simple, inexpensive coating system will provide a visually pleasing ceiling finish.
There is no need for an expensive suspended ceiling. As a consequence overall floor thickness can also be reduced, leading to a reduced height and cost of the whole structure.

The laying and installation of Tray-dec 300 section is easy and fast, saving labour costs.

The patented method of web connections does away with time consuming fastening methods such as screwing and crimping while at the same time providing a positive bond between concrete and steel.

The flat profile means end closers are not required to prevent concrete spillage around the ends of the trays - a further cost saving. The unpropped spans allowable, when pouring wet concrete on new Tray-dec 300, have more than doubled compared with the original Tray-dec.

Tray-dec 300 now out performs most other system saving propping costs.

A standard base metal thickness of 0.75 is used for all Tray-dec 300. When Tray-dec 300 floor is exposed to fire the totally embedded vertical webs will not reach extreme temperatures. Therefore, the fire emergency reinforcement required when no fire protection sprays are used can consist of steel mesh placed directly on top of the webs. When required to achieve the desired fire rating, additional longitudinal steel may be incorporated with the mesh.

The flat underside of Tray-dec 300 offers substantial labour cost savings when compared with trapezoid'al composite floor systems. This is because all the steel form work is exposed to fire, necessitating careful and time consuming positioning of the fire emergency reinforcement.