steel&tube

ComFlor™

# COMFLOR® 80

## PRODUCT GUIDE

FEB 2026

## FOR COMFLOR® SALES & PROJECT SUPPORT CONTACT CFDL

In addition to providing sales support for the full ComFlor® range, CFDL (Composite Floor Decks Ltd) provide design, installation and stud welding options for composite floor decking systems.

***0508 332 546*** *comflorsales@steelandtube.co.nz*

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### COMFLOR® TECHNICAL ENQURIES

***0800 266 356*** *comflortechnical@steelandtube.co.nz*

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STRONGER TOGETHER

***0800 478 335*** | ***steelandtube.co.nz*** | ***sales@steelandtube.co.nz***

# COMFLOR® 80

**ComFlor®, an advanced solution in composite steel floor decking systems, is offered by 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.

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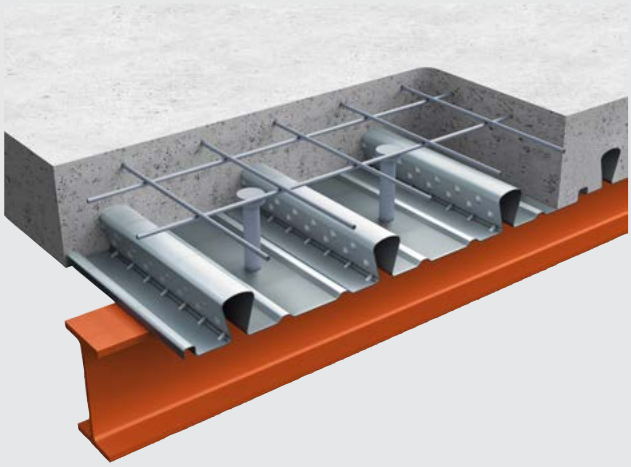
## SUSTAINABILITY AND QUALITY FOCUSED

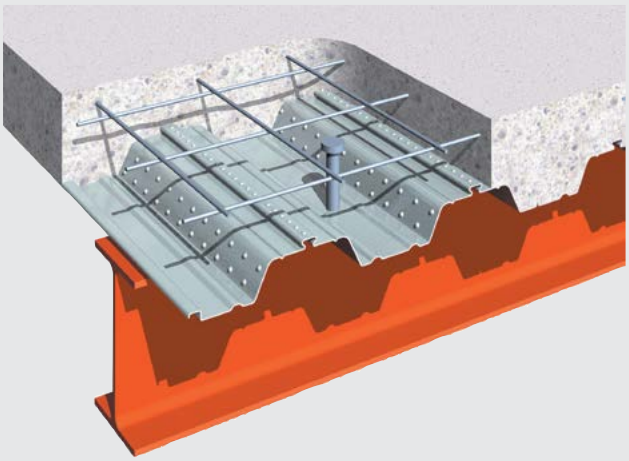
Where possible, we offer low-carbon metals, while ensuring quality and consistency for our customers. Our procurement team and external auditors evaluate suppliers against strict criteria such as Modern Slavery, ESG, Quality Control, Delivery Performance, and more, so that our customers can have peace of mind when buying with Steel & Tube.

# COMFLOR® PROFILE RANGE



## COMFLOR® SR

ComFlor® SR is the latest evolution of a long line of re-entrant profile design, the favoured profile shape for a vast number of projects. It provides a virtually flat soffit and the best fire and acoustic performance of the ComFlor® range. The re-entrant shape and embossments give excellent composite slab strength characteristics and the open pan provide strong shear stud interaction. Able to span to 3.8 metres double unpropped and over 6.5 metres propped.

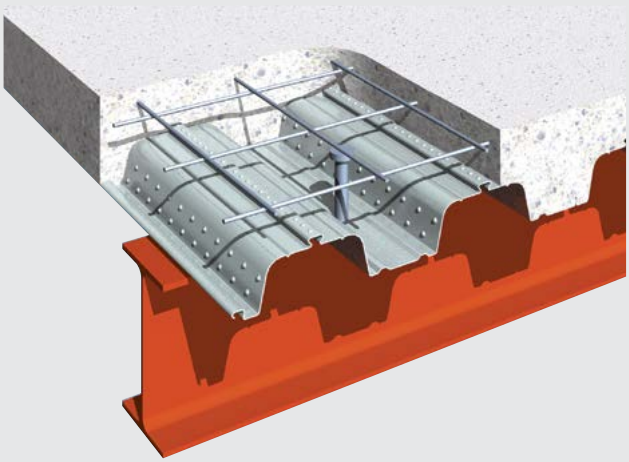


## COMFLOR® 60

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 double spans to 4.0 metres and propped spans to 6.5 metres.

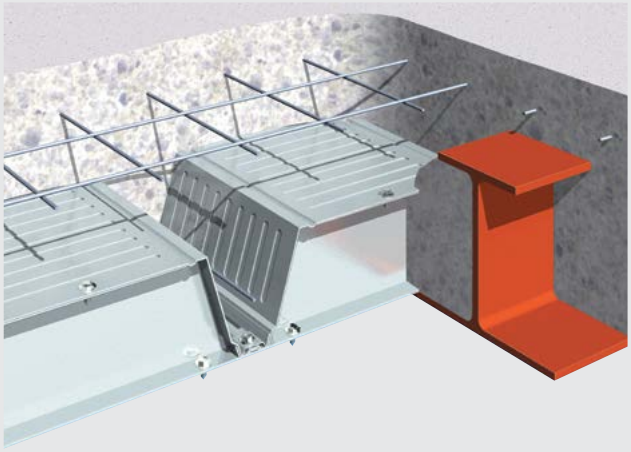


## COMFLOR® 80

ComFlor® 80 is a 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/ G550 galvanised steel, stretches unpropped double spans to 5.0 metres and propped spans to 6.5 metres.

Longer spans simplify and reduce the number of support beams in the steel frame, driving down overall construction cost.



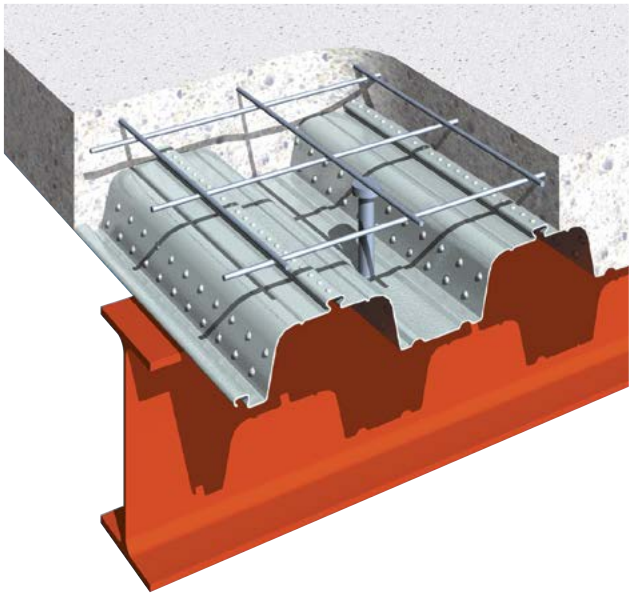
## COMFLOR® 210

ComFlor® 210 is a long span composite deck that offers unpropped spans to 5.1 metres and propped spans to 8.5 metres 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 OVERVIEW

**ComFlor® 80 is a composite decking that offers longer spans, minimised concrete volumes, and sets new benchmarks for shallow slab construction efficiencies.**

**The efficiency and spanning capacity of the trapezoidal profile is enhanced by the large curved corner and the use of high strength G500/G550 galvanized steel to give major performance advantages over traditional square shouldered profiles.**



### PROVEN CONSTRUCTION ECONOMIES

ComFlor® 80 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 5.0M

Design software is available to give unpropped double span options of up to 5.0m. 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 and structural design is minimised by the profile design.

The profiled shape further reduces the volume of concrete required, effectively decreasing the slab depth by 45mm (ponding not considered). This reduction in depth and concrete volume leads to a lower overall floor height, decreased dead loads on the structure and foundations, ultimately cost savings in the construction of the building.

### 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® 80

The AS/NZS 2327 C 3.6.2.7.3 states that the nominal height of the connector shall extend not less than 2 times the diameter of the shear stud above the top of the main trapezoidal section. The ComFlor® 80 trapezoidal height is 80mm meaning that a standard 125mm stud is suitable for use with the ComFlor® 80 profile.

### FIRE PROPERTIES OF THE COMFLOR® 80 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 80mm results in a reduced overall slab depth being required for any particular fire rating. Fire test reports up to 4 hours to BS5950 are available for ComFlor® 80.

### FIRE DESIGN SOFTWARE TOOLS

ComFlor® Software is available for the design of slabs with up to 2-hour fire rating to AS/NZS 2327 Appendix E. The profile has been rigorously tested at Imperial College, London. The ComFlor® 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 M10 Wedge Nut gravity hanger system.

# COMFLOR® 80 DESIGN INFORMATION

## DESIGN NOTES

### DECK MATERIAL

Zinc coated steel to AS 1397 G500/G550, Z275, with a guaranteed minimum yield stress of 500 N/mm2. Minimum zinc coating mass is 275 g/m2 total including both sides. 450 g/m2 available by request.

### COMFLOR® SOFTWARE

Full design can be carried out using the ComFlor® software. Available free on request, or download at:
**www.steelandtube.co.nz/specifiers/comflor®#Documents-and-Links**

### MINIMUM SECONDARY (TRANSVERSE) REINFORCEMENT

In accordance with AS/NZS 2327 Clause 2.2.1, transverse reinforcement must be provided within the depth of the concrete above the decking ribs.

The area of top reinforcement in the primary span direction must be no less than the area of top reinforcement required in the transverse direction.

The required amount of top reinforcement in the transverse direction shall comply with Table 2.2.1 of AS/NZS 2327.

If the imposed actions do not exceed a concentrated load of 7.5 kN or distributed of 5.0 kN/m² nominal transverse reinforcement is permitted without calculations, otherwise the distribution of bending moments caused by these loads shall be determined, and the transverse reinforcement determined using AS 3600 or NZS 3101.

### DESIGN DETAILS

ComFlor® provide a set of design details for the entire product range, available in various formats for use in drawings, facilitating the specification of all our products.

**www.steelandtube.co.nz/bimspec/comflor**

### TECHNICAL SERVICES

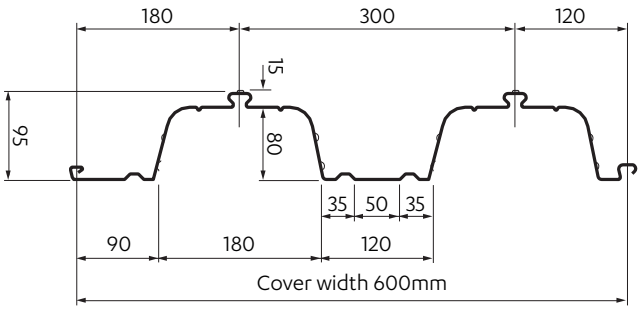
A comprehensive advisory service for the design of composite flooring is available to all specifiers and users.

Should queries arise which are not covered by this literature or by the ComFlor® design software, please contact us at **comflortechnical@steelandtube.co.nz** or call **0800 266 356**

# COMFLOR® 80 DESIGN INFORMATION

## COMFLOR® 80 COMPOSITE SLAB - VOLUME AND WEIGHT (EC VALUES)

| SLAB DEPTH mm | CONCRETE VOLUME ($m^3/m^2$) | NORMAL WEIGHT CONCRETE Weight of concrete $kN/m^2$ | |
|---|---|---|---|
| | | WET | DRY |
| 150 | 0.105 | 2.48 | 2.42 |
| 160 | 0.115 | 2.71 | 2.65 |
| 170 | 0.125 | 2.95 | 2.88 |
| 180 | 0.135 | 3.18 | 3.12 |
| 190 | 0.145 | 3.42 | 3.35 |
| 200 | 0.155 | 3.65 | 3.58 |
| 210 | 0.165 | 3.89 | 3.81 |
| 220 | 0.175 | 4.12 | 4.04 |
| 230 | 0.185 | 4.36 | 4.27 |
| 240 | 0.195 | 4.59 | 4.50 |
| 250 | 0.205 | 4.83 | 4.73 |
| 260 | 0.215 | 5.07 | 4.96 |




**VOLUME AND WEIGHT TABLE NOTES:**

1. Deck and beam deflections (i.e. ponding) is not allowed for in the table.
2. Deck and mesh weight is not included in the weight of concrete figures.
3. Density of concrete is taken as:
   Normal weight (wet) 2400 $kg/m^3$
   Normal weight (dry) 2350 $kg/m^3$

## COMFLOR® 80 SECTION PROPERTIES (PER METRE WIDTH)

| NOMINAL THICKNESS mm | DESIGN THICKNESS mm | CROSS SECTION AREA $mm^2/m$ | PROFILE WEIGHT $kN/m^2$ | MOMENT OF INERTIA $cm^4/m$ | | ULTIMATE MOMENT CAPACITY kNm/m | |
|---|---|---|---|---|---|---|---|
| | | | | Sagging | Hogging | Sagging | Hogging |
| 0.75 | 0.70 | 1163 | 0.09 | 138.53 | 113.60 | 9.18 | 8.14 |
| 0.90 | 0.86 | 1382 | 0.11 | 157.10 | 136.48 | 12.06 | 10.11 |
| 1.00 | 0.96 | 1549 | 0.12 | 171.56 | 158.25 | 14.31 | 11.99 |
| 1.20 | 1.15 | 1914 | 0.15 | 216.42 | 180.65 | 19.70 | 14.04 |

# COMFLOR® 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 **0800 266 356** for our Hegley acoustic report, or download them from our website at: **www.steelandtube.co.nz/specifiers/comflor%C2%AE#Documents-and-Links**
- **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 to provide temporary propping and so the span and slab depth required governs the deck selection.

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

## FULL DESIGN USING COMFLOR® SOFTWARE

The combination of this manual and ComFlor® Design Software makes full design easy. The final design should be verified using the ComFlor® Design Software. This also greatly increases the scope available to the Design Engineer and allows the engineer to print a full set of calculations which can be used for submission to a Local Authority.

## NEW ZEALAND, BRITISH STANDARDS AND EUROCODES

The ComFlor® design software user is offered a choice to design to AS/NZS 2327, BS5950: Parts 3 and 4, or to Eurocode 4.

However, New Zealand users are recommended to use the AS/NZS 2327 option.

## CRACK CONTROL REINFORCEMENT

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 AS/NZS 2327 IS recommended as the most acceptable for control of shrinkage and temperature cracking in Clause 6.3

The AS/NZS 2327 recommendation is that the cross-sectional area of the anti-crack reinforcement above the ribs shall be not less than 0.2% of the cross-sectional area of the concrete above the ribs for unpropped construction and 0.4% of this cross-sectional area for propped construction.

The Steel Construction Institute has agreed to modify the requirement with regard to anti- crack mesh, to comply with the AS/NZS 2327 recommendations. The ComFlor® design software defaults to these values.

Reference should be made to NZS3101 to confirm the exposure classification and the cover for the reinforcement mesh.
All mesh laps shall comply with the requirement of NZS 3101 Clause 8.7.6.

The New Zealand equivalent mesh sizes are identified as follows:

| MESH TYPE | SECTIONAL AREA $mm^2/m$ |
|---|---|
| SE62 | 146 |
| SE72 | 192 |
| SE82 | 251 |
| SE92 | 318 |

## REDUCED REINFORCEMENT

Where AS/NZS 2327 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, i.e. 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. Also the reduced mid-span mesh must be checked for adequacy under fire, for the rating required.

# COMFLOR® 80 DESIGN INFORMATION

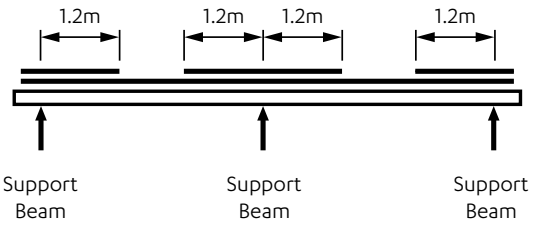



*Diagram showing full mesh area over supports*

## BAR REINFORCEMENT (BOTTOM STEEL)

The Axis Distance of bar reinforcement 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 at one bar per profile trough.

## TRANSVERSE REINFORCEMENT IN BEAMS WITH PROFILES STEEL SHEETING

Comflor® composite floor decks contribute to transverse reinforcement of the composite beam, provided that the decking is continuous across the top flange of the steel beam. For further information refer to AS/NZS 2327 Clause 3.8.9.

## CONCRETE CHOICE

In design to AS/NZS 2327 the cylinder strength is used. Therefore the concrete grade in the ComFlor® design software N20 refers to the cylinder strength value.

The strength of the concrete must meet the requirements for strength for the composite slab and shall not be less than 20MPa (cylinder strength) for NWC. Similarly, the maximum value of concrete strength shall not be taken as greater 60MPa (cylinder strength) for NWC.

In design to Eurocode 4, the cylinder strength is used. The concrete grade (C25/30) defines the (cylinder/cube strength) to EC 4.

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.

| CYLINDER STRENGTH (NZS) MPa | CUBE STRENGTH (BS) MPa |
|---|---|
| 20 | 25 |
| 25 | 30 |
| 30 | 37 |

## CONCRETE DENSITY

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

| | DENSITY kg/m³ | | |
|---|---|---|---|
| | 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 AS 1530.4 Section 4 or BS 5950: Part 8 must be satisfied and are taken into account in the tables and 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.

  30 minute fire rating is automatically achieved and requires no calculation. The capacity of the composite slab for fire design over 30 minute may be calculated using either the Mesh and Deck Method or the Bar Method. The Mesh and Deck Method will be the most economic. The Bar Method should be used for design to Eurocodes.
- The Mesh and Deck Method utilises the catenary action of the mesh or other continuous longitudinal reinforcement (bar), but requires slab continuity over at least one permanent support. The capacity assessment in fire is based on a single or double layer of standard mesh. Any bottom reinforcement is ignored.
- The Bar 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 axis distance of the bar reinforcement defines the distance from the bottom of the ribs to the centre of the bar, which has a minimum value of 25mm, and a maximum value of the profile height.

  The Bar Method can be used for slabs with no continuity and where the Mesh and Deck Method cannot provide the fire period required.

# COMFLOR® 80 DESIGN INFORMATION

## DEFLECTION LIMITS

Where more specific information is not available, 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 AS/NZS 2327 Appendix B Table B2 and BS5950: Part 4.

  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/180 (but not greater than 20 mm) when the effects of ponding are not taken into account.

  b) L/130 (but not greater than 30mm) when ponding is considered.

  L 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 AS/NZS 2327 Clause 2.6, when the deflection exceeds the lesser of L/180, 20mm,Ds/10, where Ds 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 if the construction stage deflection exceeds the above criteria. (Excluding non-structural screeds).

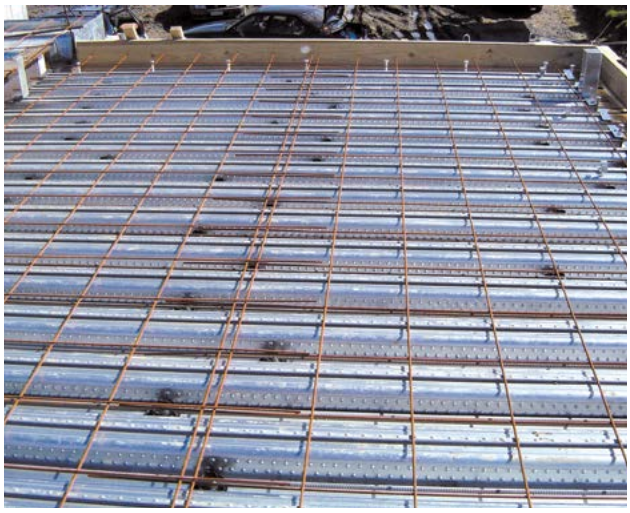
  For unpropped construction it is recommended the construction stage deflection in the ComFlor® design software be maintained at the default Span/130. The deflection limit can be reduced from 30mm as required. The help function in the ComFlor® design software contains all the details regarding parameters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

  For propped construction:
  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/500 (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/250 (but not greater than 30mm)
  The total deflection is the deflection of the slab under all applied loads – self weight, 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.



*ComFlor® – ready for concrete*

## 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.

## LOADS AND LOAD ARRANGEMENT

Reference should be made to AS/NZS 1170 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 ComFlor® default safety factors on the Loading section of the software are taken from AS/NZS 2327 and BS5950 Part 4. Reference can made to the help notes in the ComFlor® design program.

Unfactored loads are considered at the serviceability limit state, and partial safety factors for 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 1.5kN/m2 or 4.5/L (whichever is greater), where L is the span of the decking between effective supports in metres.

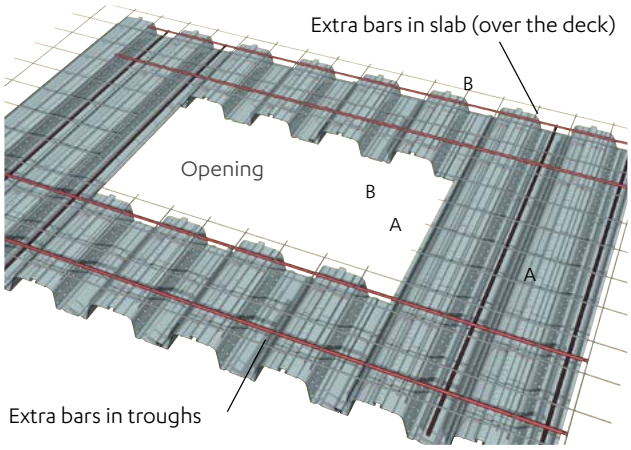
For multi span unpropped construction, the basic construction load of 1.5N/m2 is considered over one span only. On other spans, the construction load considered is half this value (i.e. 0.75kN/m2).

Construction loads are considered as imposed loads for this check.

Loads considered at the normal service stage consist of the slab self weight, superimposed dead loads and imposed loads.

# COMFLOR® 80 DESIGN INFORMATION

## OPENINGS




*Reinforcement around opening*

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.

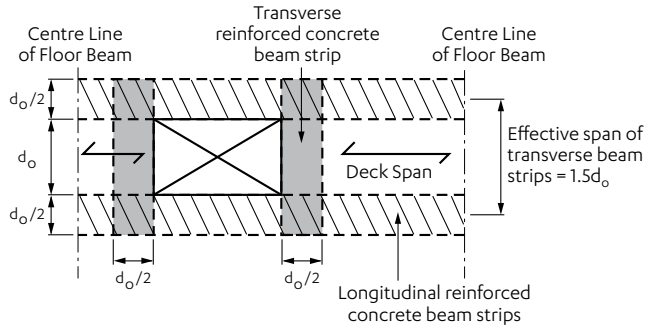
## OPENING RULES

Where W = width of opening across the span of the deck.

1. The distance between the opening and an unsupported edge must be greater than 500mm or W (whichever is greater).
2. Openings edge to edge must not be closer together than 1.5W (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 ¼ of the width of any bay is to be removed by openings.
4. Not more than ¼ 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 beam 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

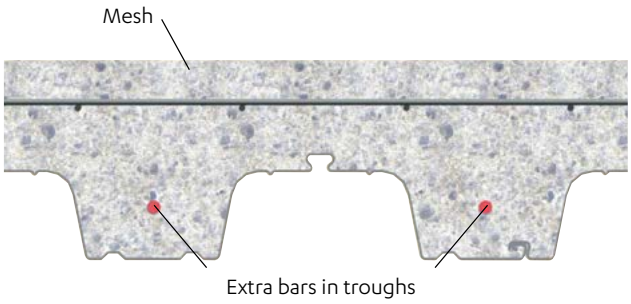
It may be assumed that an effective system of 'beam strips' span the perimeter of the opening. The effective breadth of the beam strips should be taken as $d_O/2$, where '$d_O$' is the width of the opening in the direction transverse to the decking ribs. Only the concrete above the ribs is effective. 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

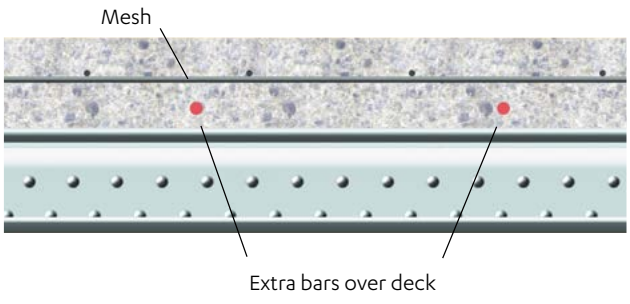
Extra reinforcement is to be provided within the 'beam strips' to suit the applied loading. This reinforcement often takes the form of bars placed in the troughs of the decking.

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

## SECTION A-A




## SECTION B-B

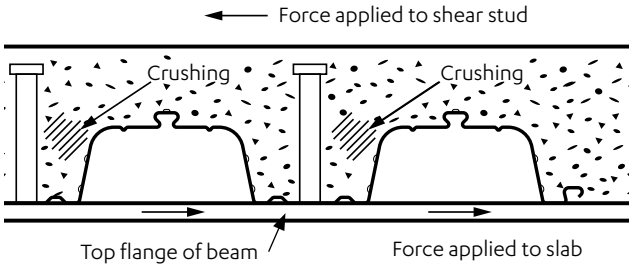


# COMFLOR® 80 DESIGN INFORMATION

## 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). In accordance to SCI publication P300.




*Welding of Shear Connectors with ComFlor® 80*

## 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 (qr) should be taken as given in the table at the bottom of the page.

The table relates to 125 x19mm shear studs with a length after welding (LAW) of 120mm.

The shear capacity of the welded studs (qr) has been derived from AS/NZS 2327 Appendix G, G4 section for composite beam design. As a result the stud capacities may be used with ComFlor® 80, which has a profile depth of 80mm.

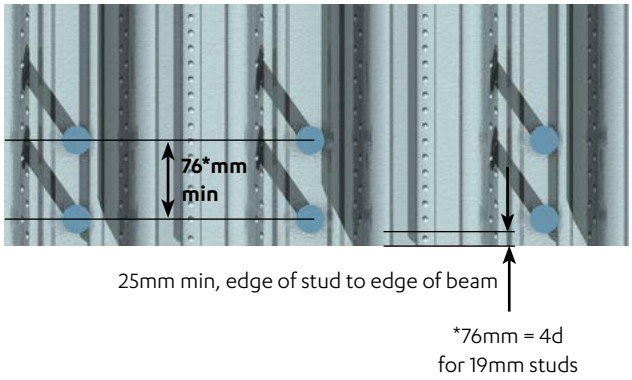
*Centrally placed studs on CF 80*

## SUITABILITY OF THE CF 80 DECK

For the CF 80 deck, the position of the stiffeners and the offset side-lap rib dictates the centralised placement of studs.

CF 80 studs can only be placed in the centre of the profile, which means they are 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 page 7. Standard 125 x 19mm diameter shear studs (120mm LAW) are suitable for use with ComFlor® 80.




## DESIGN GUIDE

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

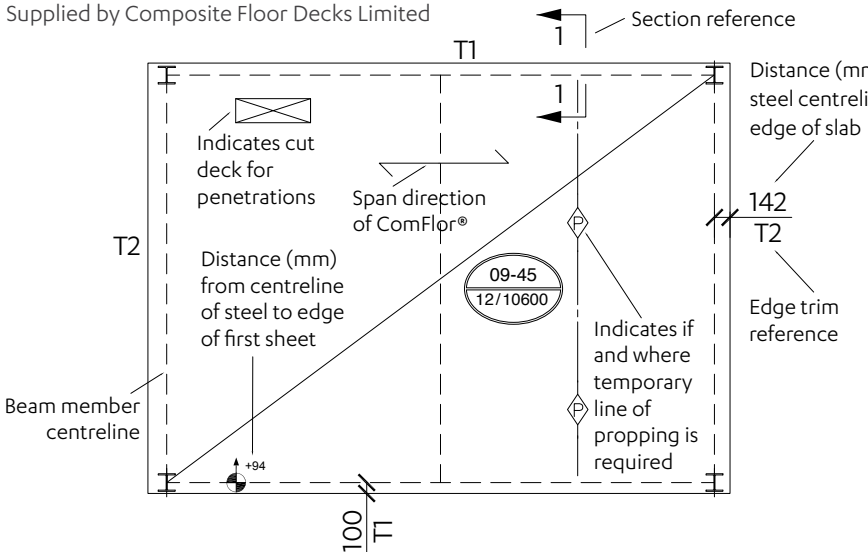
## THROUGH DECK WELDED SHEAR STUD CAPACITY

| Nominal resistance per connector in kN for 19 mm diameter x 125 mm long (LAW) studs through-deck welded ComFlor® 80 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Thickness of Deck, *t* (mm) | Number of studs per rib | *f*u = 410 MPa | | | | *f*u = 450 MPa | | | |
| | | Specified concrete cylinder strength (characteristic strength), *f*'c (MPa) | | | | Specified concrete cylinder strength (characteristic strength), *f*'c (MPa) | | | |
| | | 25 | 30 | 35 | 40 | 25 | 30 | 35 | 40 |
| ≤ 1.0 | 1 | 61.79 | 61.79 | 61.79 | 61.79 | 67.82 | 67.82 | 67.82 | 67.82 |
| | 2 | 43.69 | 43.69 | 43.69 | 43.69 | 47.96 | 47.96 | 47.96 | 47.96 |
| > 1.0 | 1 | 61.79 | 61.79 | 61.79 | 61.79 | 67.82 | 67.82 | 67.82 | 67.82 |
| | 2 | 43.69 | 43.69 | 43.69 | 43.69 | 47.96 | 47.96 | 47.96 | 47.96 |

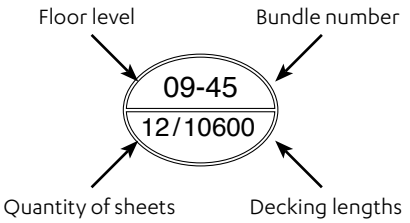
# COMFLOR® 80 CONSTRUCTION DETAILS

## TYPICAL FLOOR LAYOUT PLAN

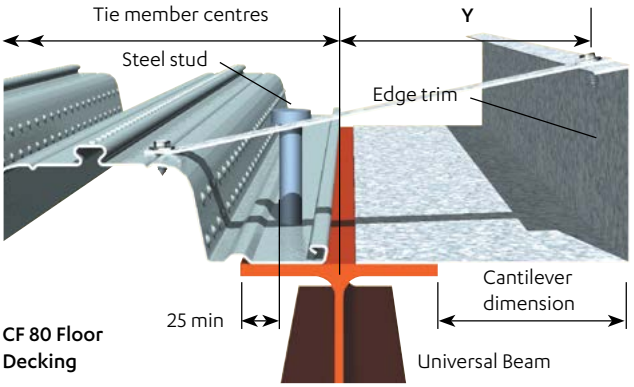
Supplied by Composite Floor Decks Limited

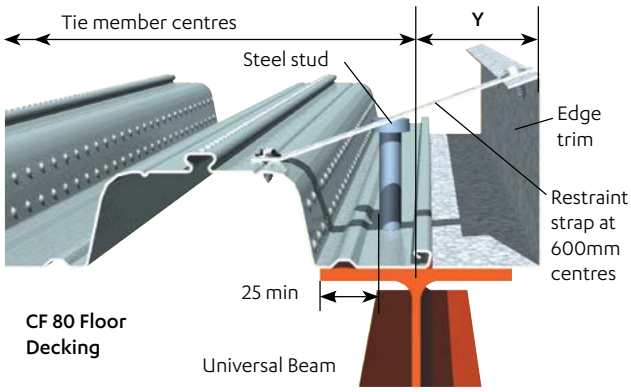



## DECK NOTATION DETAIL




## TYPICAL SIDE DETAIL

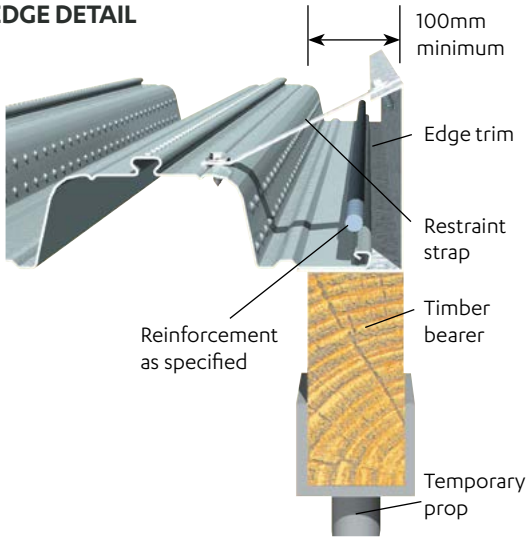



*See typical plan for dimension* **'X'** *&* **'Y'**

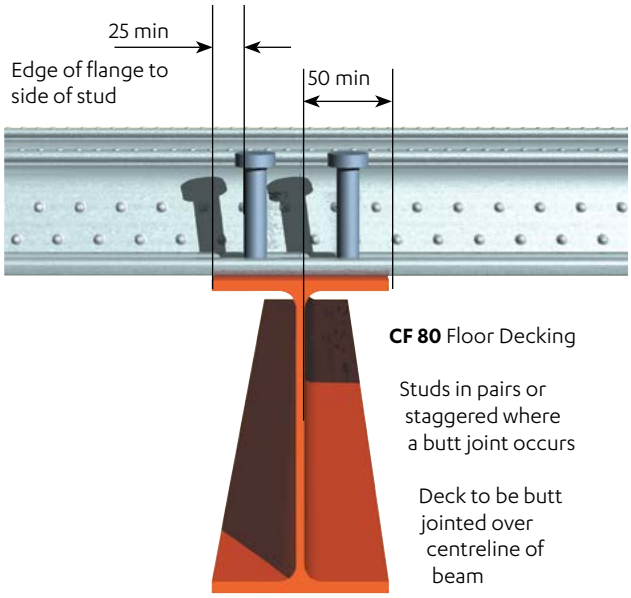
For edge trim cantilevers over 150mm, additional reinforcement is required. See table on page 18 for maximum cantilevers without props.

## UNSUPPORTED EDGE DETAIL

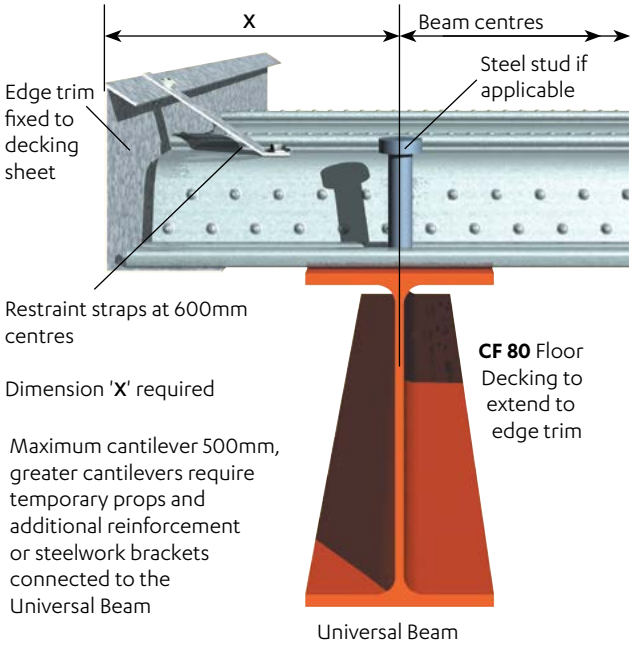


# COMFLOR® 80 CONSTRUCTION DETAILS

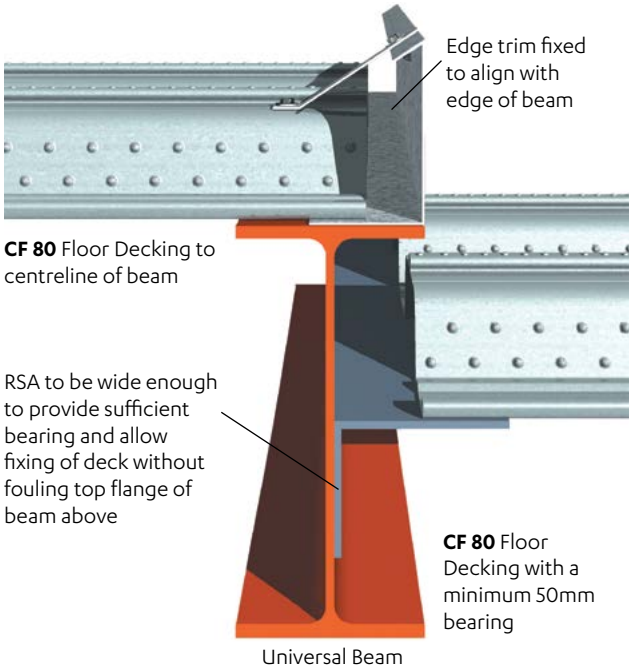
## BUTT JOINT



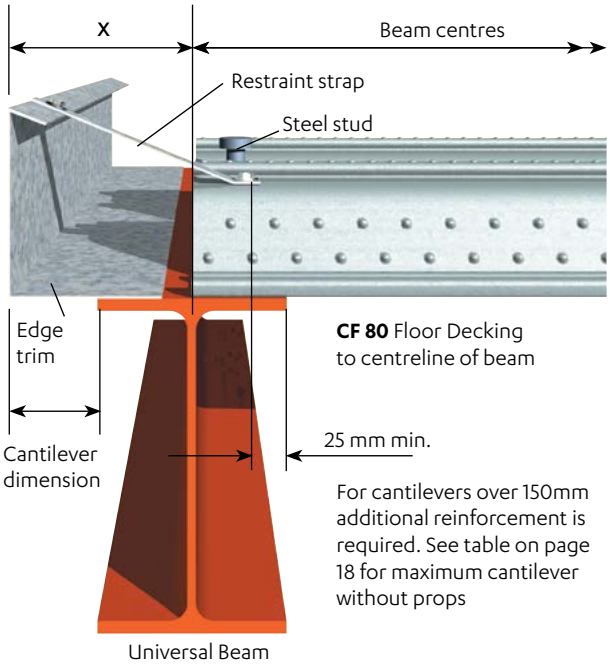

## TYPICAL END CANTILEVER




## STEP IN FLOOR

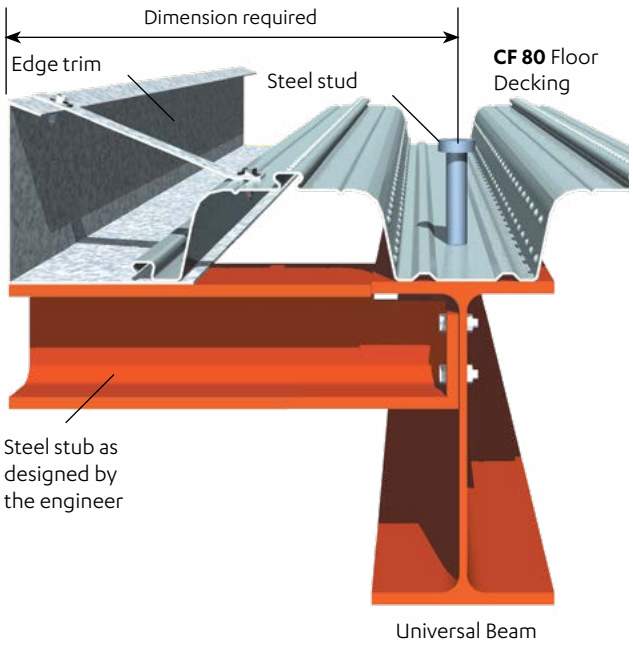



## END DETAIL

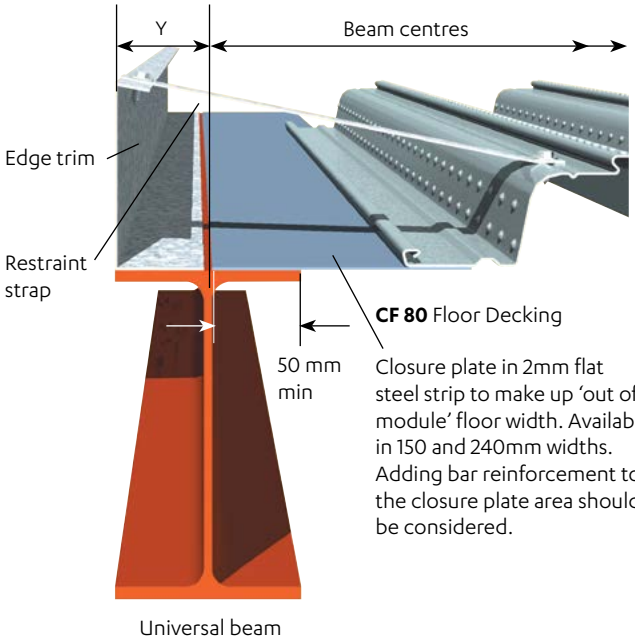


# COMFLOR® 80 CONSTRUCTION DETAILS

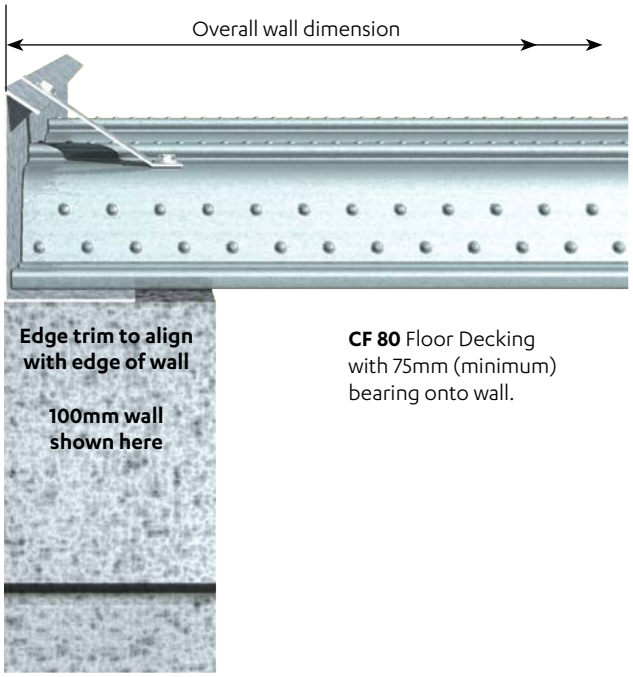
## SIDE CANTILEVER WITH STUB BRACKET



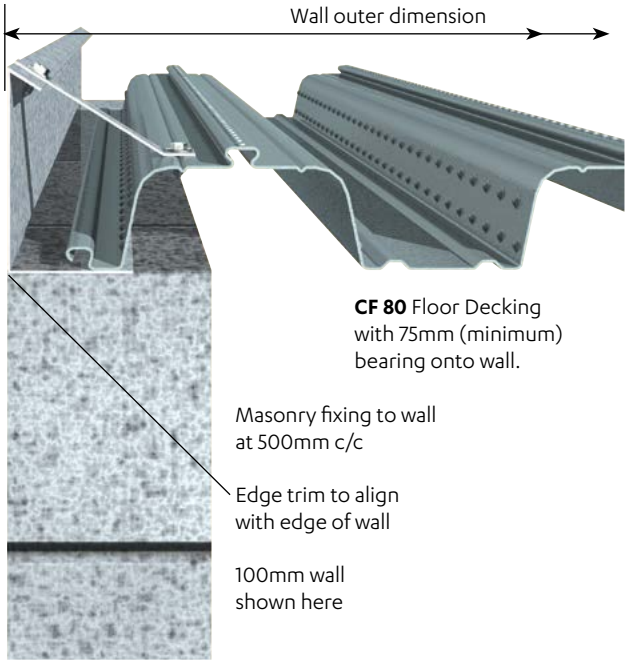

## TYPICAL EDGE WITH PLATE




## TYPICAL WALL END DETAIL

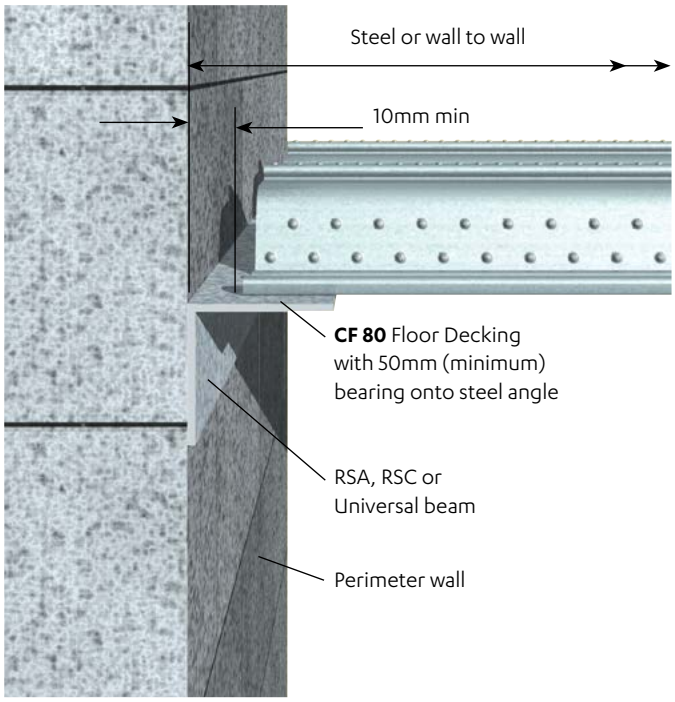



## TYPICAL WALL SIDE DETAIL

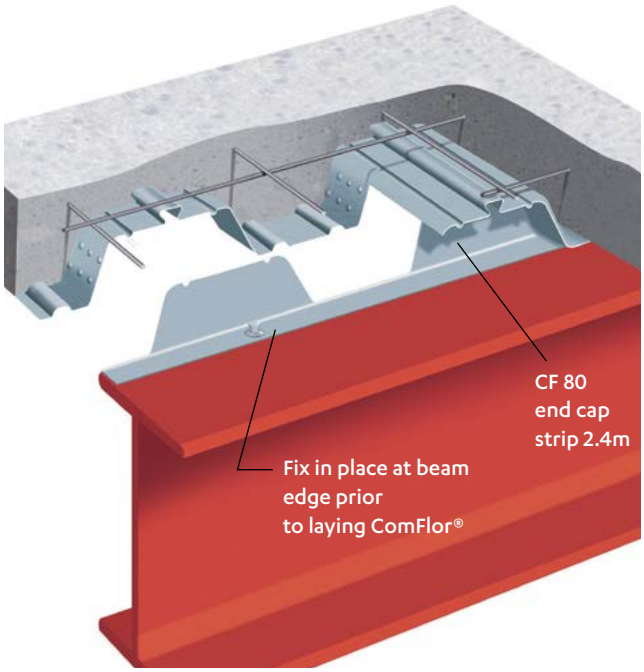


# COMFLOR® 80 CONSTRUCTION DETAILS

### DECK INSIDE OF WALL DETAIL




### END CAP STRIP DETAIL




# COMFLOR® 80 SITEWORK

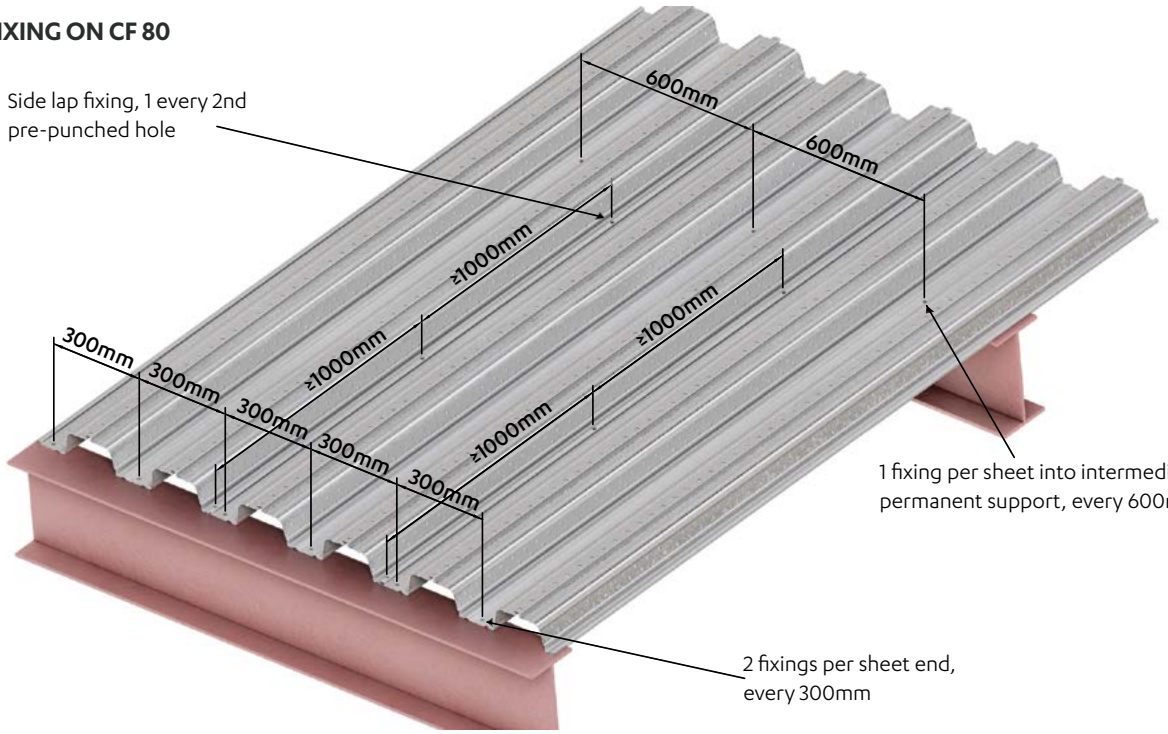
## DECK FIXING

It is important to secure ComFlor® to the supporting structure by fixing through the troughs. Common methods include using powder actuated pins, predrilled anchors, or self-drilling screws. The design engineer may specify alternate fixings.

| FIXINGS FOR COMFLOR® 80 | |
|---|---|
| **To Steel** | Shot Fired Fixing: For nominal fixing (tacking) prior to through deck shear stud welding use Hilti X-U15 P8TH or equivalent. For situations where through deck shear stud welding is not to be applied shortly after sheet tacking or if specific beam restrain or wind load resistance is required, a fully rated powder actuated shear pin such as Hilti ENP Siding and Decking Nail or equivalent should be considered by the project's designer engineer.<br>Self-drilling Screws: To steel up to 11mm thick, use grade 500 Hex Head screws. |
| **To Concrete** | Pre drill hole. Nominal fixing can be achieved using 6.5x32mm or similar concrete rated anchor. |
| **To side laps or Closure** | Self Drilling Hex Head screw with minimum diameter of 4.8mm (10g).<br>Minimum of 3 threads must protrude beyond the material to effect a secure fixing. |
| **To Timber** | Hex Head Tek screw, T17, minimum 5.5 mm (12g) diameter and 50mm long should be used. |

| FIXING SPACING | |
|---|---|
| **Side Lap Fixing** | 1 every 2nd pre-punched hole but no greater than every 1000mm |
| **End Fixing** | 2 per sheet end, 1 every 300mm |
| **Intermediate support** | 1 per sheet, 1 every 600mm |
| **Side fixing onto support** | 1 every 1000mm maximum |
| **End cap strip** | 3 per 2400mm strip. Fix behind the hump to avoid a clash with sheet placement. |

## DECK FIXING ON CF 80



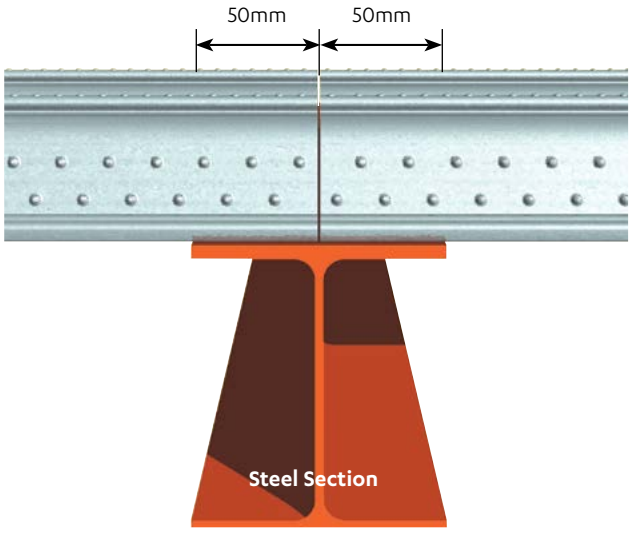

**NOTES:**

1. The advice provided is based on established industry practices. It is intended to serve as guidance rather than being prescriptive. There has not been any specific testing. The advice is given in good faith and draws from decades of successful installations, but it does not imply any responsibility or guarantee that the recommended fixings are suitable for your specific application. If specific wind load or beam top flange lateral restraint requirements are necessary, the design engineer shall determine the appropriate fixing specifications.
2. Any shear studs omitted for clarity.

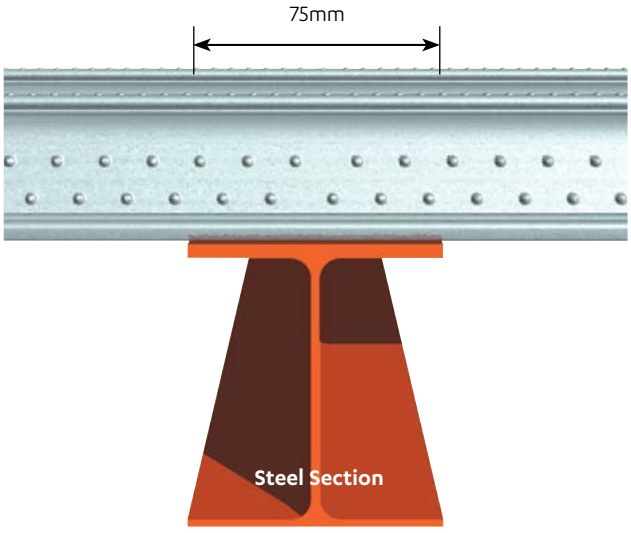
# COMFLOR® 80 SITEWORK

## BEARING REQUIREMENTS

End bearing and shared bearing (minimum)

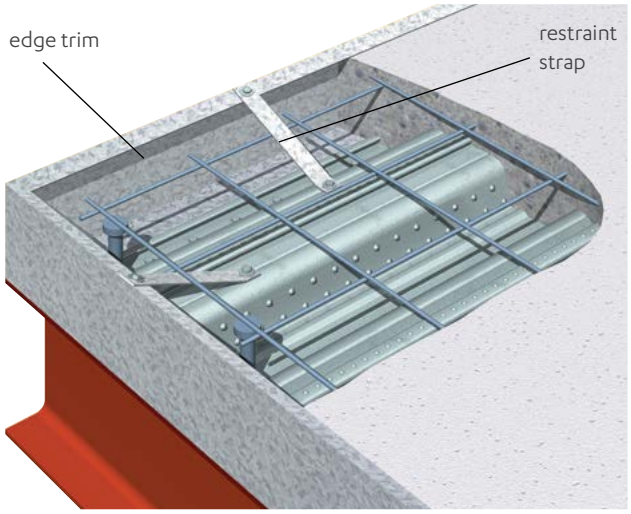



Continuous bearing (minimum)




## 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 | 0 | 115 | 150 | 185 |
| 200 | x | 100 | 130 | 160 |
| 250 | x | 0 | 100 | 135 |
| 300 | x | x | 0 | 100 |
| 350 | x | x | x | 0 |

x - not recommended

# COMFLOR® 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. Ring and bend tests should be 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 Construction Details Butt Joint 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 SE62, SE72 and SE82 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 as per manufacturer requirements.

### 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, working in the direction of span.

Care should be taken to avoid heaping of concrete in any area during the casting sequence.

Construction and day joints should occur near a support beam, preferably also at a deck joint.

Contact us on: **0800 266 356** for specific advice pertaining to your project.

### CEILINGS AND SERVICES HANGER SYSTEMS

The 15mm high raised mini-dovetail re-entrant stiffener on ComFlor® 80 profile allow for the quick and easy suspension of ceiling and services, using a suspension system.

### THREADED M10 WEDGE NUT FIXINGS

Wedges are dovetail shaped steel blocks, which are threaded to take metric bolts or threaded rods. The M10 wedge nut hanger system is installed after the concrete of the composite slab has been poured and is hardened.

### INSTALLATION OF M10 WEDGE NUT

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/nut is then tightened. The dovetail shaped wedge nuts will lock into the dovetail re-entrants under vertical loading.

### LOAD BEARING CAPABILITY

Wedge nut fixing type ComFlor® M10 have a safe static working load of 2.8kN each.

# COMFLOR® 80 SITEWORK

## OPENINGS

Openings greater than 300mm square must be designed by the engineer, with extra reinforcement placed around the opening. Openings up to 700mm square 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.

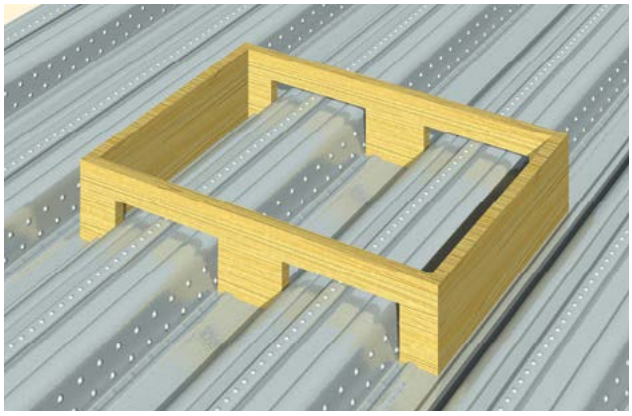
Where temporary supports are required by the design, these must provide continuous support to the profiled sheeting. Spreader beams (timbers) are used, supported by temporary props at one metre centres.

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

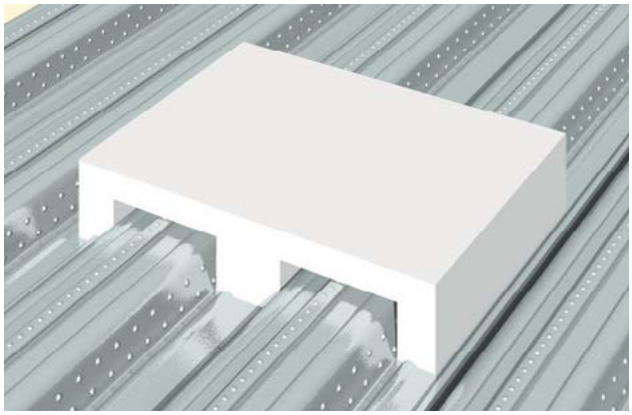
[b] The temporary supports are placed at midspan or at other suitable centres if more supports per span are required.

[c] The spreader beams or timbers are to provide a minimum bearing width of l00mm. The spreaders must not deflect more than 10mm and should be placed narrow edge up.

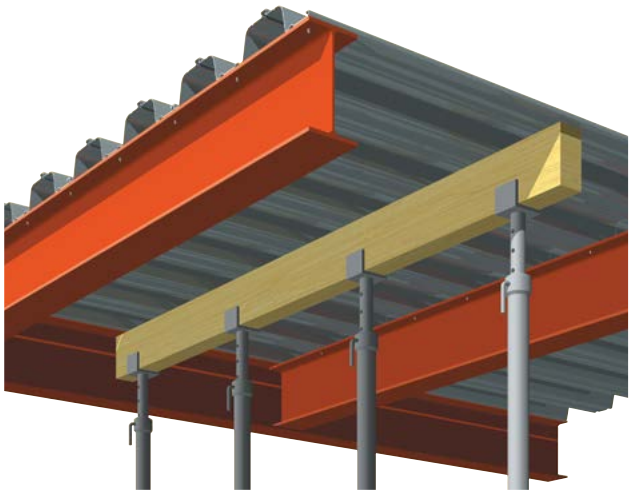
[d] The propping structure is not to be removed until the concrete has reached at least 70% of its characteristic strength.



*Timber shutter (supplied by others)*



*Dense polystyrene block (supplied by others)*



*Temporary 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 16m 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 (with potentially disastrous results). 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 or galvanising.

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. The bundles should be positioned such that the interlocking side laps are on the same side. 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 90o to it. Care should be taken to ensure that the bundles are not upside down, particularly with trapezoidal profiles.

The embossments should be oriented so that they project upwards.

## PLACEMENT OF DECKING

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', i.e. 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 up to 5mm is generally considered not to allow excessive concrete leakage, but, if necessary, the ends of the sheets may be taped together.

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 leakage.

## 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.

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.

# REFERENCES – HEALTH AND SAFETY

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

## NEW ZEALAND STANDARDS

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

### COMPOSITE STRUCTURES

1. AS/NZS 2327: Composite structures - Composite steel-concrete construction buildings

### PROFILED STEEL DECK

2. AS/NZS 4600: Cold-formed steel structures

### FIRE RESISTANCE

3. AS 1530.4: Methods for fire test on building materials, components and structures. Part 4: Fire-resistant test element of construction.

### CONCRETE

4. NZS 3101: Concrete structures standard

### STEEL STRUCTURES

5. NZS 3404: Steel structures standard

### DESIGN ACTIONS

6. AS/NZS 1170.1: Structural design actions

## EUROCODE 4

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

## BRITISH STANDARDS

11. BS 5950: Part 4 Structural use of steelwork in building.
12. BS 5950: Part 3 Design in composite construction.
13. BS 5950: Part 8 Code of practice for fire resistant design.
14. BS 8110: Structural use of concrete.

## 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 according to The Health and Safety at Work Act 2015 (HSWA) 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 5g/m> (8 hours TWA) and 10mg/m< (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 to download from **www.steelandtube.co.nz/specifiers/comflor#Documents-and-Links**.

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 AS/NZS 2327 design standard.

In design to AS/NZS 2327, the cylinder strength is used.

Therefore the concrete grade in the ComFlor® design software N20 refers to the cylinder strength value.

All the variables start with a default value. Check or input new variables on Datasheet Structure, Loading and Design.

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 technical support when using the ComFlor® design software contact us on **0800 266 356**.

# FOR COMFLOR SALES & PROJECT SUPPORT CONTACT CFDL

**In addition to providing sales support for the full ComFlor® range, CFDL (Composite Floor Decks Ltd) provide design, installation and stud welding options for composite floor decking systems.**

### STREAMLINED COORDINATION

The CFDL in-house team offers complete services with strong product knowledge and proven systems integration — providing an efficient delivery option where a coordinated approach is preferred.

### SAFETY & QUALITY ASSURED

CFDL systems are backed by strict quality management, traceable installation records, and robust safety processes – giving peace of mind on every job.

As part of New Zealand's leading steel provider, we offer unmatched supply chain reliability, access to broader product ranges, and nationwide service support.

steel&tube | CFDL

***0508 332 546 comflorsales@steelandtube.co.nz***

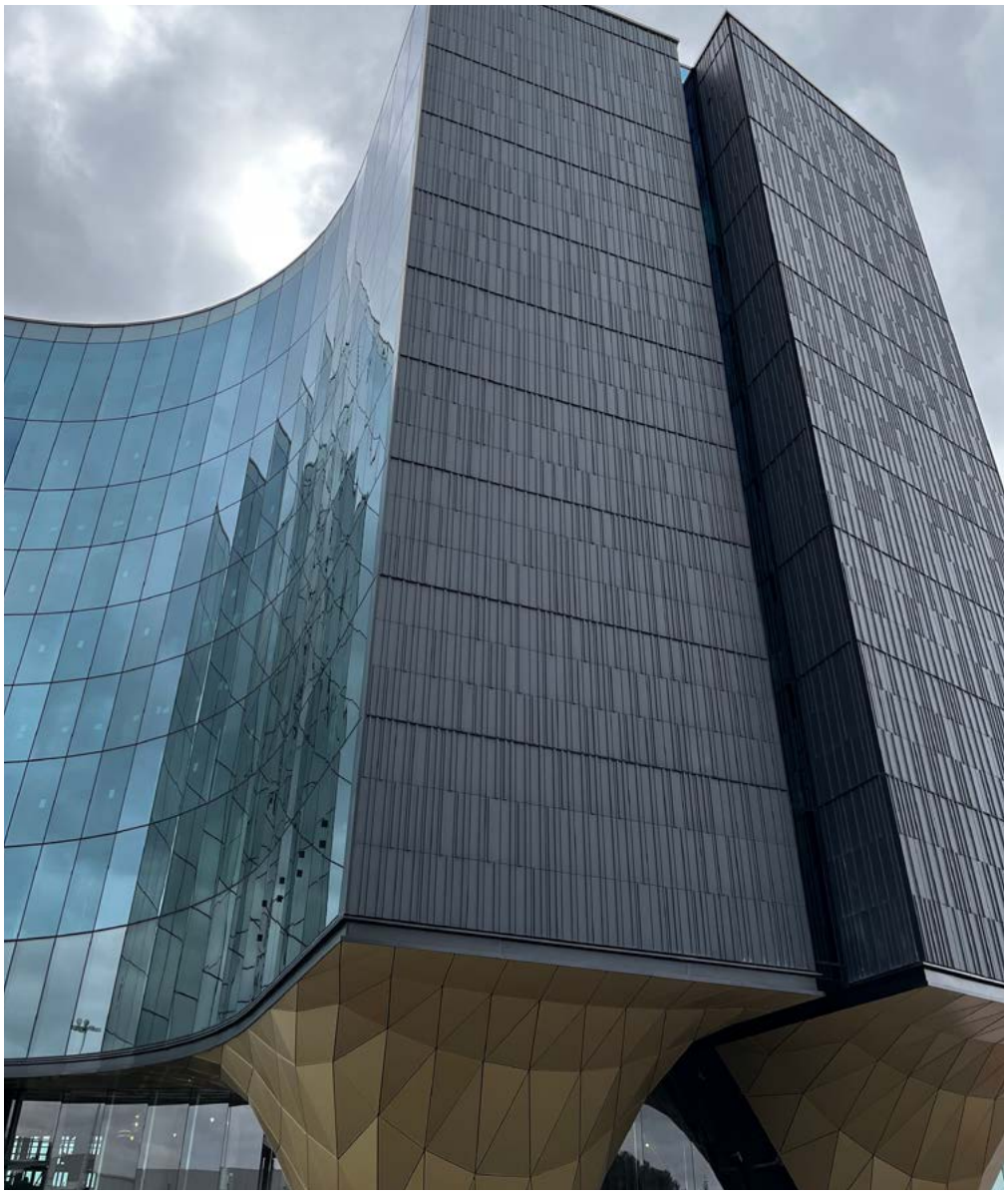
*Maxim Hotel – CF80*

*Deloitte – CF80*

*Hide Lane – CF80*

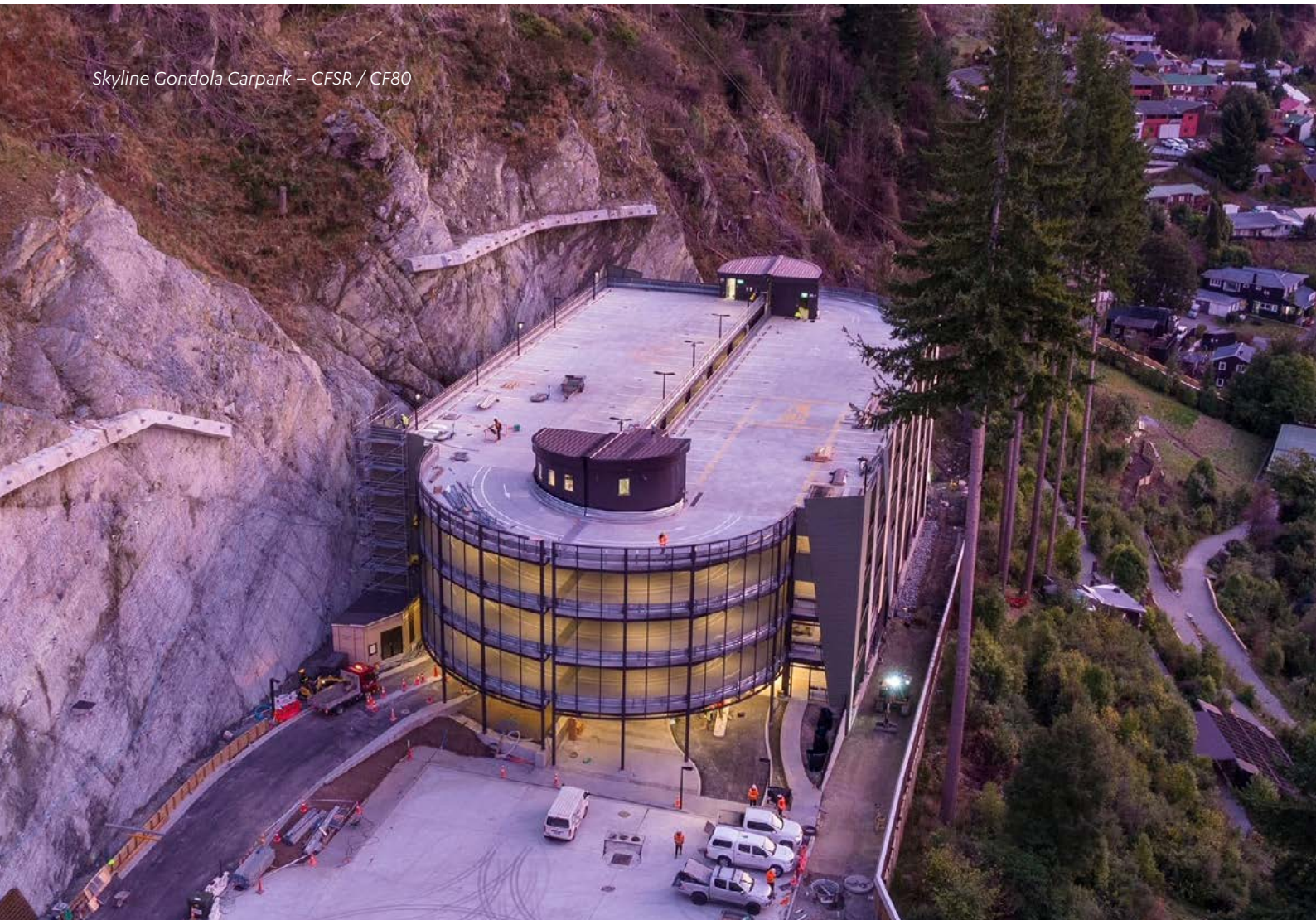
*Chews Lane – CF80*


*National Mini Storage – CF80*



*Te Arikinui Hotel – CF80*

*Te Pae Christchurch Convention Centre – CF60 / CF80*



*Skyline Gondola Carpark – CFSR / CF80*

# NATIONWIDE STEEL SOLUTIONS

Steel & Tube offers a comprehensive range of steel related products and services through a nationwide distribution and processing network, so no matter where you are in the country we can deliver product to you.

As experts in our field, we pride ourselves in being able to offer a consistent end-to-end customer experience, advising, sourcing and supplying customers with their steel requirements. And underlying everything we do, is our continued commitment to quality.


ComFlor® sales enquiries (CFDL)
***0508 332 546***
comflorsales@steelandtube.co.nz

ComFlor® technical enquiries
***0800 266 356***
comflortechnical@steelandtube.co.nz

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