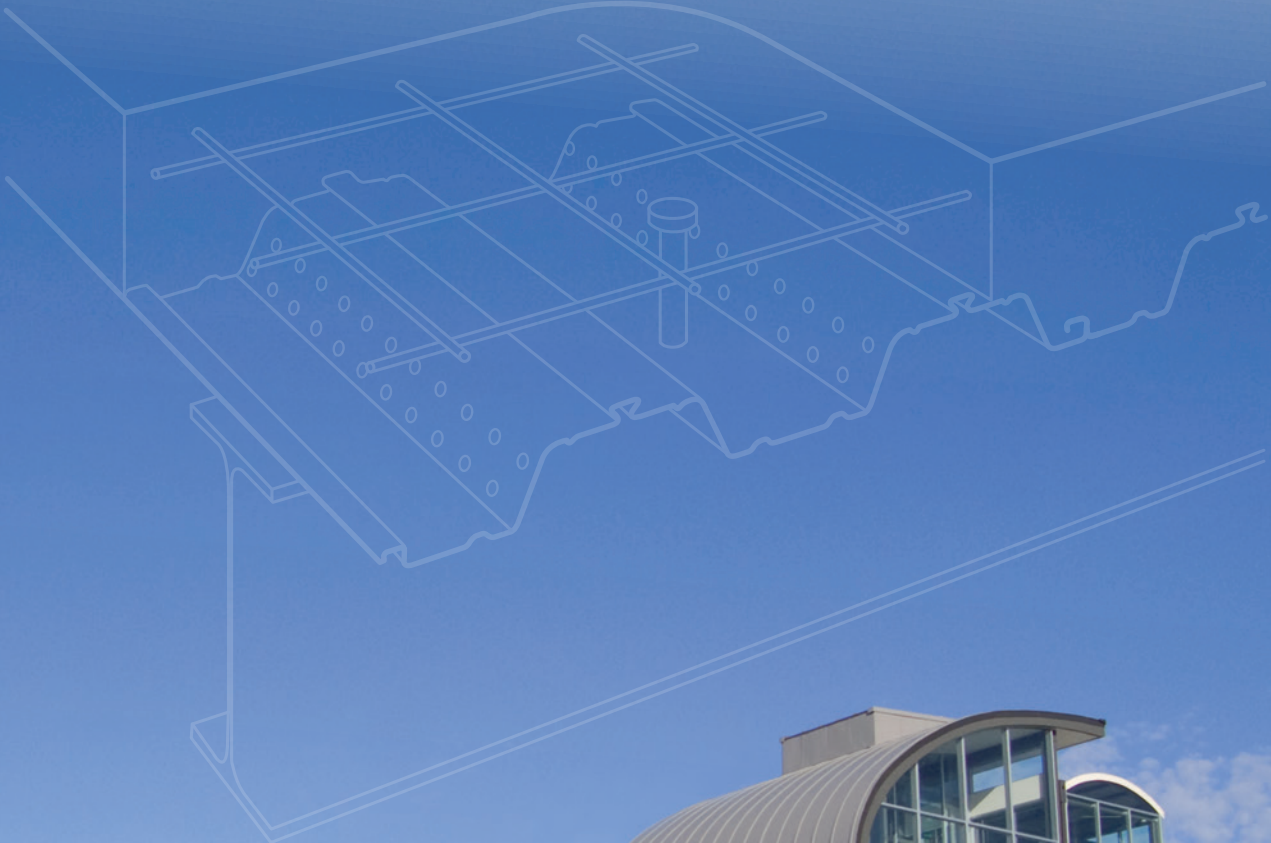


PRODUCT GUIDE

COMFLOR® 60

COMPOSITE FLOOR DECKING





Introduction

Steel & Tube is pleased to provide this ComFlor® Product Guide for your use.

ComFlor, the new generation in composite steel floor decking systems joins Steel & Tube, New Zealand's leading distributor of steel and stainless steel products and services – bringing the world of steel-framed construction closer to you.

Extensive testing has been undertaken in conjunction with the UK-based Steel Construction Institute to ensure ComFlor meets internationally recognised construction standards.

Steel & Tube are applying British research and technology along with New Zealand-made equipment and steel, to manufacture ComFlor right here in New Zealand.

Make ComFlor your first-choice flooring solution for the New Zealand building environment.

To find out more about our range of ComFlor profiles, please visit www.comflor.co.nz

To read about Steel & Tube's extensive range of products and solutions sourced and manufactured to international standards, please visit www.steelandtube.co.nz

ComFlor® is a registered trade mark used in Australia and New Zealand under licence from Tata Steel UK Limited.



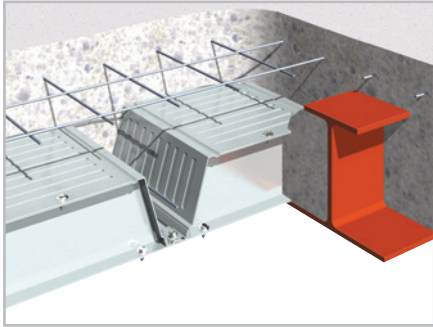


ComFlor® 60 Profile

Contents

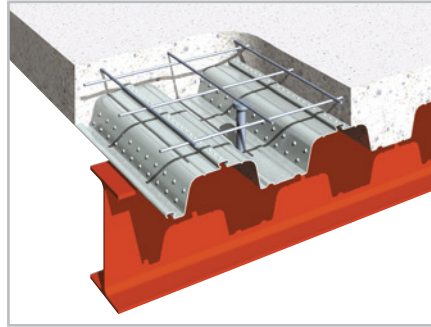
| | |
|---------------------------------|----|
| ComFlor® Product Range | 2 |
| ComFlor® 60 | 3 |
| Design Information | 4 |
| Construction Details | 13 |
| Sitework | 17 |
| Transport and Handling | 21 |
| Health and Safety | 22 |
| Composite Floor Design Software | 23 |

ComFlor® Composite Floor Decks



ComFlor® 210

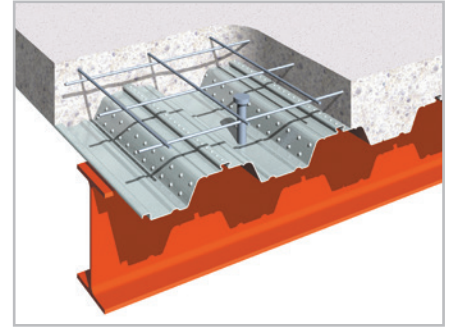
ComFlor 210 is a long span composite deck that offers unpropped spans to 5.5m and propped spans to 9m with a corresponding reduction in steelwork. When combined with asymmetric beams, the deck can be contained within the beam depth, which produces a “slim floor”, leading to reduced overall building height and savings in cladding costs, or enables an extra storey to be added for buildings of 10 storeys plus. The shape of the CF 210 deck permits services to be installed effectively within the slab depth, allowing further reductions to the floor zone.



ComFlor® 80

ComFlor 80 is a new generation composite steel deck that offers longer spans, minimised concrete volumes, and sets new benchmarks for shallow slab construction efficiencies.

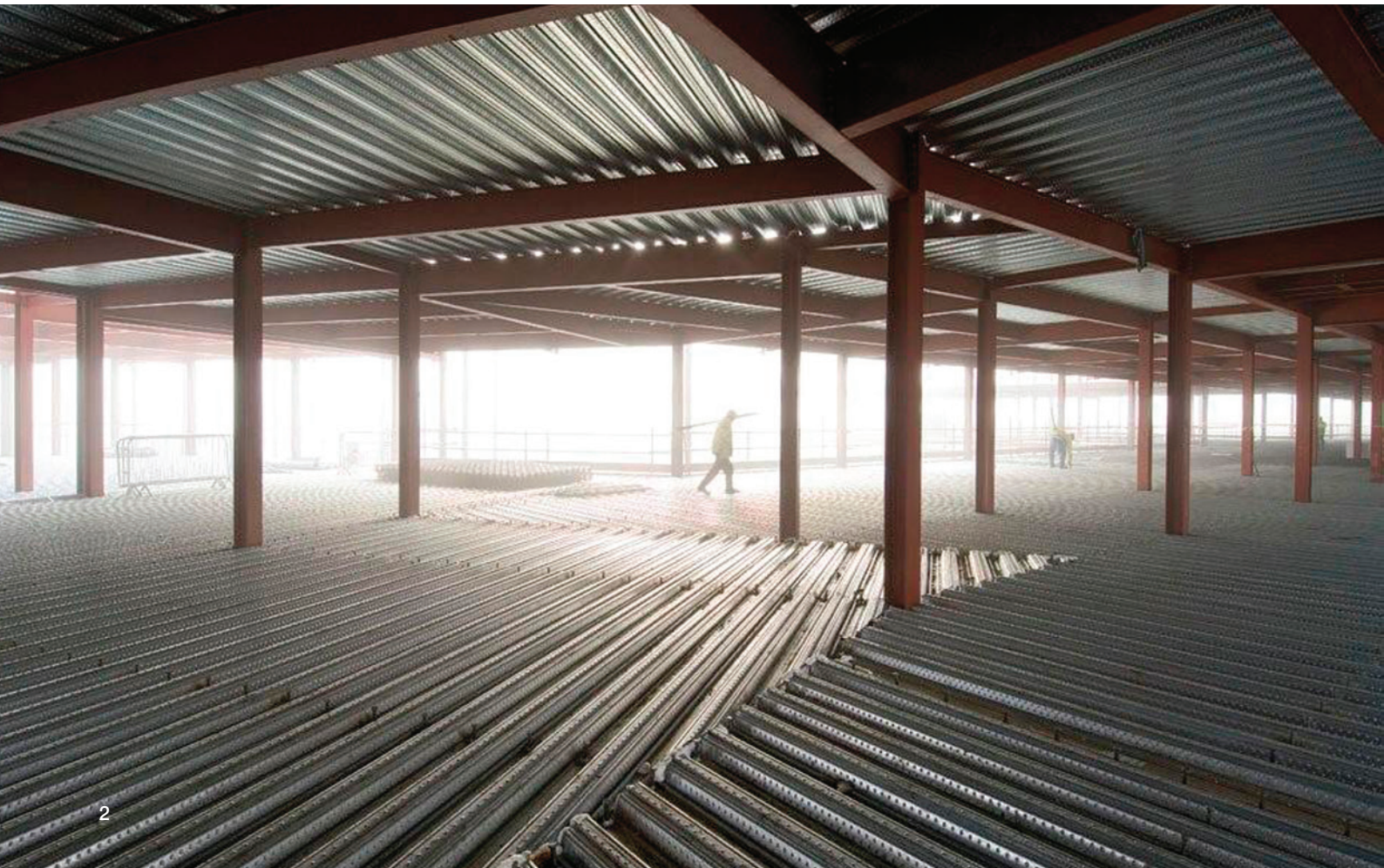
The large curved corner, combined with the use of high strength G500 galvanised steel, stretches unpropped continuous spans to 5.3 metres and propped spans to 7.1 metres. Longer spans simplify and reduce the number of support beams in the steel frame, driving down overall construction cost.



ComFlor® 60

ComFlor 60 composite floor profile offers the ultimate in lightweight steel decking for all multi-rise buildings. It combines exceptional spanning capabilities with reduced concrete usage to provide a cost-effective and attractive floor solution that is easy to install.

The state-of-the-art profile has been developed using modern roll-forming techniques. Capable of unpropped continuous spans to 4.5 metres and propped spans to 6.8 metres.



ComFlor® 60

The latest addition to the comprehensive range of ComFlor flooring profiles.

ComFlor 60 composite floor profile offers the ultimate in lightweight steel decking for all multi-rise buildings.

The state-of-the-art profile has been developed using modern roll-forming techniques, drawing on our 20 years of experience in designing advanced composite floor systems.

Engineered with a lower rib height ComFlor 60 provides excellent acoustic performance, fire protection and improved vibration dampening properties. Its profile has been specially designed with trough stiffeners and side laps positioned to guarantee centrally placed shear studs, ensuring the best possible stud performance.

The cover width is just 600mm, creating lightweight sheets that are easy to handle – delivering significant on-site safety benefits.

Proven Construction Economies

ComFlor 60 has a wide range of applications, is fast to construct, lightweight, and provides a safe working platform so that the building process can continue without delay.

Unpropped Spans of up to 4.5m

Design software is available to give unpropped double span options of up to 4.5m. Longer deck spans broaden beam spacing and reduce the number of the support beams, resulting in rapid erection and savings on the cost of the supporting steelwork.

Reduced Slab Depth and Concrete Usage

The slab depth required for fire, acoustic and structural design is minimised by the profile design. Concrete usage is further reduced by the profile shape, which eliminates an effective 33mm (ponding not considered) from the slab depth. Reduced slab depth and concrete volumes results in lower overall floor height, reduced dead loads on the structure and foundations, and savings on the total cost of the building structure.

Central Stud Placement Ensures Correct Stud Location

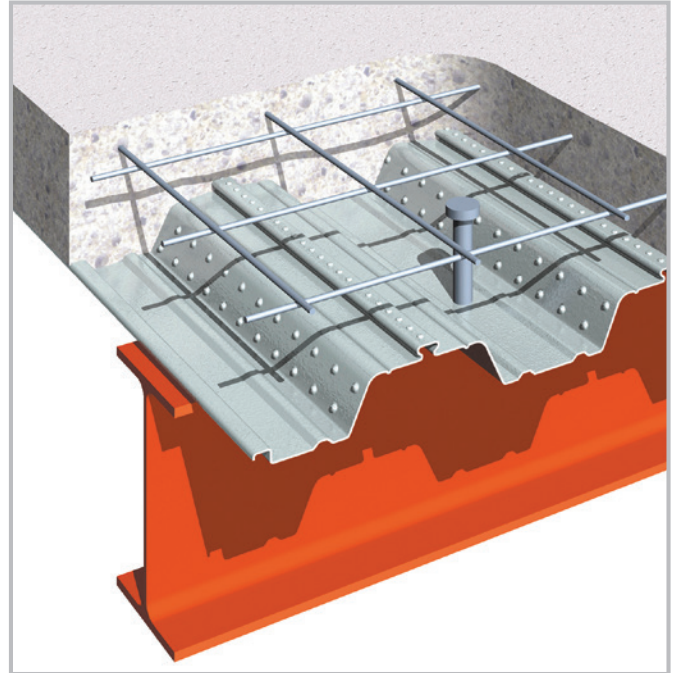
The centralised stud position ensures optimum capacity of the shear connectors, enhancing composite action, while reducing the need for site checking of stud location. The result is saving on beam weights and reduced construction risk.

Standard Shear Studs are Effective with ComFlor 60

The Steel Construction Institute confirmed in Note AD147 that the shear connectors should extend at least 35mm above the top of the main trapezoidal section. The CF 60 profile depth is 75mm including the top re-entrant section and the trapezoidal height is 60mm meaning that a standard 100mm (LBW) stud is suitable for use with the ComFlor 60 profile.

Fire Properties of the ComFlor 60 Profile

Tests have confirmed the top re-entrant dovetail has no effect on the transmission of heat energy through the slab.



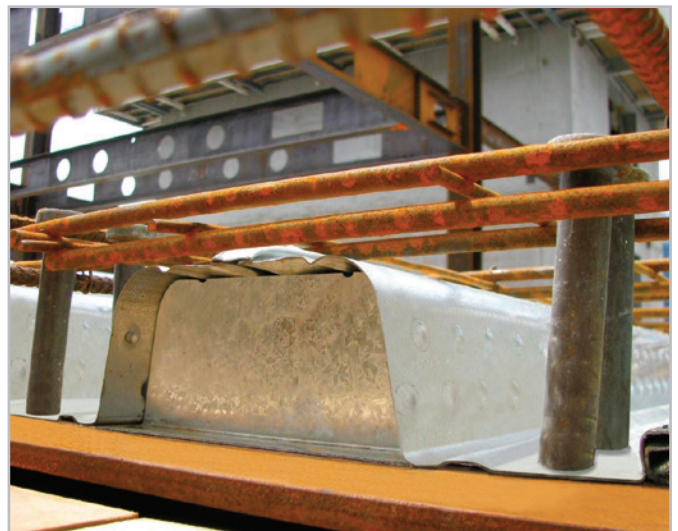
The effective profile height of 60mm results in a reduced overall slab depth being required for any particular fire rating. Fire ratings of 4 hours are possible with CF 60.

Design Software Tools

ComFlor design software is available for the design of slabs with up to 4-hour fire rating to BS 5950 or Eurocodes. The profile has been rigorously tested at Imperial College, London. The ComFlor design software has been independently produced and verified by the Steel Construction Institute in the United Kingdom.

Low Cost Ceiling and Services Hanger Systems

The dovetail re-entrant allows for quick and easy suspension of ceilings and services using low cost hanger fixings.



ComFlor[®] 60 Design Information

Design Notes

Deck Material

Zinc coated steel to AS 1397 G500, Z275, with a guaranteed minimum yield stress of 500 N/mm². Minimum zinc coating mass is 275 g/m² total including both sides.

Quick Reference Tables

The quick reference load/span and fire design table are intended as a guide for initial design. Full design can be carried out using the ComFlor software. Available free on request, or download at www.comflor.co.nz

Anti-crack Mesh

BS5950: Part 4: 1994 (BS Pt4) currently recommends that anti-crack mesh should comprise 0.1% of the gross cross-sectional slab area at the support. The EC4 recommendation is that anti-crack mesh should comprise 0.2% of slab area for unpropped spans and 0.4% of slab area for propped spans. The Steel Construction Institute, have agreed to modify the requirement with regard to anti-crack mesh, to comply with the EC4 recommendations. Accordingly, the mesh shown in the quick reference tables complies with EC4 and the ComFlor design software defaults to these values. Where EC4 mesh rules are used, the mesh may be reduced midspan – see Design Information on page 8.

The reduced BS Pt4 mesh values may still be used by overriding the default in the ComFlor design software. The mesh top cover default is 30mm in the ComFlor design software and can be overridden to suit the environmental conditions of the slab. See page 8. Mesh laps are to be 300mm for A142 mesh and 400mm for A193, A252 and A393 mesh.

A142 equates to 142mm²/m cross sectional area of the mesh. For the New Zealand equivalent mesh sizes see page 8.

Fire

Please refer to the ComFlor design software for details of composite slabs under fire conditions. The capacity of the slab in fire can be calculated using:

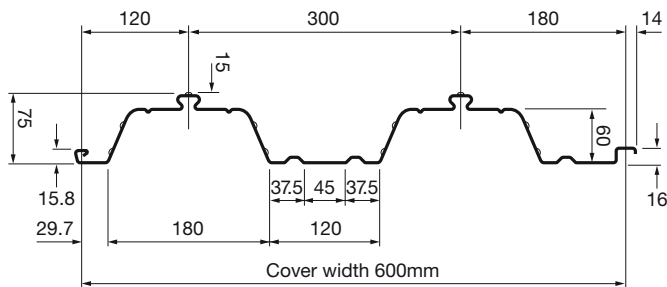
The Simple Method using standard anti-crack mesh.

For full fire engineering the Fire Engineering Method using standard mesh, plus bar reinforcement in each rib, should be used.

Technical Services

The ComFlor Technical Department offers a comprehensive advisory service for the design of composite flooring to all specifiers and users.

Should queries arise which are not covered by this literature or by the ComFlor design software, please contact us: Ph (09) 271 1780, comflor@comflor.co.nz



Volume and weight table notes:

- Deck and beam deflections (ie ponding) is not allowed for in the table.
- Deck and mesh weight is not included in the weight of concrete figures.
- Density of concrete is taken as:
Normal weight (wet) 2400 kg/m³
Normal weight (dry) 2350 kg/m³

| ComFlor 60 Composite Slab – Volume and Weight | | | |
|---|---|--|------|
| Slab Depth (mm) | Concrete Volume (m ³ /m ²) | Weight of Concrete (kN/m ²) Normal Weight Concrete | |
| | | Wet | Dry |
| 125 | 0.092 | 2.17 | 2.12 |
| 130 | 0.097 | 2.28 | 2.23 |
| 140 | 0.107 | 2.52 | 2.46 |
| 150 | 0.117 | 2.75 | 2.69 |
| 160 | 0.127 | 2.99 | 2.93 |
| 170 | 0.137 | 3.22 | 3.16 |
| 180 | 0.147 | 3.46 | 3.39 |
| 190 | 0.157 | 3.69 | 3.62 |
| 200 | 0.167 | 3.93 | 3.85 |
| 250 | 0.217 | 5.11 | 5.00 |

Section Properties (per metre width)

| Nominal Thickness (mm) | Design Thickness (mm) | Profile Weight (kN/m ²) | Area of Steel (mm ² /m) | Height to Neutral Axis (mm) | Moment of Inertia (cm ⁴ /m) | Ultimate Moment Capacity (kNm/m) | |
|------------------------|-----------------------|-------------------------------------|------------------------------------|-----------------------------|--|--|---------|
| | | | | | | Sagging | Hogging |
| 0.75 | 0.70 | | | | | (0.75 ComFlor 60 is in development at time of publication) | |
| 0.90 | 0.86 | 0.103 | 1276 | 29.6 | 92.77 | 9.30 | 7.50 |
| 1.00* | 0.96 | 0.114 | 1424 | 30.5 | 106.15 | 11.27 | 9.36 |
| 1.10* | 1.06 | 0.125 | 1572 | 31.2 | 119.53 | 13.24 | 11.21 |
| 1.20 | 1.16 | 0.137 | 1721 | 31.7 | 132.91 | 15.21 | 13.07 |

*By special order – minimum quantities apply for information shaded grey.

ComFlor[®] 60 Design Information

Quick Reference Table

Parameters assumed for quick reference span tables

Steel Grade

In New Zealand ComFlor 60 is manufactured from Grade 500 strip with a minimum yield of 500 MPa. For deck material specifications see previous page.

Spans

Effective span, L_p is the smaller of, clear span plus profile height or centre to centre of support in metres, to the nearest 50mm. A 150mm support width is used in the table.

Prop Width

Minimum of 100mm required.

Mesh

Unpropped uses 0.2% of slab cross-sectional area, propped spans 0.4%. See notes on previous page. Equivalent reinforcing bar can be substituted. Ductile steel must be used to achieve full continuity over permanent supports.

Concrete Grade

The concrete is assumed to be Grade 30 cube strength (25MPa cylinder strength) with a maximum aggregate size of 20mm. Concrete wet weight used 2400kg/m³. Modular ratio 10 used.

Construction Load

The greater of 1.5kPa or 4.5/ L_p (where L_p is the effective span between supports) is used in accordance with BS Pt4. No allowance has been made for the heaping of concrete during the casting of the slab.

Super Imposed Live Load

Loading used are estimations of those regularly required for suspended floor systems. 1.5kPa for residential, 2.5kPa for carparks/domestic balcony, 3.0kPa for office/commercial spaces and 5.0kPa for storage facilities. In the fire consideration the superimposed live load component is reduced by a factor of 0.5.

Super Imposed Dead Load

The loads stated in the table are to cover partitions, finishes, ceilings and services. The self weight of the slab is taken into account in these resulting spans and need not be considered as part of the applied load.

Fire Rating

Fire ratings given in the table satisfy BS5950: Part 8. The thinner slab thicknesses (125mm, 130mm) are governed by insulation. Thicker slabs are limited by strength parameters. Integrity is never a limiting factor for ComFlor systems.

In some cases the higher loading situation governs the published 'generalised' fire rating and a longer fire rating is possible than that shown in the table in some cases.



The Simplified Fire Design Method has been used – this relies on the tensile contribution from the mesh in the fire condition.

A 30 minute fire rating is achieved by ComFlor 60 without the need of specific fire steel. Minimum bottom cover if fire steel is used is 25mm.

An upper limit of two hours is possible using the Simple Fire Design Method. Greater spans and fire ratings up to four hours can be achieved using the Fire Engineering Method in the ComFlor design software.

Deflections Construction Stage

$L/130$ or 30mm maximum used. Dead weight of concrete has been considered. Construction loads are not considered. Additional weight of ponded concrete is only considered once deflections exceed either, span/180, slab depth/10 or 20mm.

Deflections Composite Stage

$L/350$ but no greater than 20mm. Due to imposed loads only. Separate to any construction deflection.

Total Load Deflection

$L/250$ but no greater than 30mm. Takes into account all applied loads, self weight, super dead and super live in addition to the effect of creep and any prop removal.

Shear Studs

No shear studs or end anchorage have been considered in this table. Generally the minimum cover to shear studs is 25mm.

Slab Thickness

As governed by BS Pt4, clause 3.3.5 and NZS3101: Part 1: 1995 clause 13.3.7.2 – the minimum slab thickness is governed by profile height plus 50mm.

Vibration

A span/slab ratio of span/40 has been used as an upper limit in this table. This parameter may not suit more sensitive applications. A general guidance of span/35 for double/continuous spans and span/30 for single spans is recommended for more sensitive applications.

ComFlor® 60 Design Information

Quick Reference Table

Load Span Table – Normal Weight Concrete

| Props | Span Type | Fire Rating (hour) | Slab Depth (mm) | Fire Reinforcement (25mm bott. Cover) | Mesh Type (mm ² /m) | Deck Thickness 0.75 (mm) | | | | |
|--------------------------|-------------|--------------------|-----------------|---------------------------------------|--------------------------------|--------------------------|------|------|------|--|
| | | | | | | 1.50 | 2.50 | 3.00 | 5.00 | |
| | | | | | | 0.8 | 0.1 | 0.8 | 0.5 | |
| No Temporary Props | Single Span | 0.5 | 125 | None | A142 | Design pending | | | | |
| | | 0.5 | 130 | None | A142 | | | | | |
| | | 1.0 | 140 | None | A193 | | | | | |
| | | 1.5 | 160 | None | A252 | | | | | |
| | | 1.5 | 180 | None | A252 | | | | | |
| | | 2.0 | 200 | None | 2xA142 | | | | | |
| | Double Span | 0.5 | 125 | None | A142 | | | | | |
| | | 0.5 | 130 | None | A142 | | | | | |
| | | 1.0 | 140 | None | A193 | | | | | |
| | | 1.5 | 160 | None | A252 | | | | | |
| | | 2.0 | 180 | None | A252 | | | | | |
| | | 2.0 | 200 | None | 2xA142 | | | | | |
| 1 Row of Temporary Props | Single Span | 0.5 | 125 | None | 2xA142 | | | | | |
| | | 0.5 | 130 | None | 2xA142 | | | | | |
| | | 0.5 | 140 | None | A393 | | | | | |
| | | 0.5 | 160 | None | 2xA252 | | | | | |
| | | 0.5 | 180 | None | 2xA252 | | | | | |
| | | 0.5 | 200 | None | 2xA393 | | | | | |
| | | 0.5 | 230 | None | 2xA393 | | | | | |
| | | 0.5 | 260 | None | A800 | | | | | |
| | Double Span | 0.5 | 125 | None | 2xA142 | | | | | |
| | | 0.5 | 130 | None | 2xA142 | | | | | |
| | | 0.5 | 140 | None | A393 | | | | | |
| | | 0.5 | 160 | None | 2xA252 | | | | | |
| | | 0.5 | 180 | None | 2xA252 | | | | | |
| | | 0.5 | 200 | None | 2xA393 | | | | | |
| | | 0.5 | 230 | None | 2xA393 | | | | | |
| | | 0.5 | 260 | None | A800 | | | | | |

Notes

- 1.0mm and 1.1mm (shaded grey) is available by special request – a lead time of 8 weeks and minimum order applies.
- 0.75mm material is currently under development – Please contact us on: Ph (09) 271 1780.
- The limits used on this table may not suit the specific use of your project – please contact us directly for advice relating to your project.
- *To achieve greater spans use two rows of temporary propping and/or wider beams.

| Maximum Span (m) | | | | | | | | | | | | | | | | |
|------------------------------|------|------|------|----------------------------|------|------|------|----------------------------|------|------|------|----------------------------|------|------|------|--|
| Deck Thickness 0.9 (mm) | | | | Deck Thickness 1.0 (mm) | | | | Deck Thickness 1.1 (mm) | | | | Deck Thickness 1.2 (mm) | | | | |
| Superimposed Live Load (kPa) | | | | | | | | | | | | | | | | |
| 1.50 | 2.50 | 3.00 | 5.00 | 1.50 | 2.50 | 3.00 | 5.00 | 1.50 | 2.50 | 3.00 | 5.00 | 1.50 | 2.50 | 3.00 | 5.00 | |
| Superimposed Dead Load (kPa) | | | | | | | | | | | | | | | | |
| 0.8 | 0.1 | 0.8 | 0.5 | 0.8 | 0.1 | 0.8 | 0.5 | 0.8 | 0.1 | 0.8 | 0.5 | 0.8 | 0.1 | 0.8 | 0.5 | |
| 3.55 | 3.55 | 3.55 | 3.55 | 3.65 | 3.65 | 3.65 | 3.65 | 3.80 | 3.80 | 3.80 | 3.80 | 3.95 | 3.95 | 3.95 | 3.95 | |
| 3.50 | 3.50 | 3.50 | 3.50 | 3.60 | 3.60 | 3.60 | 3.60 | 3.75 | 3.75 | 3.75 | 3.75 | 3.90 | 3.90 | 3.90 | 3.90 | |
| 3.40 | 3.40 | 3.40 | 3.40 | 3.55 | 3.55 | 3.55 | 3.55 | 3.65 | 3.65 | 3.65 | 3.65 | 3.80 | 3.80 | 3.80 | 3.80 | |
| 3.25 | 3.25 | 3.25 | 3.25 | 3.40 | 3.40 | 3.40 | 3.40 | 3.50 | 3.50 | 3.50 | 3.50 | 3.60 | 3.60 | 3.60 | 3.60 | |
| 3.10 | 3.10 | 3.10 | 3.10 | 3.25 | 3.25 | 3.25 | 3.25 | 3.35 | 3.35 | 3.35 | 3.35 | 3.50 | 3.50 | 3.50 | 3.50 | |
| 3.00 | 3.00 | 3.00 | 3.00 | 3.15 | 3.15 | 3.15 | 3.15 | 3.25 | 3.25 | 3.25 | 3.25 | 3.35 | 3.35 | 3.35 | 3.30 | |
| 3.65 | 3.65 | 3.65 | 3.65 | 4.00 | 4.00 | 4.00 | 4.00 | 4.30 | 4.30 | 4.30 | 4.30 | 4.55 | 4.55 | 4.55 | 4.55 | |
| 3.65 | 3.65 | 3.65 | 3.65 | 3.95 | 3.95 | 3.95 | 3.95 | 4.25 | 4.25 | 4.25 | 4.25 | 4.50 | 4.50 | 4.50 | 4.50 | |
| 3.55 | 3.55 | 3.55 | 3.55 | 3.85 | 3.85 | 3.85 | 3.85 | 4.15 | 4.15 | 4.15 | 4.15 | 4.40 | 4.40 | 4.40 | 4.40 | |
| 3.35 | 3.35 | 3.35 | 3.35 | 3.70 | 3.70 | 3.70 | 3.70 | 4.00 | 4.00 | 4.00 | 4.00 | 4.25 | 4.25 | 4.25 | 4.25 | |
| 3.15 | 3.15 | 3.15 | 3.15 | 3.55 | 3.55 | 3.55 | 3.55 | 3.85 | 3.85 | 3.85 | 3.85 | 4.10 | 4.10 | 4.10 | 3.90 | |
| 2.95 | 2.95 | 2.95 | 2.95 | 3.40 | 3.40 | 3.40 | 3.40 | 3.70 | 3.70 | 3.70 | 3.70 | 3.95 | 3.95 | 3.95 | 3.95 | |
| 4.80 | 4.80 | 4.70 | 4.20 | 4.95 | 4.95 | 4.75 | 4.40 | 5.00 | 5.00 | 4.85 | 4.45 | 5.00 | 5.00 | 4.90 | 4.55 | |
| 4.90 | 4.90 | 4.80 | 4.30 | 5.00 | 5.00 | 4.90 | 4.45 | 5.10 | 5.10 | 4.95 | 4.60 | 5.20 | 5.20 | 5.00 | 4.65 | |
| 5.05 | 5.05 | 5.00 | 4.45 | 5.15 | 5.15 | 5.10 | 4.65 | 5.25 | 5.25 | 5.20 | 4.80 | 5.35 | 5.35 | 5.25 | 4.90 | |
| 5.30 | 5.30 | 5.25 | 4.75 | 5.40 | 5.40 | 5.35 | 4.95 | 5.50 | 5.50 | 5.45 | 5.15 | 5.60 | 5.60 | 5.55 | 5.35 | |
| 5.55 | 5.55 | 5.50 | 5.05 | 5.65 | 5.65 | 5.60 | 5.25 | 5.80 | 5.80 | 5.75 | 5.45 | 5.90 | 5.90 | 5.85 | 5.65 | |
| 5.75 | 5.75 | 5.75 | 5.30 | 5.90 | 5.90 | 5.85 | 5.50 | 6.00 | 6.00 | 5.95 | 5.70 | 6.10 | 6.10 | 6.10 | 5.90 | |
| 5.95 | 5.95 | 5.95 | 5.95 | 6.20 | 6.40 | 6.15 | 5.85 | 6.30 | 6.50 | 6.30 | 6.10 | 6.45 | 6.65 | 6.40 | 6.30 | |
| * | * | 5.65 | 5.65 | * | * | 6.20 | 6.15 | * | * | 6.60 | 6.40 | * | * | 6.70 | 6.60 | |
| 4.80 | 4.80 | 4.75 | 4.20 | 4.95 | 4.95 | 4.85 | 4.40 | 5.00 | 5.00 | 4.90 | 4.55 | 5.00 | 5.00 | 4.95 | 4.60 | |
| 4.90 | 4.90 | 4.85 | 4.30 | 5.00 | 5.00 | 4.95 | 4.45 | 5.10 | 5.10 | 5.05 | 4.65 | 5.20 | 5.20 | 5.10 | 4.70 | |
| 5.00 | 5.00 | 5.00 | 4.45 | 5.15 | 5.15 | 5.10 | 4.65 | 5.25 | 5.25 | 5.20 | 4.80 | 5.35 | 5.35 | 5.25 | 5.00 | |
| 5.30 | 5.30 | 5.25 | 4.65 | 5.40 | 5.40 | 5.35 | 4.95 | 5.50 | 5.50 | 5.45 | 5.15 | 5.60 | 5.60 | 5.55 | 5.35 | |
| 5.30 | 5.30 | 5.30 | 4.95 | 5.65 | 5.65 | 5.55 | 5.05 | 5.80 | 5.80 | 5.65 | 5.45 | 5.90 | 5.90 | 5.85 | 5.65 | |
| 5.00 | 5.00 | 5.00 | 5.00 | 5.70 | 5.70 | 5.55 | 5.10 | 6.00 | 6.00 | 5.95 | 5.70 | 6.10 | 6.10 | 6.10 | 5.90 | |
| * | * | * | * | * | * | * | 5.30 | * | * | * | 5.90 | 6.40 | 6.40 | 6.40 | 6.30 | |
| * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | * | |

5. The spans shown in the above table are indicative only. They are not intended for generic use. Specific design using the ComFlor design software and advice from the ComFlor Building Systems' support team is recommended.

ComFlor design software is available free on CD by contacting us on: Ph (09) 271 1780 or online at www.comflor.co.nz

ComFlor® 60/80 Design Information

Composite Floor Decking design is generally dictated by the construction stage condition, the load and span required for service, and the fire resistance required for the slab. The deck design is also influenced by the composite beam design.

Design Parameters

Fire Rating

Strength = dictates size of mesh or bottom steel used

Insulation = dictates minimum slab depth

Integrity = never governs due to deck membrane

Acoustics

Consider the STC value of the slab thickness chosen. Please contact us on: Ph (09) 271 1780 for an acoustic report.

Vibration

Span/slab thickness ratio as well as support beam configuration will influence this serviceability aspect of any design.

Concrete Weight

Also dictates minimum slab depth and influences the deck span during the pour.

Deck Span (unpropped)

Usually dictates general beam size and spacing.

Deck Span (propped)

To fully utilise the composite slab properties temporary propping may be required.

Two Stage Design

All Composite Floors must be considered in two stages.

1. Wet Concrete/ Construction Stage

- load carried by deck alone
- deflections due to concrete load, ponding and construction loads
- total system deflection including beams

2. Cured Concrete/ Composite Stage

- load carried by composite slab
- consider deflections due to prop removal (if any) and imposed load and beam deflections

General Design Aims

Generally designers prefer to reduce the requirement for temporary propping and so the span and slab depth required governs the deck selection.

Fire requirements usually dictate slab depth. For most unpropped applications, the imposed load on the slab will not limit the design.

Quick Reference and Full Design

The combination of this manual and ComFlor design software makes both quick reference and full design easy. Indicative design may be carried out from the printed tables; however the final design should be verified using the ComFlor design software, which allows the design engineer to print a full set of calculations which can be used for submission to a Local Authority.

British Standards and Eurocodes

The ComFlor design software user is offered a choice to design to BS5950: Parts 3 and 4 (BS Pt3, BS Pt4), or to Eurocode4 (EC4). However, New Zealand users are recommended to use the BS5950 option. The quick reference tables are designed to BS Pt4, with the important exception of the mesh recommendations, which utilise the more conservative EC4 recommendation.

Anti-crack Mesh

The flexural reinforcement requirements over supporting beams may be specified by the user to minimise flexural crack widths to suit the use of the floor.

The provisions of BS Pt4 are recommended as the most acceptable for control of shrinkage and temperature cracking (in the body of the slab) in NZS3404 C13.2.2.

BS Pt4 currently recommends that anti-crack mesh should comprise 0.1% of the cross-sectional slab area at the support. The EC4 recommendation is that anti-crack mesh should comprise 0.2% of slab area for unpropped spans and 0.4% of slab area for propped spans.

The Steel Construction Institute, has agreed to modify the requirement with regard to anti-crack mesh, to comply with the EC4 recommendations. Accordingly, the mesh shown in the quick reference tables complies with EC4 and the ComFlor design software defaults to these values. The reduced BS mesh values may still be used by overriding this default in the ComFlor design software.

Reference should be made to NZS3101 to confirm the exposure classification and the cover for the reinforcement mesh. Mesh laps are to be 300mm for A142 mesh and 400mm for A193, A252 and A393.

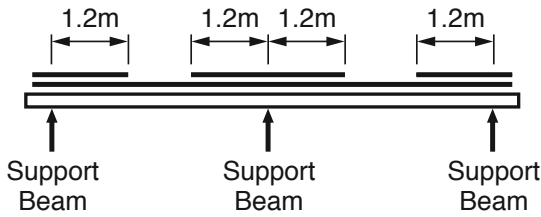
The New Zealand equivalent mesh sizes are identified as follows:

| Mesh Type | Sectional Area mm ² /m | HRC Sheet Type |
|-----------|--------------------------------------|----------------|
| A142 | 142 | 665, D147 |
| A193 | 193 | 663, D212 |
| A252 | 252 | 662, D264 |
| A393 | 393 | 333 |

Reduced Mesh

Where EC4 mesh rules are used, as recommended by the Steel Construction Institute, the full stipulated mesh applies to the slab 1.2m either side of every support. Outside of this, ie in the mid-span area, the mesh area may be halved (to 0.2% for propped and 0.1% for unpropped construction), provided there are no concentrated loads, openings etc. to be considered. The reduced mid-span mesh must be checked for adequacy under fire, for the rating required.

ComFlor® 60/80 Design Information



Bar Reinforcement (bottom steel)

The Axis Distance of bar reinforcement referred to within the ComFlor design software defines the distance from the bottom of the ribs to the centre of the bar, which has a minimum value of 25 mm, and a maximum value of the profile height. Where used, bar reinforcement is placed one bar per profile trough. The bar reinforcement is also considered in composite slab capacity calculations.

Transverse Reinforcement

BS Pt4 allows a mesh area of 0.1% of the cross sectional area of the concrete above the profile ribs to be used in the direction transverse to the deck span. This is not considered in the ComFlor design software but can lead to further cost savings.

ComFlor composite floor decks contribute to transverse reinforcement of the composite beam, provided that the decking is either continuous across the top flange of the steel beam or alternatively that it is welded to the steel beam by shear stud connectors. For further information refer to BS5950: Part 3: Section 3.1.Clause 5.6.4.

Concrete Choice

BS5950 uses the cube strength for design. Accordingly the ComFlor design software refers to the cube strength value (e.g. C30) in the 'Concrete Grade' input cell.

The strength of the concrete must meet the requirements for strength for the composite slab and shall not be less than 25MPa (cube strength) nor greater than 50MPa (cube strength) for NWC.

In design to EC4, the cylinder strength is used. The concrete grade (C25/30) defines the (cylinder/cube strength) to EC4. In design to NZS3404 and NZS3101, the 28 day cylinder strength is used. Generally a cylinder test strength is around 80% of a cube test strength for a given concrete mix.

The following relative values of cylinder and cube strengths can be used to convert between cylinder and cube strengths for the purposes of the ComFlor design software and this brochure.

| Cube Strength (BS) | Cylinder Strength (NZS) |
|--------------------|-------------------------|
| MPa | MPa |
| 25 | 20 |
| 30 | 25 |
| 37 | 30 |

Concrete Density

In the absence of more precise information, the following assumptions may be made for normal weight concrete (NWC):

| | Density kg/m ³ | | |
|-----|---------------------------|------|---------------|
| | Wet | Dry | Modular Ratio |
| NWC | 2400 | 2350 | 10 |

The wet density is used in the design of the profiled steel sheets and the dry density in the design of the composite slab.

Fire Design

Fire Insulation

The fire insulation requirements of BS 5950: Part 8 must be satisfied and are taken into account in the tables and ComFlor design software.

Shear Connectors in Fire Situation

If shear connectors are provided, any catenary forces transferred from the slab to the support beams can be ignored within the fire resistance periods quoted.

Fire Design Methods

There are three requirements for fire design:

- Bending resistance in fire conditions.
- Minimum slab depth for insulation purposes.
- Integrity for the slab against fire protection.

The capacity of the composite slab in fire may be calculated using either the Simple Method or the Fire Engineering Method. The Simple Method will be the most economic. The Fire Engineering Method should be used for design to Eurocodes.

The Simple Method

The Simple Method may be used for simply supported decks or for decks continuous over one or more internal supports. The capacity assessment in fire is based on a single or double layer of standard mesh. Any bar reinforcement is ignored.

The Fire Engineering Method

The Fire Engineering Method is of general application. The capacity assessment in fire is based on a single or double layer of standard mesh at the top and one bar in each trough.

The ComFlor design software assumes the bar is positioned just below the top of the steel deck. For CF 60/80 with a raised dovetail in the crest, the bar will be placed below the dovetail.

Deflection Limits

In the absence of more appropriate information, the following limits should be adopted:

Construction Stage Deflection

The construction stage deflection is based on unfactored dead loads only. Construction loads are not considered. Deflection limits for the decking are given in BS5950: Part 4.

ComFlor[®] 60/80 Design Information

The main reason for limiting deflections at the construction stage is to limit the volume of concrete that is placed on the deck; excess deflections will lead to ponding of the concrete, and this will increase the dead loads on the structure. These deflections should not normally exceed the following:

- a) $L_p/180$ (but not greater than 20 mm) when the effects of ponding are not taken into account.
- b) $L_p/130$ (but not greater than 30mm) when ponding is considered.

L_p is the effective span of the decking, i.e. the lesser value of: the clear span plus the profile height or the centre to centre dimension of the permanent supports.

According to BS5950, when the deflection exceeds $D_s/10$, where D_s is the overall depth of the composite slab, the additional weight of concrete due to the deflection of the sheeting is to be taken into account in the self-weight of the composite slab. Therefore ponding, resulting from the deflection of the decking, is only taken into account by the ComFlor design software for CF 60/80 if the construction stage deflection exceeds $D_s/10$. (Excluding non-structural screeds).

For unpropped construction it is recommended the construction stage deflection in the ComFlor design software be maintained at the default $\text{Span}/130$. The deflection limit can be reduced from 30mm as required. The help function in the ComFlor design software contains all the details regarding parameters used in the calculation process.

Two values are calculated for the deflection of the slab (composite stage deflection):

- The deflection under imposed loads
- The total deflection

Imposed Load Deflection:

$L_p/350$ (but not greater than 20mm)

The deflection under imposed loads is the deflection of the slab under imposed loads only. This value should be used in assessing the effect of the deflection of the slab on finishes.

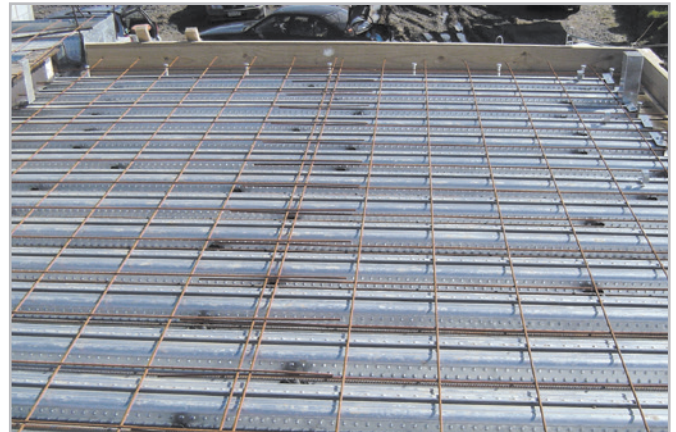
Total Load Deflection:

$L_p/250$ (but not greater than 30mm)

The total deflection is the deflection of the slab under all applied loads – dead, imposed and superimposed dead, additional to the construction stage deflection (see above). This value takes into account the effect of creep of the concrete under dead loads and any additional deflection due to prop removal.

Vibration

The ComFlor design software will, in addition, check the dynamic sensitivity of the composite slab in accordance with the SCI publication P076: Design Guide on the Vibration of Floors. The natural frequency is calculated using the self-weight of the slab, ceilings and services, screed and 10% imposed loads, representing the permanent loads on the floor.



ComFlor – ready for concrete

Loads and Load Arrangement

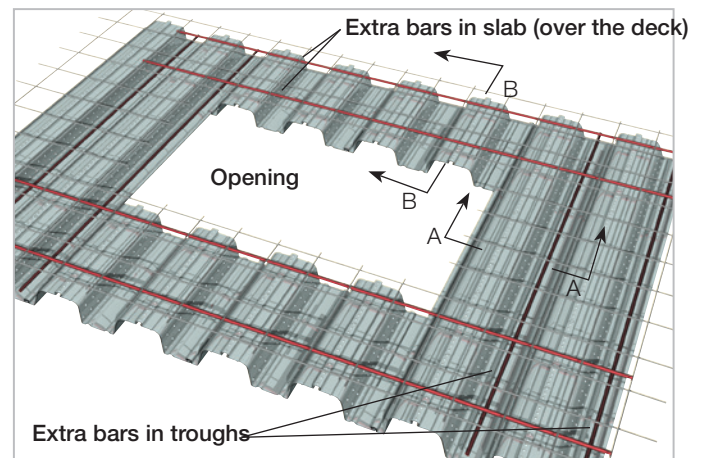
Reference should be made to AS/NZ1170 for live load conditions. Factored loads are considered at the ultimate limit state. These are obtained by multiplying the characteristic values of the applied loads by partial safety factors.

The default partial safety factors on Datasheet 2 of the ComFlor design software are taken from BS5950 Part 4. Reference can be made to the help notes within the software for clarification.

Unfactored loads are considered at the serviceability limit state, and in fire conditions. Loads considered at the construction stage consist of the slab self weight and the basic construction load. The basic construction load is taken as the larger of: 1.5kPa or $4.5/L_p$.

For multi span, unpropped construction, the basic construction load of 1.5kPa is considered over one span only. On other spans, the construction load considered is half this value (ie 0.75kPa). Construction loads are considered as imposed loads for this check. Loads considered at the normal service stage consist of the slab self weight, superimposed live and dead loads.

Openings



Reinforcement around opening

ComFlor® 60/80 Design Information

Openings can be accommodated readily in composite slabs by boxing out prior to pouring concrete and cutting out the deck after the concrete has cured (see Sitework section on page 20).

The design of openings depends on their size:

Small

Openings up to 300 mm square do not normally require additional reinforcement.

Medium

Openings between 300 mm and 700 mm square normally require additional reinforcement to be placed in the slab. This is also the case if the openings are placed close together.

Large

Openings greater than 700mm square should be fully trimmed with additional permanent support steelwork.

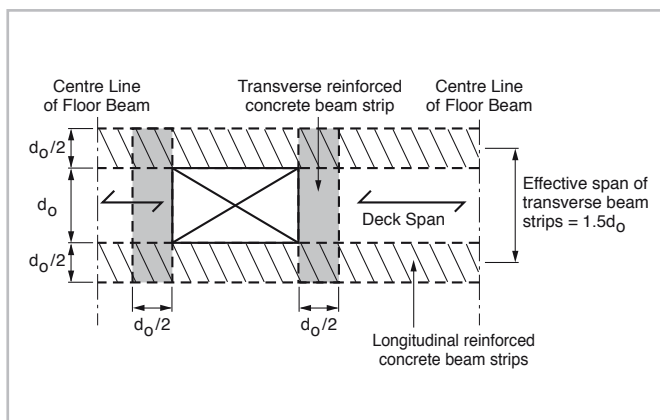
Opening Rules

Where d_o = width of opening transverse to the span of the deck.

1. The distance between the opening and an unsupported edge must be greater than 500mm or d_o (whichever is greater).
2. Openings must not be closer together than $1.5d_o$ (of the largest opening) or 300mm, whichever is the greater. If they are closer they must be considered as one opening.
3. Not more than $\frac{1}{4}$ of the width of any bay is to be removed by openings.
4. Not more than $\frac{1}{4}$ of the deck span is to be removed by openings.

Where these rules are not satisfied, the openings must be fully trimmed with permanent support steelwork.

If the opening falls within the effective breadth of the concrete flange of any composite beam (typically $\text{span}/8$ each side of the beam centre line), the beam resistance should be checked assuming an appropriately reduced effective breadth of slab.



Load paths and beam strips around medium to large openings

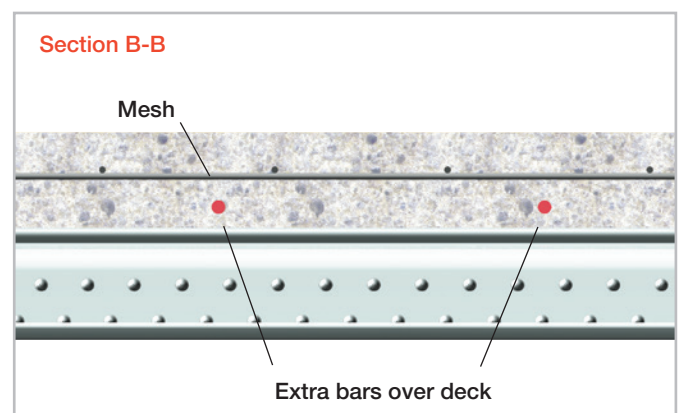
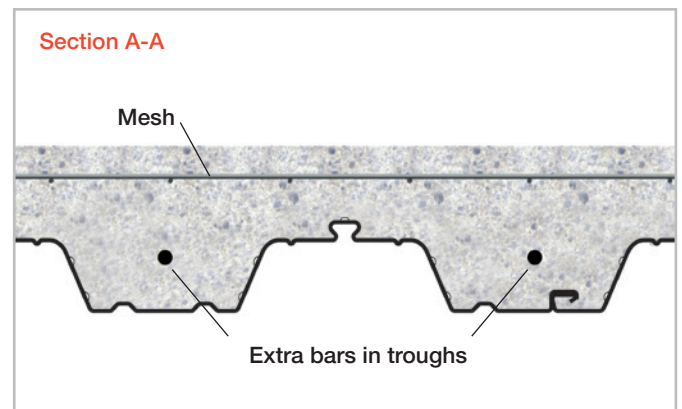
Slab Design around Openings

It may be assumed that an effective system of 'beam strips' span the perimeter of the opening. The effective width of the beam strips (acting transverse to the deck span direction) should be taken as $d_o/2$. Only the concrete above the ribs is effective. The transverse beam strips are assumed to be simply supported and span a distance of $1.5d_o$. The longitudinal beam strips are designed to resist the load from the transverse beam strips, in addition to their own proportion of the loading.

Reinforcement

Extra reinforcement is to be provided within the 'beam strips' to suit the applied loading. This reinforcement often takes the form of bars placed in the troughs of the decking.

Additional transverse or diagonal bars may be used to improve load transfer around the opening.



ComFlor® 60/80 Design Information

Composite Beam Design

Savings in beam weight of up to 50% can be achieved when the composite slab is effectively anchored to the steel beam. The slab will then act as a compression flange to the beam.

The methods of connection between slab and beam is generally by means of through deck welding of 19mm diameter shear studs of varying height, which are fixed to the beam after the decking has been laid. The thickness of the top flange of the steel section must not be less than 0.4 times the stud diameter (e.g. 7.6mm for a 19mm stud).

Headed Stud Capacity

When the decking profile is oriented with the ribs running perpendicular to the steel beam, the welded shear capacity of headed studs (q_r) should be taken as given in the table on this page.

In the absence of more up to date information, the shear stud capacities shown on the table on this page have been derived using BS5950 Part 3 for ComFlor 80 and COBENZ97 2.0f (utilising NZS3404:Part 1:1997 Amd 2 and NZS 3101:1995) for ComFlor 60. The stud capacities may be used with CF 80 and CF 60, which have profile depths of 80mm and 60mm respectively.

Suitability of the CF 60 and CF 80 Deck

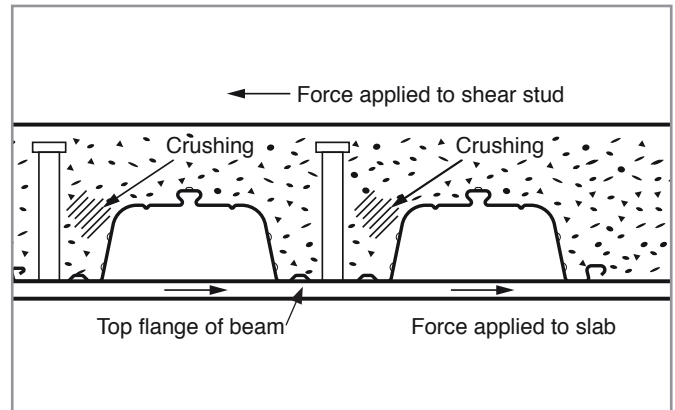
For both CF 60 and CF 80 deck, the position of the stiffeners and the offset side-lap rib dictates the centralised placement of studs, meaning they are naturally located in the ideal position, ensuring optimum capacity of the stud while site supervision of the stud location is kept to a minimum.

The profile height of the CF 80 profile is taken as 80mm – see profile drawing on page 5 of the ComFlor 80 design guide. Standard 125 x 19mm diameter shear studs (120mm LAW) are suitable for use with ComFlor 80.

The profile height of the CF 60 profile is taken as 60mm – see profile drawing on page 4. Standard 100 x 19mm diameter shear studs (95mm LAW) are suitable for use with ComFlor 60.

Design Guide

The Steel Construction Institute/ Metal Cladding and Roofing Manufacturers Association publication P300 – “Composite Slabs and Beams using Steel Decking: Best Practice for Design and Construction” is recommended for further reference.



Welding of Shear Connectors with CF 60/80

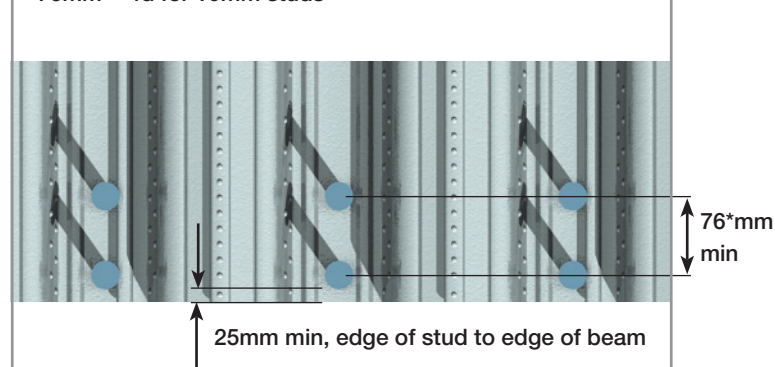
Through Deck Welded Shear Stud Capacity

| Deck | Stud Length (after weld) mm | Shear Capacity, q_r (kN per stud) | | | |
|------------|-----------------------------|-------------------------------------|--------------------|-------------------|--------------------|
| | | $f'c = 25$ MPa | | $f'c = 30$ MPa | |
| | | 1 stud per trough | 2 studs per trough | 1 stud per trough | 2 studs per trough |
| ComFlor 80 | 120 x 19dia | 62.8 | 44.2 | 71.1 | 50.1 |
| ComFlor 60 | 95 x 19dia | 66.9 | 47.3 | 73.3 | 51.9 |



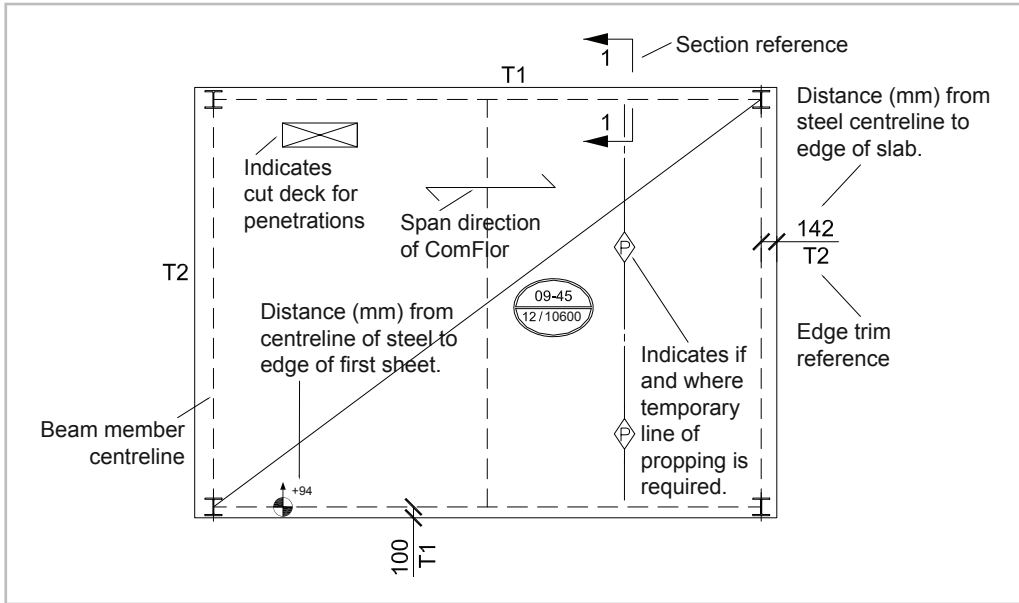
Centrally placed studs on CF 60/80

*76mm = 4d for 19mm studs

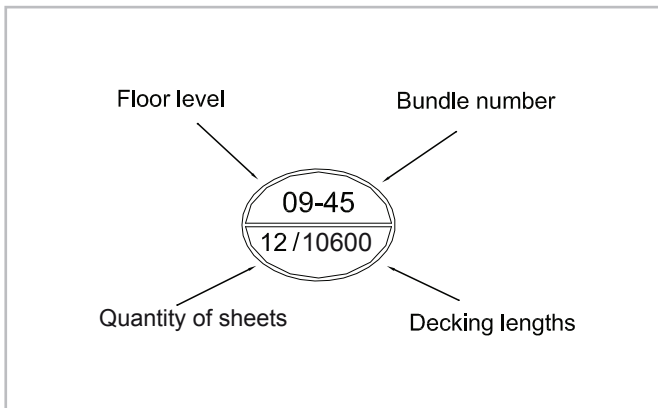


ComFlor® 60/80 Construction details

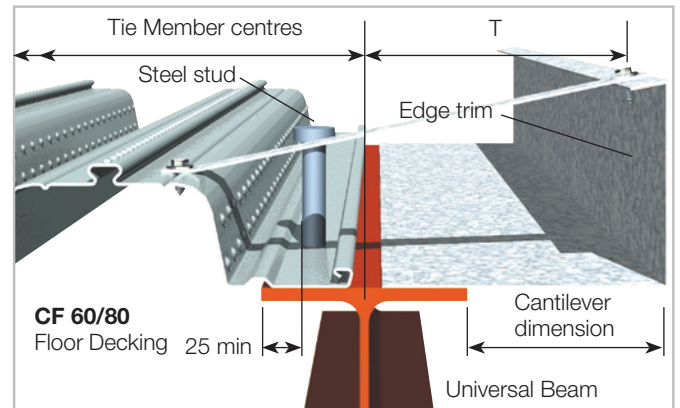
Typical Floor Layout Plan supplied by Composite Floor Decks Limited



Deck Notation Detail

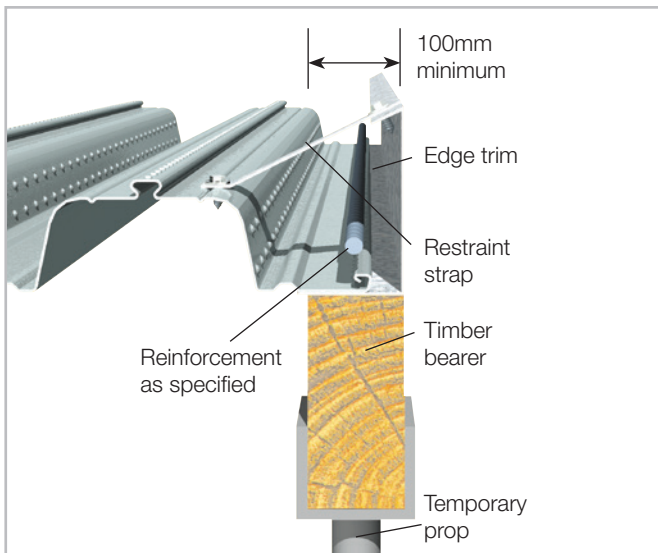


Typical Side Detail

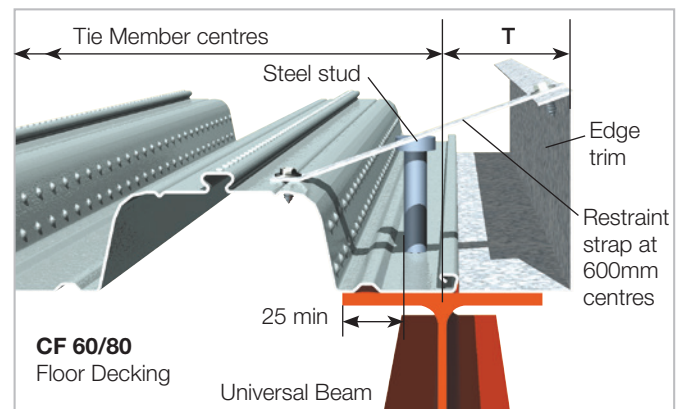


For edge trim cantilevers over 150mm, additional reinforcement is required. See table on page 18 for maximum cantilevers without props.

Unsupported Edge Detail



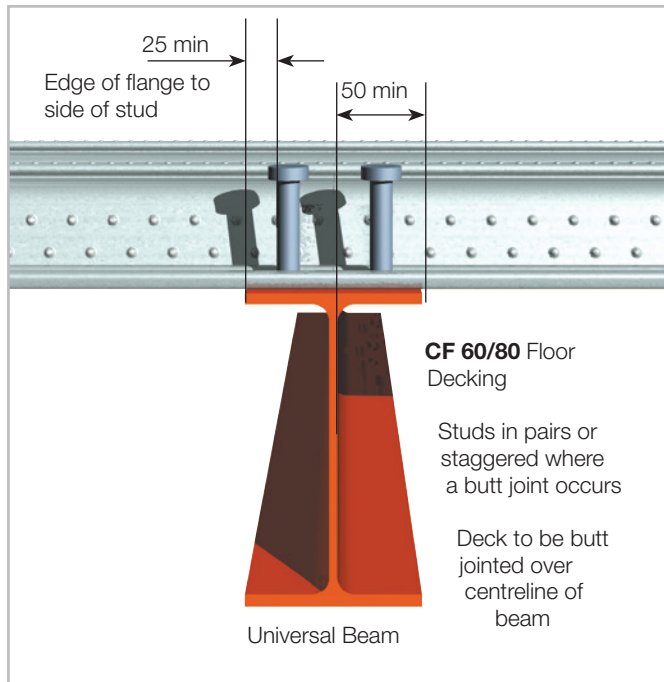
Typical Side Detail



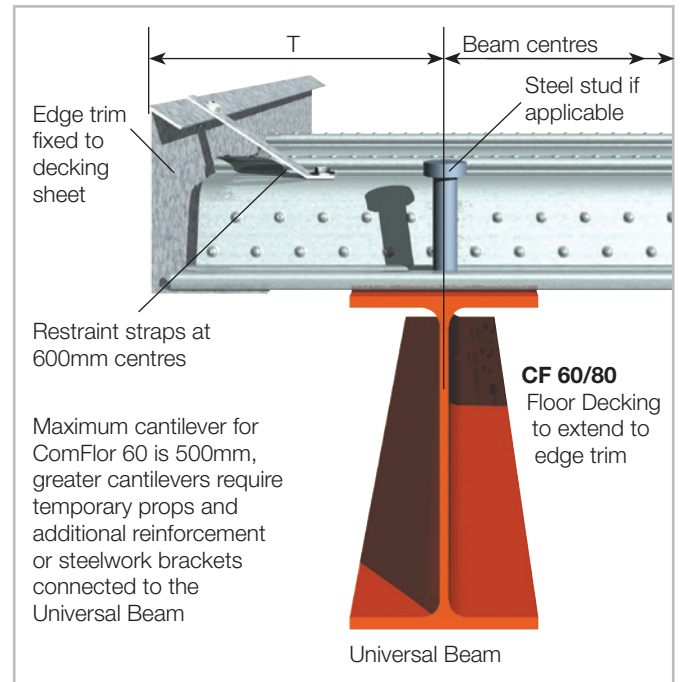
See typical floor layout plan for dimension T

ComFlor® 60/80 Construction details

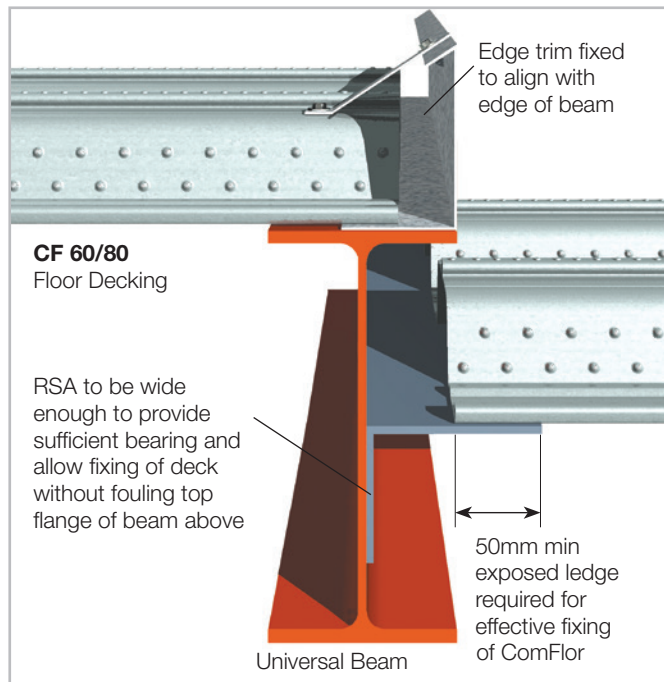
Butt Joint



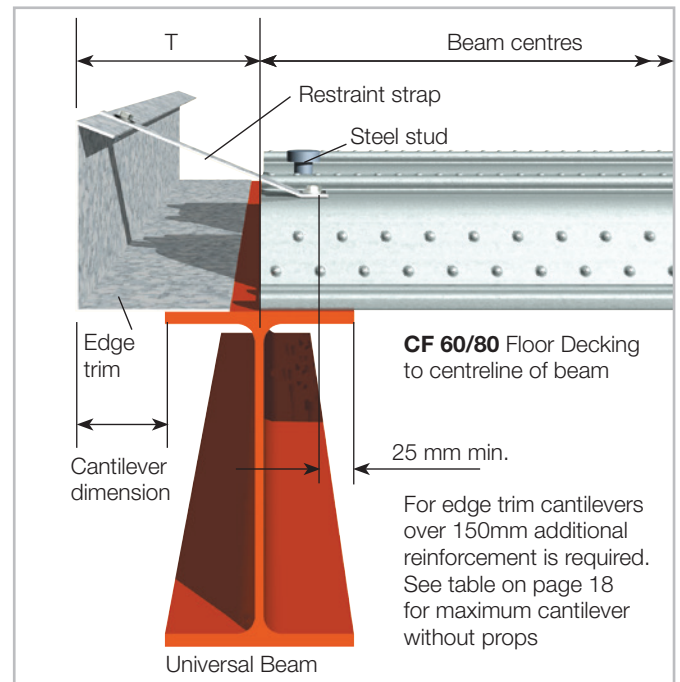
Typical End Cantilever



Step in Floor

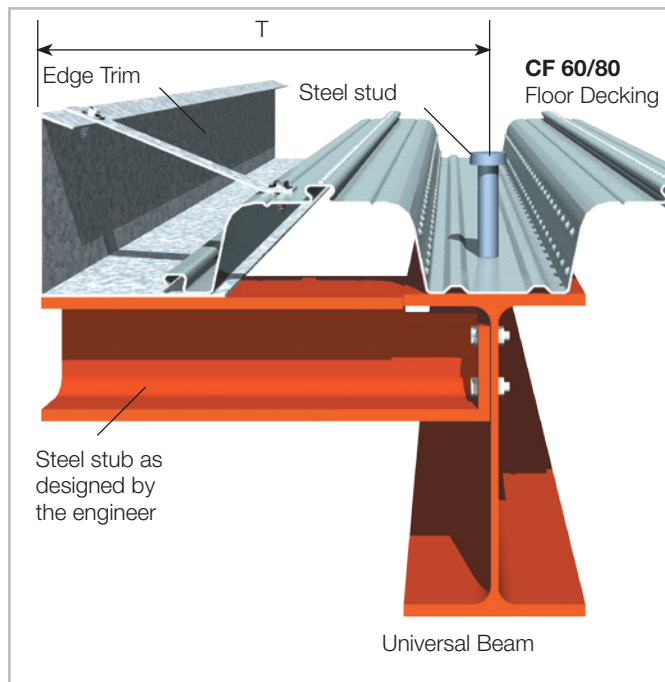


End Detail

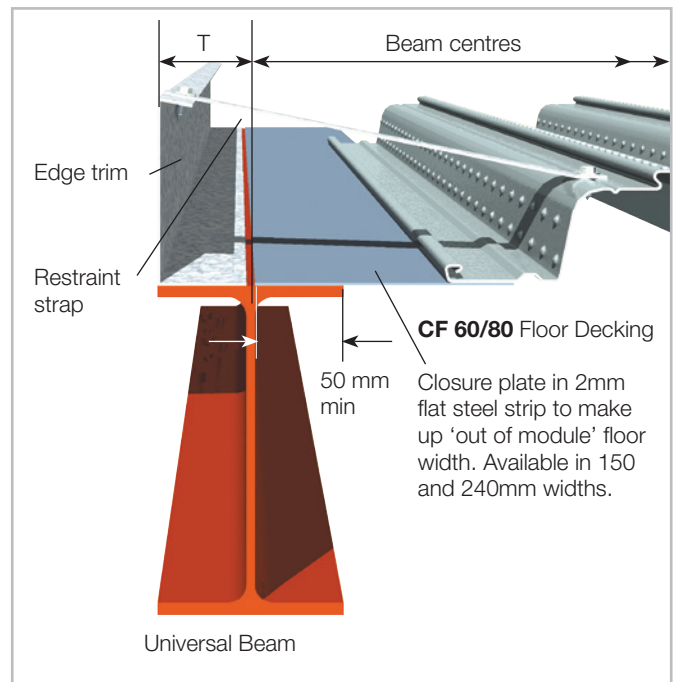


ComFlor® 60/80 Construction details

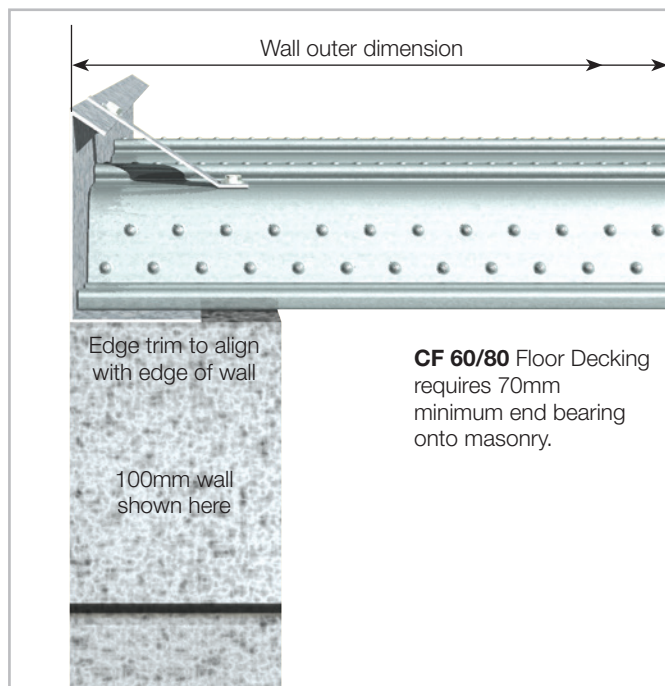
Side Cantilever with Stub Bracket



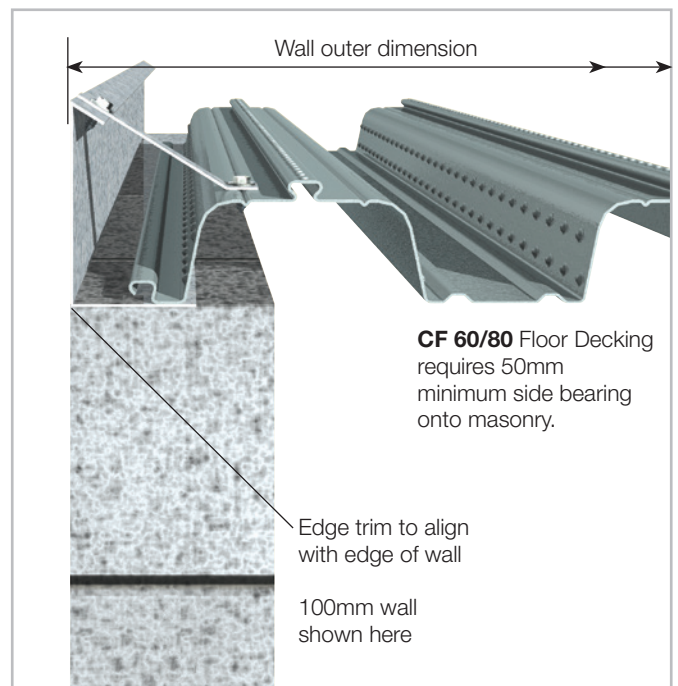
Typical Edge with Plate



Typical Wall End Detail

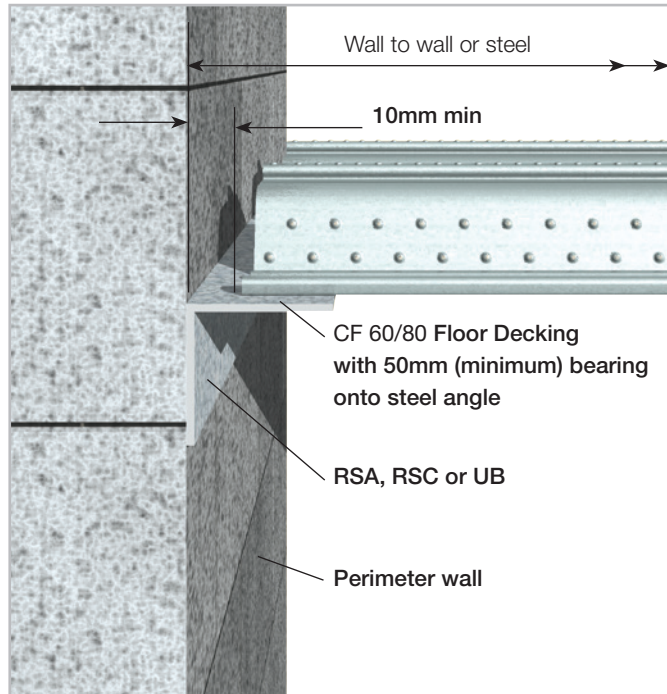


Typical Wall Side Detail

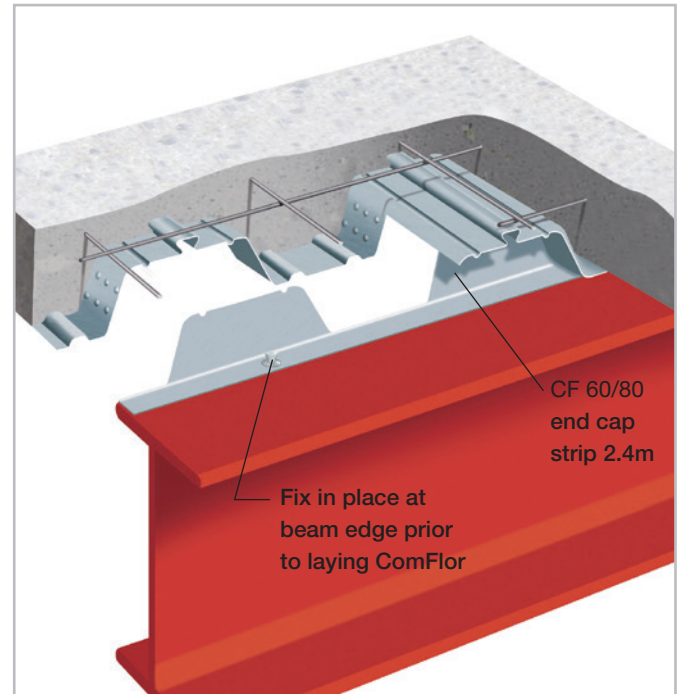


ComFlor® 60/80 Construction details

Deck Inside of Wall Detail



End Cap Strip Detail



ComFlor® 60/80 Sitework

Deck Fixing

Immediately after laying, the deck must be fixed through its troughs to the top of the supporting structure. Powder actuated pins or self-drilling screws are used.

Where shear studs are being used, the deck requires two fixings per sheet per support at sheet ends and one fixing per sheet at intermediate supports.

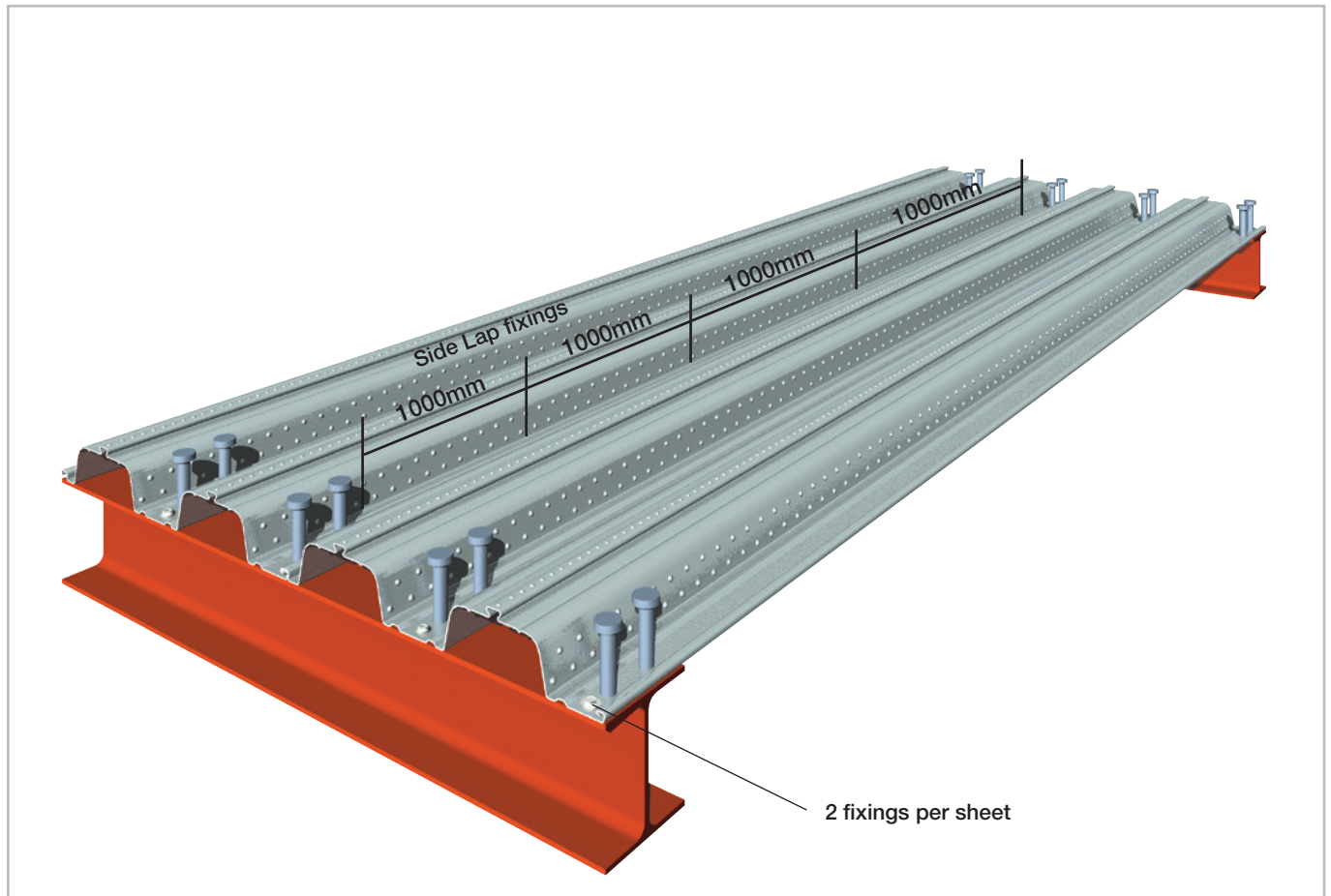
Fixings for ComFlor 60 and ComFlor 80

| | |
|-------------------------------|---|
| To steel | Heavy duty powder actuated fixings – Hilti ENP2 nail/Spit SBR14 or equivalent Self-drilling screws. To steel up to 11mm thick – SFS SD14 - 5.5 x 32 / EJOT HS 38 or equivalent. To steel up to 17mm thick SFS TDC-T-6.3 x 38 or equivalent |
| To masonry or concrete | Pre drill hole - use self tapping fixing suitable for masonry/ concrete – SFS TB-T range/EJOT 4H32 or equivalent |
| To side laps or closures etc. | Self drilling stitching screw typically SFS SL range / EJOT SF25 or equivalent |

Fixing Spacings

| | |
|--------------------------|--------------------|
| Side lap fixing | 1 every 1000mm |
| End fixing | 2 per sheet |
| Intermediate supports | 1 per sheet |
| Side fixing onto support | 1 every 1000mm |
| End cap strip | 3 per 2400mm strip |

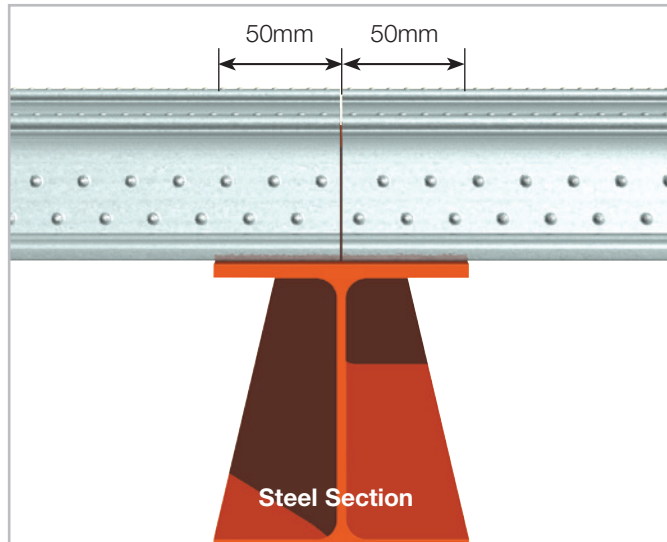
Deck Fixing on CF 60/80



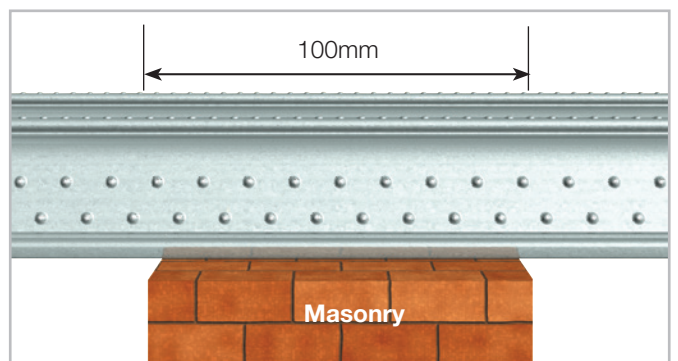
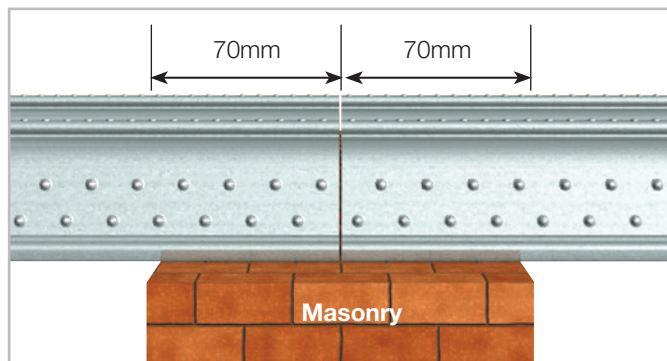
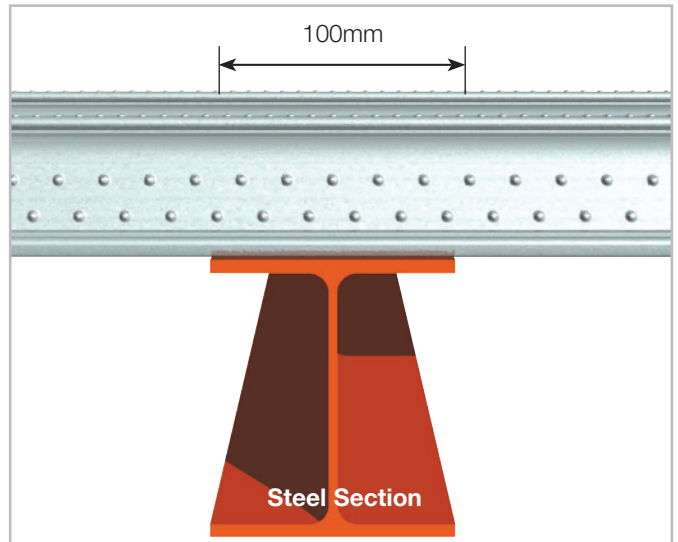
ComFlor® 60/80 Sitework

Bearing Requirements

End bearing and shared bearing (minimum)



Continuous bearing (minimum)



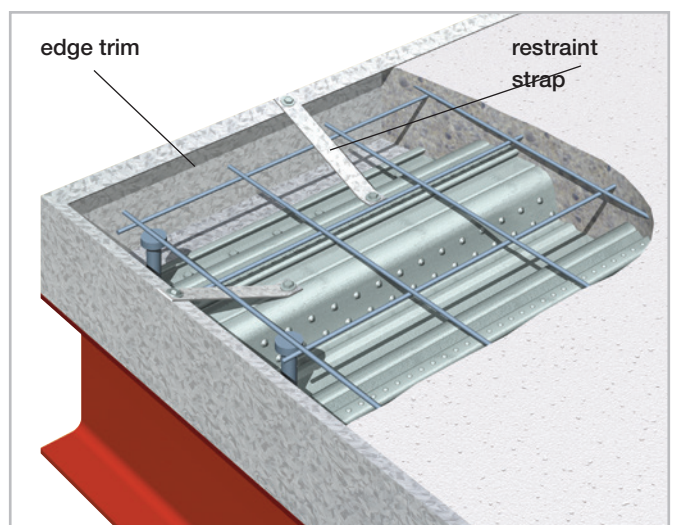
Edge Trim

This is used to retain the wet concrete to the correct level at the decking perimeters. It is fixed to the supports in the same manner as the deck and the top is restrained by straps at 600mm centres, which are fixed to the top of the deck profile, by steel pop rivets or self-drilling screws.

Edge Trim Selector

| Edge Trim Depth | Galvanised Steel Edge Trim Thickness (mm) | | | |
|-----------------|---|-----|-----|-----|
| | 0.9 | 1.2 | 1.6 | 2.0 |
| | Maximum Cantilever (mm) | | | |
| 130 | 100 | 125 | 160 | 195 |
| 150 | x | 115 | 150 | 185 |
| 200 | x | 100 | 130 | 160 |
| 250 | x | x | 100 | 135 |
| 300 | x | x | x | 100 |
| 350 | x | x | x | x |

x - not recommended



ComFlor® 60/80 Sitework

Shear Connectors

Most commonly used shear connectors are 19mm diameter headed studs, which are welded to the support beam through the deck, a process carried out by specialist stud welding contractors.

Site conditions must be suitable for welding and bend tests carried out as appropriate. The spacing and position of the shear connectors is important and must be defined by the design engineer on the deck set out drawings.

Minimum Spacing: The minimum centre-to-spacing of stud shear connectors should be $6d$ along the beam and $4d$ across the beam, where d is the nominal shank diameter. Where rows of studs are staggered, the minimum transverse spacing of longitudinal lines of studs should be $3d$.

Maximum spacing: 800mm in regions of a composite member not subject to inelastic earthquake effects and 400mm in regions subject to inelastic earthquake effects (yielding regions).

The shear stud should not be closer than 25mm to the edge of the beam. See page 14.

Further guidance on shear studs for designers and installers may be found in the Steel Construction Institute publications: P300 Composite Slabs and Beams Using Steel Decking: Best Practice for Design and Construction, P055 Design of Composite Slabs and Beams with Steel Decking.

Mesh Placement

Standard reinforcing mesh, such as A142, A193 and A252 is usually required, positioned towards the top of the slab. The top cover to the reinforcement mesh should be as specified by the design engineer. Support stools are required to maintain the correct mesh height. The mesh must be lapped by 300mm for A142 and A193 mesh, and by 400mm for A252 and A393 mesh.

Casting Concrete

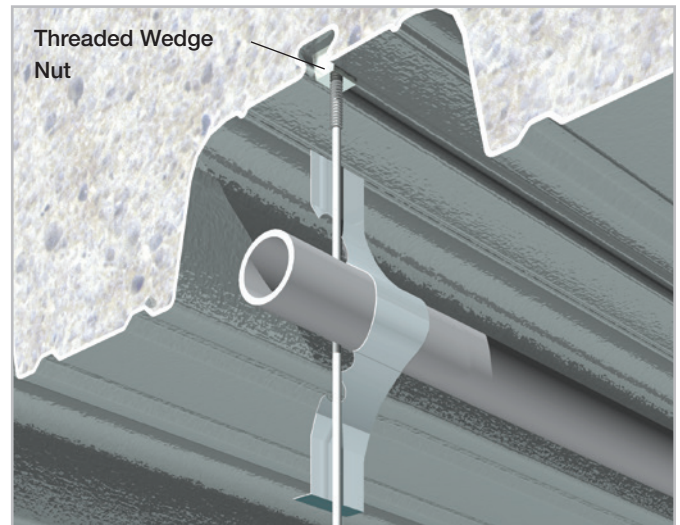
Before the concrete is poured, the decking must be cleared of all dirt and grease, which could adversely influence the performance of the hardened slab. The water soluble lubricant left on the decking from the roll forming process does not have to be removed. Concrete should be poured evenly, so as to spread the load along each sheet.

Care should be taken to avoid heaping of concrete in any area during the casting sequence. Construction and day joints should occur over a support beam, preferably also at a deck joint.

Contact us on: Ph (09) 271 1780 for specific advice pertaining to your project.

Ceilings and Services Hanger Systems

The 15mm high raised mini-dovetail re-entrant stiffener on the CF 60/80 profiles allows for the quick and easy suspension of ceilings and services, using the ComFlor wedge nut or Erico type GTD 1217 hangers and a suspension system by others.



Threaded Wedge Nut Fixings

Wedges are dovetail shaped steel blocks, which are threaded to take M8 metric bolts or threaded rods. The wedge nut hanger system is installed after the concrete of the composite slab has been poured and is fully cured.

Installation

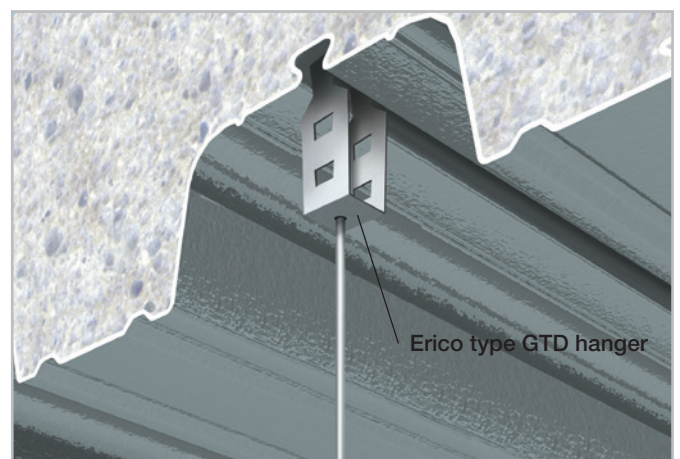
For installation of the system, the bolt/threaded rod and wedge nut assembly are inserted into the raised re-entrants of the profile before being pushed high up into the dovetail and rotated 90 degrees. The rod/bolt is then tightened. The dovetail shaped wedge nuts will lock into the dovetail re-entrants under vertical loading.

Erico type GTD 1217 hangers are squeezed together by hand and introduced to the dovetail in the ComFlor profile. Rotate 90 degrees and release. Once load is applied they will hang securely.

Load Bearing Capability

Wedge nut fixing type ComFlor M8 or Erico type PHWC8 have a safe static working load of 3.0kN each.

Squeeze type hangers from Enrico, type GTD 1217 M8 have a safe static working load of 0.5kN each.



ComFlor® 60/80 Sitework

Openings

Openings greater than 300mm must be designed by the engineer, with extra reinforcement placed around the opening. Openings up to 700mm can be accommodated readily in composite slabs, by boxing out prior to pouring concrete and cutting out the deck after concrete has cured.

Larger openings require support trimming steel, which must be installed prior to the decking. The decking is cut away immediately and the opening edges are then treated like any other perimeter with edge trim. **Note: do not cut the opening in the steel deck prior to concreting, or before the concrete has cured.**

Temporary supports

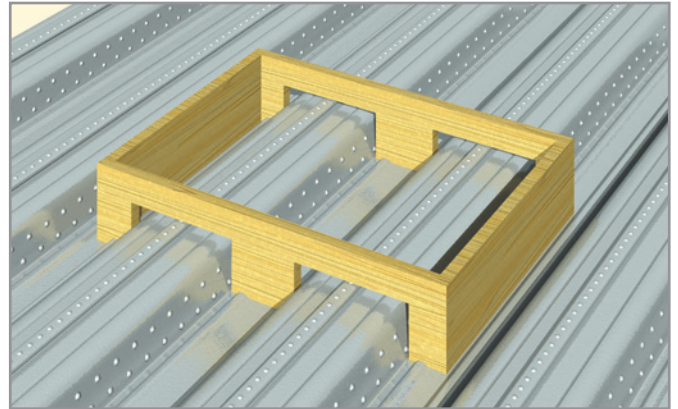
The safe design and installation of temporary props is the responsibility of the main contractor or designated sub-contractor. Where temporary supports are required by the design, these must provide continuous support to the profiled sheeting. Spreader beams (timbers) are used, supported by temporary props at one metre centres.

[a] The timbers and props must be of adequate strength and construction.

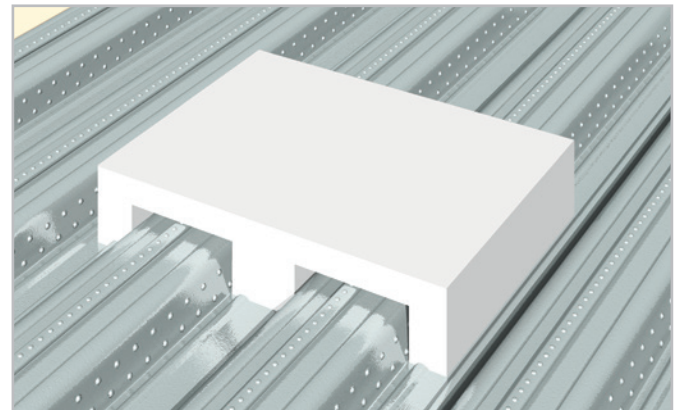
[b] The temporary supports are placed at midspan or at other suitable centres if more supports per span are required. Please contact our Technical Department.

[c] The spreader beams or timbers are to provide a minimum bearing width of 100mm. The spreaders must not deflect more than 10mm and should be placed narrow edge up, see diagram.

[d] The propping structure is not to be removed until the concrete has reached at least 70% of its characteristic strength.



Timber shutter (supplied by others)

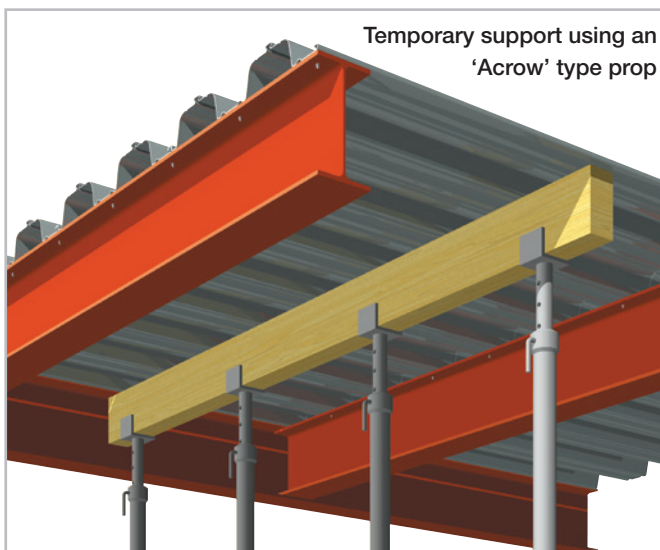


Dense polystyrene block (supplied by others)

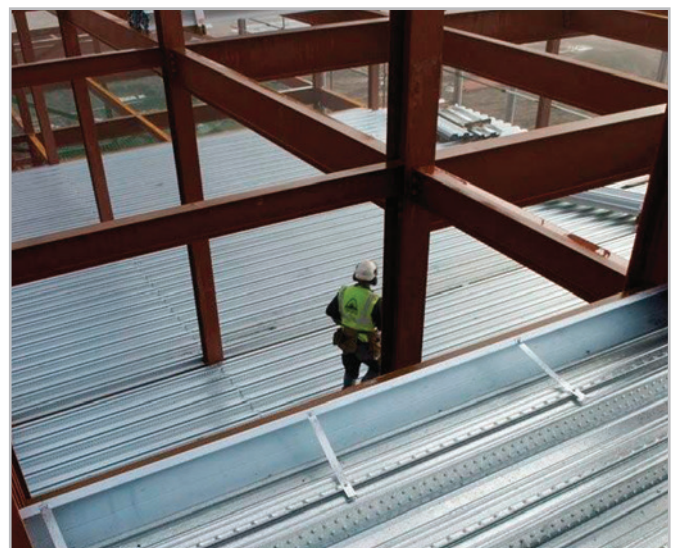
Temporary Props

Timber Bearer Guide for CF 60 and CF 80
All to be min. 100mm wide

| Slab depth (mm) | Bearer depth (mm) |
|-----------------|-------------------|
| 130 - 160 | 200 |
| 170 - 200 | 250 |



Temporary support using an 'Acrow' type prop



Transport & Handling

Information of particular interest to Composite Flooring Contractors is given below.

Receiving Decking

ComFlor Decking is packed into bundles of up to 25 sheets, and the sheets are secured with metal banding. Each bundle is 650mm wide (the overall width of a single sheet) by up to 650 mm deep, and may weigh up to 2.5 tonnes, depending on sheet length (average weight is about 1.5 tonnes). Loads are normally delivered by an articulated truck approximately 16 m long with a maximum gross weight of up to 40 tonnes, and a turning circle of approximately 19m. The Main Contractor should ensure that there is suitable access and appropriate standing and off-loading areas.

Each bundle has an identification tag. The information on each tag should be checked by operatives from the decking contractor (or, if they are not on site, the Main Contractor) immediately upon arrival. In particular, the stated sheet thickness should be checked against the requirement specified on the contract drawings, and a visual inspection should be made to ensure that there is no damage.

Lifting Bundles

The bundles should be lifted from the truck. Bundles should never be off-loaded by tipping, dragging, dropping or other improvised means.

Care is needed when lifting the decking bundles; protected chain slings are recommended. Unprotected chain slings can damage the bundle during lifting; when synthetic slings are used there is a risk of severing them on the edges of the decking sheets.

If timber packers are used, they should be secured to the bundle before lifting so that when the slings are released they do not fall to the ground (risking injury). Bundles must never be lifted using the metal banding.

Positioning the Decking

The support steelwork should be prepared to receive the decking before lifting the bundles onto it. The top surface of the underlying beams should be reasonably clean. When thru-deck welding of shear studs is specified, the tops of the flanges should be free of paint, galvanising, dirt or other impurities.

The identification tags should be used to ensure that bundles are positioned on the frame at the correct floor level, and in the nominated bay shown on the deck layout drawing. Multiple bundles should be positioned such that the interlocking side laps are on the same side for any one continuous area.

This will enable the decking to be laid progressively without the need to turn the sheets. The bundles should also be positioned in the correct span orientation, and not at 90° to it. Care should be taken to ensure that the bundles are not upside down. The embossments should be oriented so that they project upwards.

Placement of Decking

Ensure that all safety netting and barriers are securely in place prior to working at any height that poses injury risk from falling. The breaking open of bundles and installation of decking should only

begin if all the sheets can be positioned and secured. This will require sufficient time and suitable weather. The decking layout drawing should also be checked to ensure that any temporary supports that need to be in position prior to deck laying are in place. Access for installation will normally be achieved using ladders connected to the steel frame. Once they have started laying out the sheets, the erectors will create their own working platform by securely fixing the decking as they progress.

The laying of sheets should begin at the locations indicated on the decking layout drawings. These would normally be at the corner of the building at each level; to reduce the number of 'leading edges', ie unprotected edges, where the decking is being laid. When the bundles have been properly positioned, as noted above, there should be no need to turn the sheets manually, and there should be no doubt which way up the sheet should be fixed.

Individual sheets should be slid into place and, where possible, fixed to the steelwork before moving onto the next sheet. This will minimise the risk of an accident occurring as a result of movement of a sheet when it is being used as a platform. (However, for setting-out purposes, it may be necessary to lay out an entire bay using a minimum number of temporary fixings before fully securing the sheets later).

Sheets should be positioned to provide a minimum bearing of 50mm on the steel support beams. The ends of adjacent sheets should be butted together. A gap of 5mm is the maximum in order to avoid excessive concrete seepage. Tape may be used to seal any gaps. When end gaps are greater than 5mm, it is normally sufficient to seal them with an expanding foam filler. The longitudinal edges should be overlapped, to minimise concrete seepage.

Cutting Sheets

Where necessary, sheets may be cut using a grinder or a nibbler. However, field cutting should be kept to a minimum and should only be necessary where a column or other obstruction interrupts the decking. Gaps adjacent to the webs of columns should be filled in with off-cuts or thin strips of steel. Decking sheets shown as continuous on the decking layout drawing should never be cut into more than one length. Also, sheets should never be severed at the location of a temporary support, and the decking should never be fastened to a temporary support.

Construction Loading

As the work progresses, unwanted scraps and off-cuts should be disposed of in a skip placed alongside the appropriate level of working. The skip should be positioned carefully over a support beam to avoid overloading the decking. If a skip is not available, scraps should be gathered for collection by the Main Contractor as soon as is possible. Partially used bundles should be secured, to avoid individual sheets moving in strong winds.

Any significant loading of the ComFlor sheeting prior to the pour should be avoided. Bundles of mesh and or reinforcing bars shall not be loaded onto the decking without special care and consideration of proper load transfer to avoid damage to the ComFlor sheeting. Specific direction may be required from the design engineer.

References – Health and Safety

The design guidance given in this brochure and in the ComFlor design software is in accordance with the following Standards.

British Standards

Composite Floor Deck

1. BS 5950: Part 4. Structural use of steelwork in building: Code of practice for design of composite slabs with profiled steel sheeting.

Composite Steel Beams

2. BS 5950: Part 3: Design in composite construction: Section 3.1. Code of practice for design of simple and continuous composite beams.

Profiled Steel Deck

3. BS 5950: Part 6. Structural use of steelwork in building: Code of practice for design of light gauge profiled steel sheeting.

Fire Resistance

4. BS 5950: Part 8. Structural use of steelwork in building: Code of practice for fire resistant design.

Concrete

5. BS 8110: Part 1. Structural use of concrete: Code of practice for design and construction.
6. BS 8110: Part 2. Structural use of concrete: Code of practice for special circumstances.

Reinforcement

7. BS 4483. Specification for steel fabric for the reinforcement of concrete.
8. BS4449. Specification for carbon steel bars for the reinforcement of concrete.

Eurocode 4

9. ENV 1993 - 1 - 3: Design of steel structures. Supplementary rules for cold formed thin gauge members and sheeting.
10. ENV 1994 - 1 - 1: Design of composite steel and concrete structures. General rules for building.
11. ENV 1994 - 1 - 2: Design of composite steel and concrete structures. Structural fire design.
12. SCI - P - 076 : Design guide on the vibration of floors. SCI in association with CIRIA (1989).

New Zealand Standards

13. AS/NZ 1170 Structural Design Actions
14. NZS 3101 Concrete Structures Standard
15. NZS 3404 Steel Structures Standard

Health and Safety

Handling Hazards

Zinc coated steel decking should be handled with care; it may be delivered with soluble protective layer of oil, which can cause contamination to lacerated skin. Decking will have sharp edges and corners. Adequate gloves and protective clothing should be worn when handling decking.

Eye Hazards

Eye protectors conforming to the specification in BS 2092 should always be worn when breaking the strapping around bundles because the sudden release of tension creates a risk to eyes. Particles of metal also create eye hazards when cutting steel, and eye protection should be worn during this activity.

Noise Hazards

Noise may be hazardous whilst handling or cutting decking, shot firing, etc. Adequate ear defenders should be worn.

Respiratory Hazards

Fumes containing oxides of iron and zinc are produced during welding or flame cutting and if inhaled these may cause metal fume fever; this is a short-lasting condition with symptoms similar to those of influenza. In conditions of exposure to such hazards, the use of respiratory equipment is recommended.

Explosives and Fumes

When using shot fired fixings, explosives and fumes may create a hazard.

Occupational Exposure Limits

Limits for iron and zinc oxides are $5\text{g}/\text{m}^3$ (8 hours TWA) and $10\text{mg}/\text{m}^3$ (10 minutes TWA). (OE recommendation)

Summary of Protective Measures

Wear adequate gloves and protective clothing and safety goggles. Ensure adequate ventilation and use personal protective equipment. Follow instructions for safe handling, use, disposal and control of cartridges issued by equipment supplier. Ensure adequate ventilation and/or use personal respiratory protective equipment. Use appropriate ear defenders or earplugs.

General Safety Points

Follow the good practice outlined here and in SCI publications. Always fix deck securely before using as a working platform.

- Rigorously employ all personal safety measures such as hard hats, protective clothing.
- Rigorously employ all site safety measures such as safety lines, edge protection, properly tied ladders.
- Don't leave any unfixed decking sheets.
- Don't heap concrete or drop from any height.
- Don't put heavy loads on unprotected deck.
- Don't place props on uncured concrete.
- Don't cut holes/voids in the deck prior to concreting.

Composite Floor Design Software

ComFlor® Design Software

The ComFlor composite floor design program is available on disc or can be down loaded from www.comflor.co.nz.

Please note that the software will be updated from time to time without prior notice. The ComFlor design software was developed by the Steel Construction Institute based in the United Kingdom.

Use of the Design Program

Choose BS5950.

In design to BS5950, the cube strength is used.

Therefore the concrete grade in the ComFlor design software C30 refers to the cube strength value. Please refer to page 9.

All the variables start with a default value. Check or input new variables on both Datasheet 1 and Datasheet 2.

When satisfied, click 'analyse' to run the calculations.

Job details may be entered for a formal printout.

Before accepting a particular design as satisfactory, it is highly advisable to print out the calculations and check that all the input parameters are correct.

Design Criteria and Methods

The design program has been produced by the Steel Construction Institute, UK.

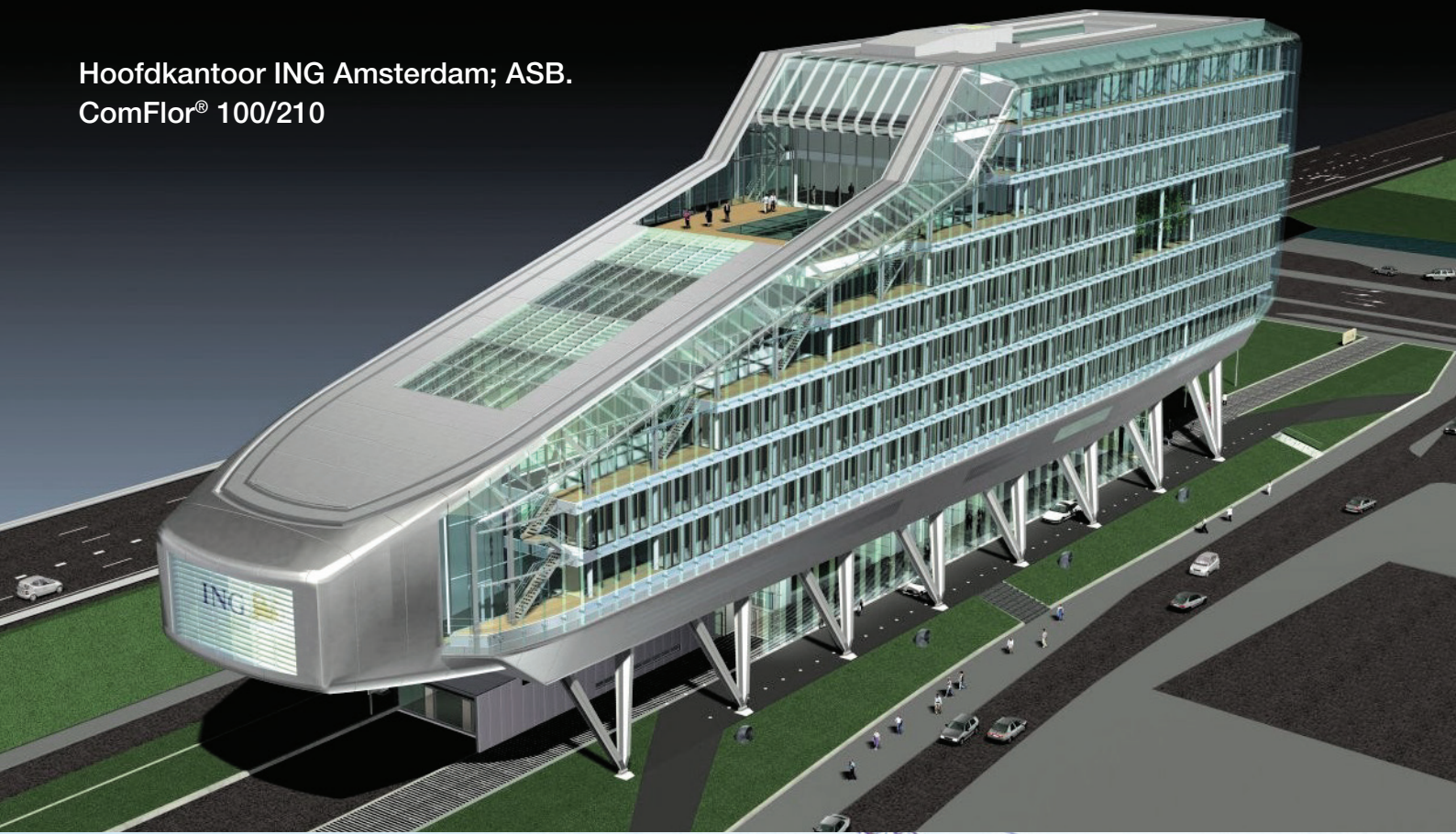
Help Function on ComFlor Design Software

The Help function on the design program contains all the detailed information that is used to produce the calculations. Click 'help' in the top left corner of the screen, then 'help topics'.

Support

For hands on support when using the ComFlor design software contact us on 09 271 1780.

Hoofdkantoor ING Amsterdam; ASB.
ComFlor® 100/210



As part of continuing product and system development, we reserve the right, at any time and without notice, to discontinue or change the products, materials, design advice, features or specifications represented in this brochure without incurring any liability.

Care has been taken to ensure that this information is accurate, but S&T Stainless, and its subsidiaries do not accept responsibility or liability for errors or information which is found to be misleading.

Copyright 2008

ComFlor® is a registered trade mark used in Australia and New Zealand under licence from Tata Steel UK Limited.



STRONGER IN EVERYWAY

 **steel&tube**

S&T STAINLESS
Head Office
7 Bruce Roderick Drive
East Tamaki
Auckland 2013
P +64 9 271 1780
F +64 9 271 1970

CONTACT US TODAY:
+64 9 271 1780
www.comflor.co.nz