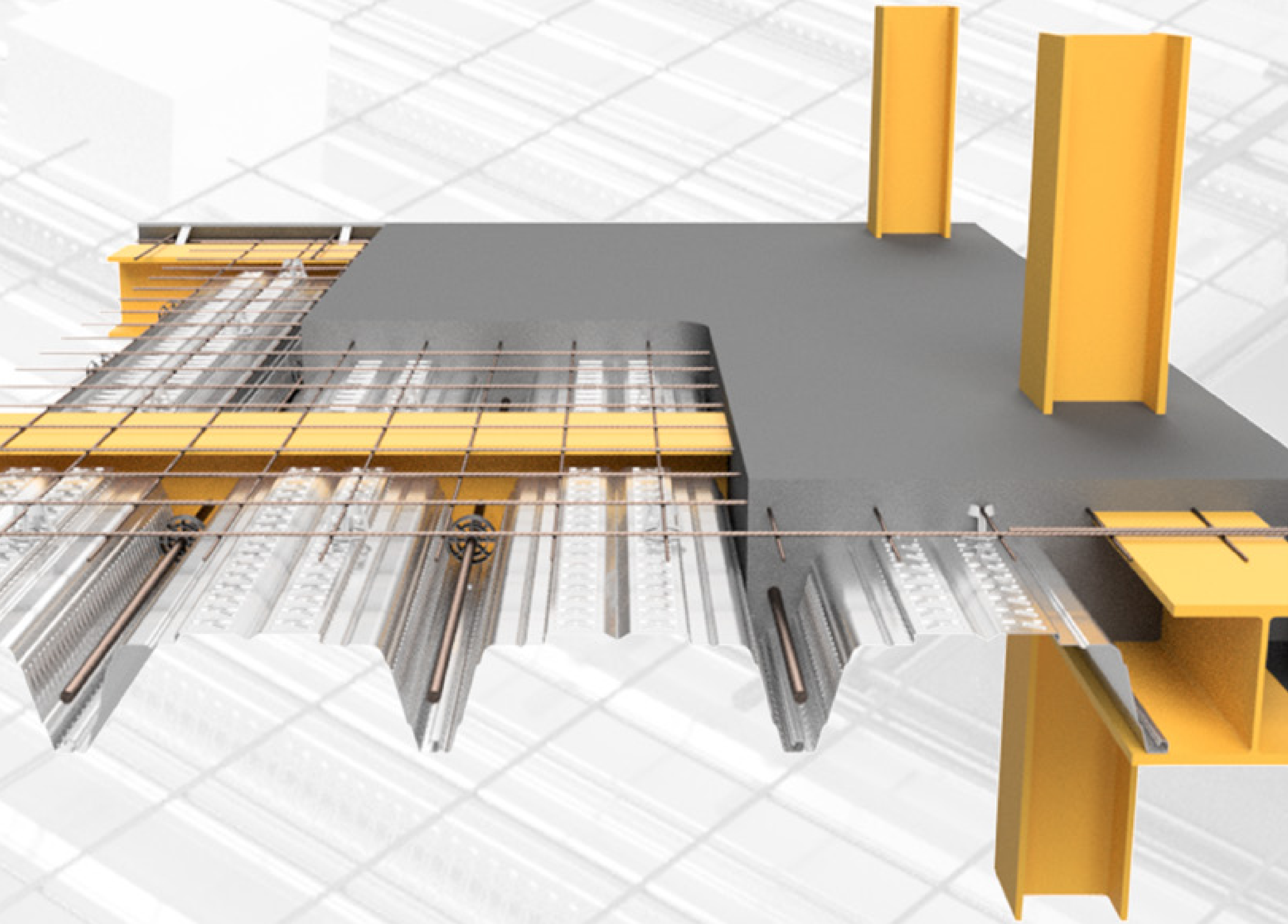


Fielders SlimDek 210® and SlimFlor®

Design and Installation Manual

Table of Contents

Introduction to Fielders SlimFlor®

SlimFlor® is an engineered composite flooring system offered by Fielders, incorporating the concrete slab within the steel beam depth to provide a quick and economical floor plate solution.

The wider bottom flange of the Asymmetrical Steel Beam (ASB) offers a bearing surface for the Fielders SlimDek 210® profile to be supported on. SlimFlor® utilises Fielders SlimDek 210® flooring profile in conjunction with Asymmetric Steel Beam Sections (ASB) to provide a floor system with a reduced construction zone.

It does this by combining the floor slab and supporting structure in the same plane, providing a lightweight, versatile and long spanning floor system.

Some of the advantages of SlimFlor® are:

- Reduced construction time (saving in labour, early tenancy and associated works, approximately 20% quicker floor-to-floor construction time)
- Minimal or no temporary propping allows for fit out of lower floors while upper floors are being constructed.
- Shallow floor depths, reduced overall building height offers savings in facade costs and building height restrictions.
- Reduced trades onsite (OH&S savings)
- Light weight structure, reducing sizes of columns, substructure, demand on lateral stability system and foundations
- Ease of service integration, with potential to accommodate the services within the slab depth.
- Inherent fire resistance. In a typical application, fire resistance of 60 minutes may be achieved without passive fire protection.

The long spanning ability of the SlimDek 210® enables the composite slab to span directly between primary beams, removing the need for secondary beams in the structural system.

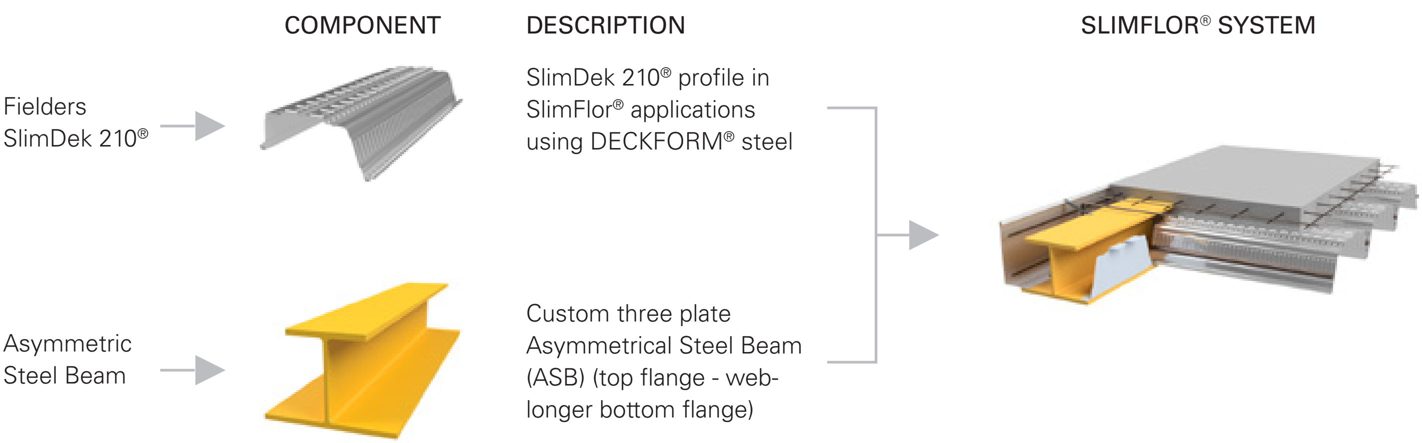


Figure 1 SlimFlor® System

2 SlimFlor® Components

2.1 KingFlor® SlimDek 210®

2.1.1 About SlimDek 210®

KingFlor® SlimDek 210® steel decking is manufactured as standard from either G550 (550MPa Yield Strength) 1.0mm base metal thickness (BMT), G500 1.2mm BMT or G450 1.5mm BMT steel. The galvanised coating thickness for all three gauges is Z350 (minimum 350g/m^2) in accordance with AS 1397-2011. SlimDek 210® can achieve spans up to 7m un-propped and up to 9m when propped during construction. The profile utilises re-entrant features to maximise the efficiency of the section in the formwork case. Proprietary ReLok® embossments are designed for strong and reliable mechanical interlock, maximising composite action for optimal reinforcement design. SlimDek 210® profile dimensions are defined in *Figure 2*.

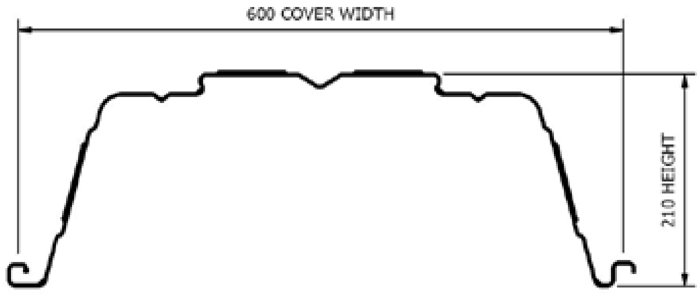


Figure 2 SlimDek 210® Section

2.1.2 Section Properties

The strength and stiffness of the SlimDek 210® profile comes from a combination of longitudinal stiffeners, ribs and embossments. Due to the nature of cold rolled steel only a proportion of these elements are effective in bending. Full scale load testing is required in order to accurately determine the capacity of deep deck profiles in both formwork and composite cases.

The effective cross section properties that describe the behaviour of the SlimDek 210® profile in the formwork stage have been obtained based on a full scale comprehensive testing program carried out on all gauges at the NATA accredited BlueScope Research and Technology facility. The strength and stiffness of thin gauged metal decking is related to the span and loading conditions. As such the gross cross section properties given in *Table 1* should not be used for ultimate and serviceability calculations.

SlimDek 210® section properties for 1.0, 1.2 and 1.5 base metal thickness are shown in *Table 1*.

Figure 3 SlimDek 210® Isometric View

	Base Metal Thickness	Cross-sectional Area of Sheeting	Sheeting Elastic Centroid	Mass		Yield Strength	Gross Moment of Inertia	Gross Section Modulus
	BMT (mm)	A_{sh} (mm^2/m)	Y_c (mm)	kg/m^2	kg/m	f_y MPa	Ixx (mm^4/m)	Zxx (mm^3/m)
1.0 BMT SlimDek 210®	1.0	1650	133.2	13.56	8.14	550	9.54×10^6	71.8×10^3
1.2 BMT SlimDek 210®	1.2	1980	133.3	16.15	9.69	500	11.5×10^6	86.1×10^3
1.5 BMT SlimDek 210®	1.5	2475	133.4	20.04	12.02	450	14.3×10^6	108×10^3

Table 1 SlimDek 210® Section Properties

Notes:

1. The gross section properties provided above are not used to determine the moment capacities of the section or formwork deflection
2. Mass calculated based on Z350 coating
3. Elastic centroid is measured from bottom of the deck

2 SlimFlor® Components

Slab Depth (mm)	Concrete Volume (m^3/m^2)
280	0.110
290	0.120
300	0.130
305	0.135

Slab Depth (mm)	Concrete Volume (m^3/m^2)
310	0.140
330	0.160
350	0.180
375	0.205
400	0.230

Table 1a Slab Depth

2.2 Asymmetric Steel Beams

An Asymmetric Steel Beam (ASB) is manufactured in one of two forms:

1. Either by welding three plates to form an I-beam section with the bottom flange wider than the top flange (refer to *Figure 4* for details). This is referred to as a CUSTOMASB; or
2. By welding an additional plate to the bottom flange of a UC (refer to *Figure 6* for details) This is referred to as an ASB(UC).

The wider bottom flange provides a bearing surface for the Fielders SlimDek 210® profile to be supported on.

The bottom flange should be a minimum of 110mm wider than the top of the flange, however we recommend 150mm to allow for 50mm bearing on each side plus 25mm of construction tolerance.

For Asymmetric Steel Beam summary tables refer to Fielders Fact Files on specifying.fielders.com.au

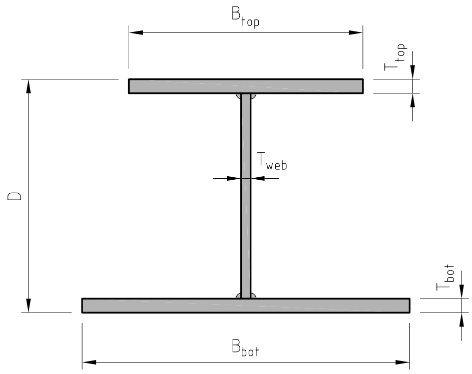


Figure 4 CUSTOMASB Nomenclature

2.2.1 CUSTOMASB

CUSTOMASB's can be fully optimised to create the most economical and efficient size and configuration of beam to suit the project design requirements. The flanges are welded to the web on both sides with a deep penetration continuous fillet weld in accordance with AS/NZS 1554.1-2014.

When nominating the size of a CUSTOMASB for manufacture the following nomenclature is used:

$D / B_{top} / B_{bot} / T_{top} / T_{bot} / T_{web}$ / Grade of steel

Refer to *Figure 4* for reference of the parameters. The typical ranges for the sizes of plates are 200-1800mm for the web, 200-600mm for the flanges with a thickness of 8, 10, 12, 16, 20, 25, 28, 32, 36 and 40mm. Material grade is 350MPa.

Figure 5 CUSTOMASB

2.2.2 ASB(UC)

An ASB(UC) *(Figure 6)* utilises the standard range of available UC's with an additional plate welded to the bottom flange, which is approximately 150mm wider than the bottom flange. The beams can be modelled in a structural analysis software package such as SpaceGass or Microstran, or by first principles. The library files for the ASB sections can be downloaded at specifying.fielders.com.au and imported directly into the structural software.

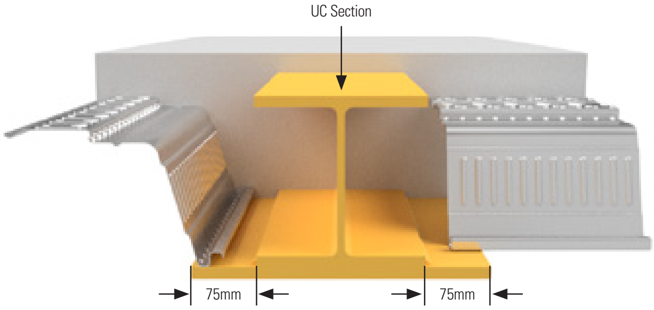


Figure 6 ASB(UC)

2 SlimFlor® Components

2.3 SlimDek 210® Accessories

2.3.1 End Diaphragms

Steel end diaphragm pieces *(Figure 7)* are required to ensure the structural integrity of the deck at the supports and minimise concrete leakage. They are manufactured using 1.5mm BMT galvanised steel and supplied in lengths of 2400mm, to support four SlimDek 210® profiles. The diaphragms are fixed to the bottom flange of the ASB prior to laying the SlimDek 210® deck using a minimum of one shot fired pin at 600mm max centres.

The SlimDek 210® sheets are then individually lowered on to the diaphragm. Once the sheets for the whole bay are in place, they are secured to the top of the diaphragm with Tek® screws. For end diaphragm details see *Section 9 Construction Details (page 28)*.

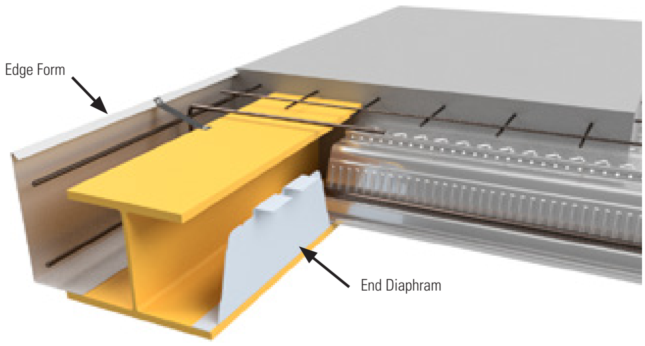


Figure 7 SlimDek 210® End Diaphragm

2.3.2 Edge Form

Galvanised steel Edge Forms *(Figure 8)* can be used for the retention of wet concrete to the correct level at the decked floor perimeters.

Easy to use and economical, they are custom made from galvanised steel in lengths between 1 and 6 metres long and fixed at the top with 25mm wide restraint straps at 600mm centres using steel pop rivets or self-drilling screws, together with shot fired fasteners at 600mm centres into the bottom flange of the perimeter steel beams. Edge Form and flashings greater than 2mm BMT will require a puddle weld at 600mm centres instead of shot fired pins. See *Table 2* and *Figure 9* for Edge Form selection criteria.

Slab Depth (mm)	Cantilever (mm)	BMT (mm)
300	0	1.5
	0-125	1.9
	126-175	3.0
350	0-75	1.9
	76-125	2.4
	126-175	3.0
400	0-75	2.4
	76-125	3.0
	126-175	N/A

Table 2 SlimDek 210® Edge Form Selector Table

Custom Edge Forms to suit deeper slabs must be assessed on a case-by-case basis.

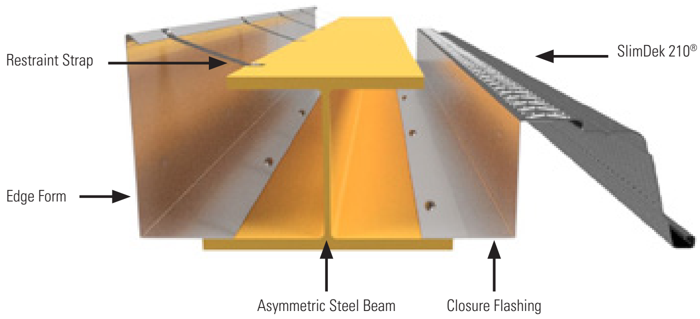


Figure 8 SlimDek 210® Edge Form

2.3.3 Closure Flashing

Often longitudinal cutting of the SlimDek 210® is required. Cut decking edges must be supported using a closure flashing *(Figure 8)*, fixed at a maximum of 600mm centres using heavy duty shot-fired pins. For closure flashing application details see *Section 9 Construction Details (page 32)*.

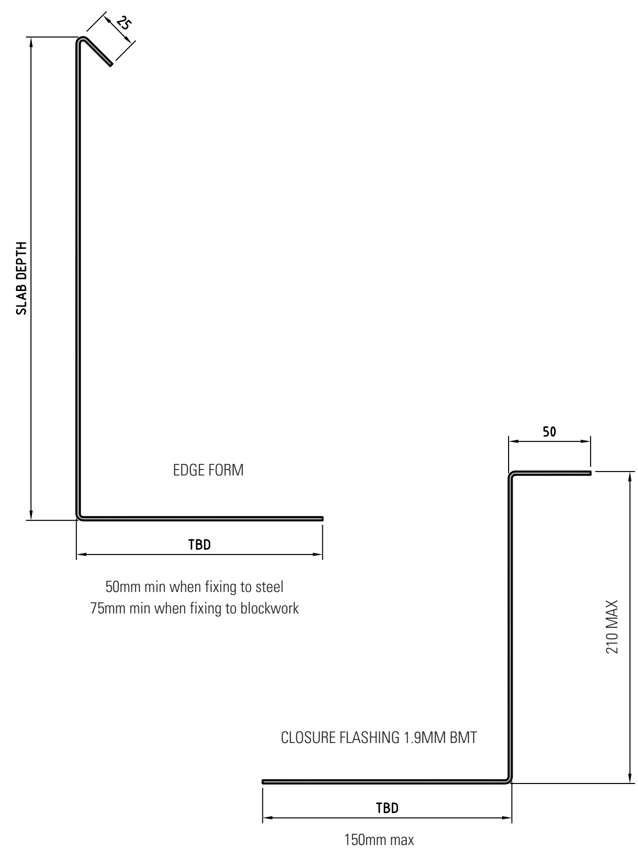


Figure 9 SlimDek 210® Edge Form and Closure Flashing Dimensions

3 Floor Design

Ultimate and serviceability limit states need to be satisfied for both the composite and the formwork stage of the SlimDek 210® floor system. Fire requirements need to be satisfied in the composite stage, and are covered in more detail in *Section 3.3*.

During construction the SlimDek 210® decking performs as the working platform and the formwork for the concrete slab. Unpropped construction is achieved for typical span and loading applications due to the superior spanning capability of the SlimDek 210®. Temporary propping may be utilised to achieve longer spans or in higher loading applications.

Composite action between the concrete and the SlimDek 210® is achieved through mechanical interlock. This enables the SlimDek 210® to be used as tensile reinforcement. Additional reinforcement may be required in the ribs to satisfy the shear and Fire Resistance Level (FRL) requirements of the design. Steel mesh reinforcement is typically provided in the top of the slab to control cracking.

The SlimDek 210® system can be designed with continuity over the supports in multi-span applications. Additional top reinforcement will be required in continuous span applications.

3.1 Construction Stage

Construction loads to be considered in the formwork design stage are as per Appendix A of AS/NZS 2327:2017.

The effective span for formwork design is the clear span plus the nominal end bearing distance of 50mm (Le = Clear span + 100mm).

Larger bearing lengths may make it difficult to place the SlimDek 210® between the flanges of the ASB's. The spanning capabilities of the steel deck are a function of the slab thickness, imposed construction loads, effective span, sheeting thickness and propping arrangement if any.

3.1.1 Recommended Deflection Limits for Formwork Design

The deflection limit of SlimDek 210® under construction loads is determined in accordance with AS 3610-1995 and Table B2 of AS/NZS 2327:2017. A deflection limit of Span/240 is generally considered acceptable for situations where the soffit of the steel decking will be visible in the final case. A less stringent deflection limit of Span/130 may be adopted if the steel decking will be concealed (i.e. ceiling).

3.1.2 Temporary Propping

In some cases, it will be necessary to provide temporary propping to the SlimDek 210® to support the construction loads or to minimise visible deflection in the decking.

Temporary propping is generally required for long span or high load applications. When props are utilised, they should be in place and suitably braced, prior to installing the decking. The timber joists are to be a minimum of 100mm wide and have adequate strength to support all construction loads and extend along the full width of the decking requiring support.

The props are typically placed at either mid span or at one third span points as determined in the design. The propping should remain in place until the concrete has achieved a minimum of 15MPa of its design strength.

Props should be stable without relying on friction with the deck for lateral stability. The end props in a row should be self-supporting, and braced to internal props. All unsupported edges must be propped, and may require additional reinforcement.

All timber (bearers, plywood formwork, etc.) needs to be isolated from direct contact with SlimDek 210® and the diaphragm panels with a strip of KingFlor® compressible foam tape to prevent oxidation of the deck.

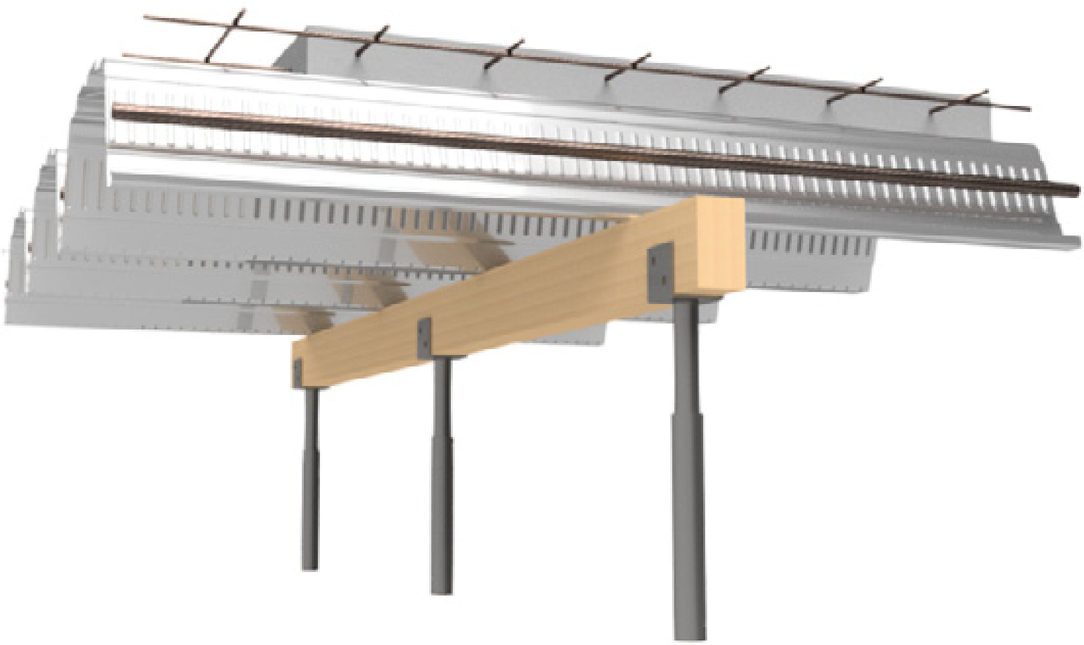


Figure 10 SlimDek 210® Temporary Propping

3.2 Composite Stage

The efficiency of composite slabs is dependent on the composite action between the steel decking (SlimDek 210®) and the concrete slab. Testing indicates the strength of mechanical interlock at the interface between the steel decking and the surrounding concrete is the key factor in the determining the behaviour of composite slabs.

Longitudinal shear transfer takes place via mechanical interlock developed between the decking and the surrounding concrete. The mechanical interlock is dependent on the re-entrant features of the profile and frequency of embossments.

Tests have shown that the SlimDek 210® composite slab supported on steel beams and provided with adequately detailed continuity reinforcement over the steel beams can be treated as fully continuous over the supports. Compression reinforcement may be required in the bottom of the slab at the supports in heavily loaded applications.

The design solutions are based on Linear Elastic Analysis as per Clause 1.6.1 of AS/NZS 2327:2017 and Clause 6.2 of AS 3600-2009, as well as the Partial Shear Connection theory according to Clause 2.7.2 in AS/NZS 2327:2017. Data about the composite performance of SlimFlor® slabs have been obtained from full scale slab tests.

The ultimate limit state requirements for composite slabs are detailed in AS/NZS 2327:2017 Clause 2.7 and 2.8. When designing a SlimDek 210® slab the design must consider the following conditions;

- Capacity to meet in-service loads
- Capacity to meet ultimate loads
- Ability to meet durability and serviceability requirements, short and long-term deflections as well as vibration.
- Ability to meet any specified fire requirements for insulation, integrity and structural adequacy.

Strength and serviceability load combinations, and pattern loads are to be considered in accordance with AS 3600-2009, Clause 2.4 and 2.4.4 and AS/NZS 1170.0-2002 Clause 4.2.

3.2.1 Design for Strength

Negative Bending Strength

The minimum flexural strength requirements outlined in AS 3600-2009 shall be satisfied for all negative bending regions where the metal decking provides no contribution to the flexural capacity of the composite slab.

Positive Bending Strength

Partial shear connection theory shall be assumed for positive bending regions. The moment capacity of the composite slab is a function of the degree of mechanical interlock between the metal decking and the concrete at various cross sections. The flexural capacity of the composite slab shall be assessed in accordance with Clause 2.7.2 of AS/NZS 2327:2017.

Shear Strength

Partial shear connection theory, as defined in AS/NZS 2327:2017, is used for the calculation of the composite shear capacity of the SlimDek 210® slab. The shear capacity of the slab shall be calculated in accordance with Clause 8.2 and 9.2 of AS 3600-2009. The shear capacity is the sum of the contribution of the rib component and the slab component. The average width (bv) of the trapezoidal rib section considered in shear calculations is 190mm per meter. The contribution of the slab is calculated using a bv of 810mm per meter.

The calculation of positive shear capacity shall account for the development length of reinforcement and SlimDek 210® up to the cross-section under consideration.

An additional "shear bar" may be required close to the supports to provide positive shear capacity where the deck and bottom bar are not fully developed. This is likely to be localised close to the external support of an end span. KingSlab® software will calculate the area of bottom tensile reinforcement required for shear and the distance to the critical cross-section from the support.

It is the responsibility of the design engineer to adequately detail reinforcement/end anchorage to achieve sufficient development at the critical cross-sections.

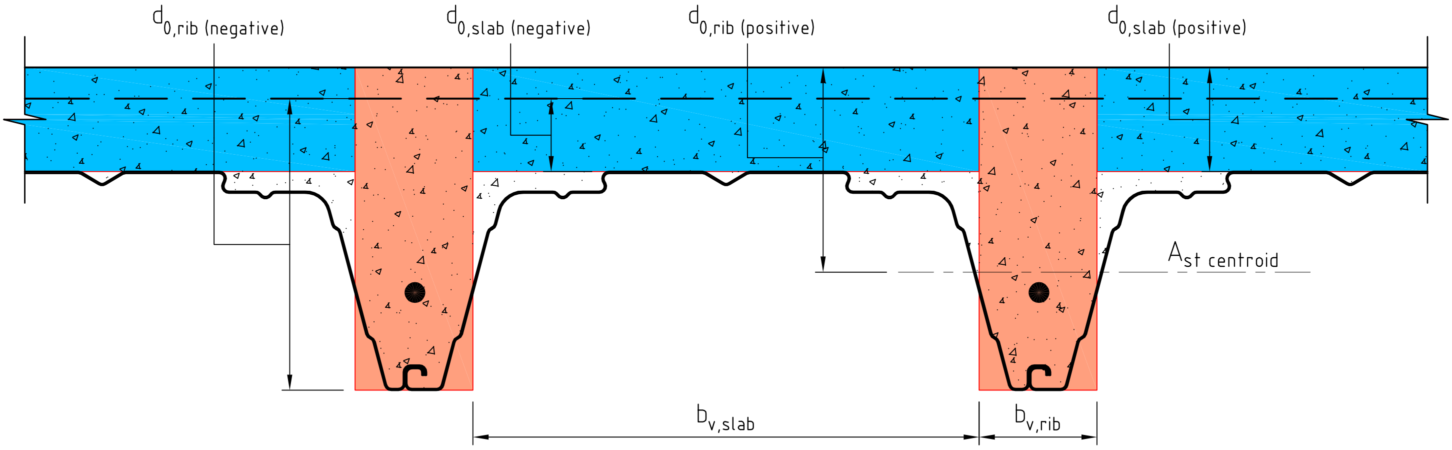


Figure 11 SlimDek 210® areas for shear capacity

Images of SlimDek 210® are for illustration purposes only final product may vary to the images shown.

3.2.2 Design for Durability and Serviceability

Deflections

Deflections shall be calculated using the method given in AS 3600-2009 Clause 8.5.3.

Composite slabs using SlimDek 210® are relatively stiff compared to slabs using shallow decking. The composite slab deflection is determined in accordance with AS 3600-2009 and Appendix B of AS/NZS 2327:2017. A deflection limit of L/250 for total deflection and L/500 for incremental deflection is generally considered appropriate. However, consideration needs to be given to brittle finishes on or supported by the slab and the deflection limit amended accordingly.

In the unpropped situation the SlimDek 210® will deflect due to the weight of concrete prior to the concrete setting. This means prior to the service loading being applied, there is no stress in the concrete and the SlimDek 210® alone is carrying the weight of the concrete. The weight of the concrete does not contribute to the incremental and total deflection of the top surface of the slab.

In the propped situation the SlimDek 210® will not deflect due to the weight of the concrete at prop locations. Once the concrete has reached 15MPa, composite action is achieved and props are removed resulting in immediate deflection of the composite section. The dead load of the concrete is now resisted by the composite section with stress in both the steel sheeting and concrete. The dead load of the concrete contributes to the incremental and total deflection of the top surface of the slab.

Defining the propping arrangement in KingSlab® design software will account for these effects.

Exposure Classification and Concrete Cover

The reinforcement cover is dependent on the exposure classification of the slab, as detailed in Table 4.10.3.2 of AS 3600-2009. The exposure classification A1, as defined in AS 3600-2009 Clause 4.3, has been used to develop the design tables included in this manual. For other classifications, the use of the KingSlab® design software is recommended.

The minimum cover over an ASB is 40mm as stated in AS 2327:2017. However, extra cover needs to be provided for any additional reinforcement placed over the ASB. Refer to *Section 3.3 for Fire Design page 10.*

Crack Control

To determine the crack control reinforcement required in the transverse direction of the SlimDek 210® slab, the height of concrete above the profile is considered and the amount of reinforcement required is designed as per Clause 9.4.1 of AS 3600-2009. *Table 3* details the transverse crack control reinforcement required for slabs in exposure classification A1, as per AS 3600-2009. The reinforcement in *Table 3* is for shrinkage and temperature effects only.

Dcs (mm)	Reinforcement		
	Minor	Moderate	Strong
280	SL72	SL102	RL918
290	SL72	SL102	RL1018
300	SL82	SL81	RL1018
310	SL82	SL81	RL1118
320	SL92	RL918	RL1118
330	SL92	RL918	RL1118
340	SL92	RL918	RL1218
350	SL92	RL918	RL1218
360	SL102	RL1018	RL1218
370	SL102	RL1018	RL1218
380	SL102	RL1018	-
390	SL102	RL1018	-
400	SL81	RL1118	-

Table 3 SlimDek 210® Crack Control Reinforcement

Note: Main bars to be orientated in transverse direction.

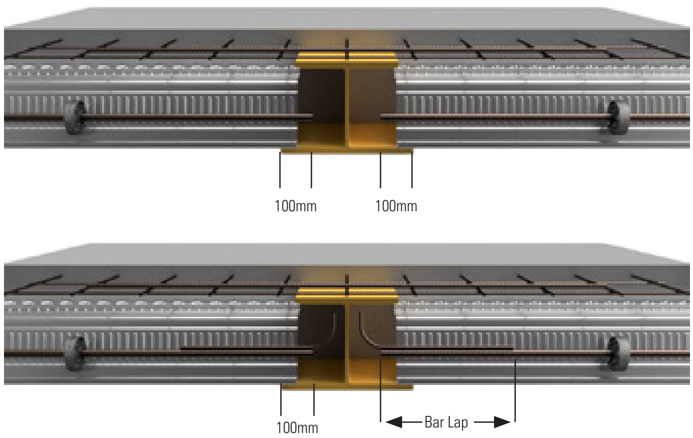


Figure 12 Detailing of bar reinforcement for end anchorage

Figure 13 Continuous bottom reinforcement

3.2.3 Reinforcement Detailing Requirements

The reinforcement in a composite SlimDek 210® slab consists of bottom bars located centrally in the ribs, top mesh, and additional top bars over the supports where required for flexure or fire.

Two methods of end anchorage of bottom bars at the support, namely straight projection and use of an additional cogged lap bar, are shown opposite in *Figure 12*. Detail design of end anchorage should be in accordance with AS3600.

In heavily loaded continuous applications, fully anchored compression reinforcement may need to be provided. Anchorage can be achieved by drilling holes in the web and continuing bottom reinforcement through. Alternatively, bars can be welded to the bottom of the web and lapped to bottom reinforcement.

Care should be taken in detailing of top mesh to ensure laps are not placed over the supports. The recommended location of laps should be beyond the points of contra-flexure.

Additional reinforcement may be required in the slab at positions of concentrated loads or adjacent to penetrations.

The minimum secondary transverse top reinforcement requirements are detailed in Table 2.2.1 of AS/NZS 2327:2017.

3.3 Fire Design - Slabs

3.3.1 Design for Insulation and Integrity

In order to satisfy the NCC requirements for insulation and integrity, minimum slab depths are given in *Table 4* for SlimDek 210® using normal density concrete (2400 kg/m^3). These values have been verified by full scale testing commissioned by Fielders and Exova Warringtonfire Aust Pty Ltd.

Minimum Dcs for Insulation and Integrity	
FRL (minutes)	Minimum Dcs (mm)
60	280
90	290
120	305
180	330
240	350

Table 4 Minimum Slab depth for Insulation and Integrity

Fire Bottom Bar Axis Distance	
FRL (minutes)	Axis distance (mm)
60	70
90	85
120	120
180	165
240	190

Table 5 Axis Distance

3.3.2 Design for Structural Adequacy

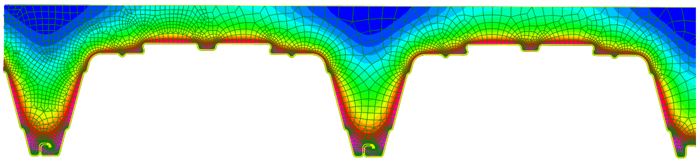
The design load combination to be considered for a fire scenario is G+ψ_l Q as outlined in Clause 4.2.4 AS/NZS 1170.0-2002.

Consideration needs to be given to the variation of mechanical properties of steel and concrete at elevated temperatures as described in Clause 7.3.2 AS/NZS 2327:2017. The axis distance recommended for the bottom bar for the various FRL's is shown in *Table 5* and is based on thermal analysis results, verified by testing. If the designer would like to adopt a different axis distance, this can be assessed in the KingSlab® software.

The SlimDek 210® steel decking does not contribute to the slab's strength in the fire situation. It is assumed that once exposed to a fire from the soffit, the metal decking will not contribute to the flexural capacity of the slab. SlimDek 210® slabs are designed for fire with two different approaches depending on whether the slab is continuous or simply supported.

After the commencement of a fire below a slab, the soffit of a concrete slab is heated whilst the top surface remains relatively cool due to the insulation properties of concrete. This results in a thermal gradient forming over the slab cross-section and consequentially, differential thermal expansion between the top and bottom surfaces.

Additional sagging curvature develops across the span as



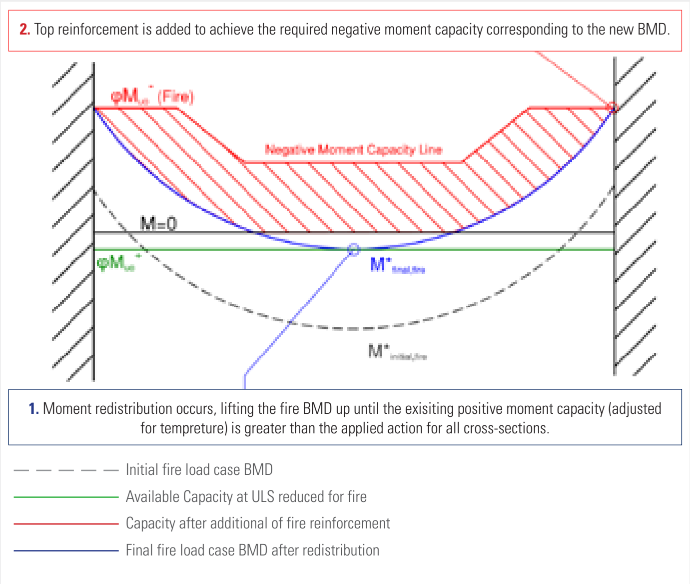
the bottom slab surface expands more than the top surface. In continuous applications, this mid-span thermally induced deflection causes rotations at the supports. In order to maintain continuity of the slab, there must be a compatibility of rotation/ strain. Therefore, 'restoring' moment couples must form to resist this end rotation. These restoring moment couples act in the opposite direction to the slab rotation, causing a negative moment to form at the support. In order to maintain force equilibrium of the system, as no additional load is applied, the increase in moment at the support corresponds to a decrease in moment at the mid-span. This moment redistribution results in the bending moment diagram shifting upwards.

The extent of moment redistribution is dependent on the fire design option selected. There are two options available to design for this revised bending moment distribution. Both design options consider the variation of material properties with temperature in accordance with Australian Standards.

3 Floor Design

Option 1: Top Reinforcement Design

The 'Top Reinforcement' design approach relies on providing sufficient negative moment capacity (top reinforcement) throughout the entire span such that the fire load case BMD can be "lifted" above the available positive capacity.

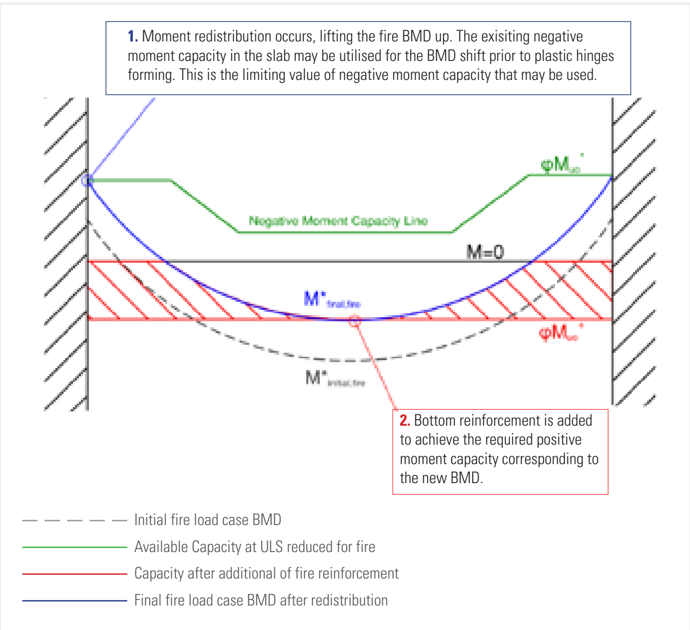


Top Reinforcement Design

Option 2: Bottom Reinforcement Design

The fire load case BMD is lifted due to the thermal effects in the slab.

The existing negative moment capacity in the slab may be utilised for this BMD shift prior to plastic hinges forming. This is the limiting value of negative moment capacity that may be utilised. The positive moment resulting from the adjusted fire case BMD is then designed for with additional bottom reinforcement.



Bottom Reinforcement Design

Both design options rely on satisfying all code requirements, with emphasis on ductility requirements as outlined in AS 3600. The moment capacity of any over-reinforced sections is ignored in the design for fire.

As such, normal ductility reinforcement (N grade) must be used in all negative regions to allow for moment redistribution.

In the simply supported case, the design requires a bottom bar to be placed in each rib with sufficient axis distance and steel area to support the loading applied in the fire situation.

The designer must ensure that the design capacity (positive or negative) is greater than the design action effect at all potentially critical cross-sections.

Full scale fire tests on composite slabs using SlimDek 210® have been commissioned by Fielders and carried out by Exova Warringtonfire Australia Pty Ltd. Data obtained has been used to validate finite element models used to determine the temperature reached throughout the concrete profile at the various fire resistance periods based on the 275 degree criteria for normal density concrete in the NCC 2016. This allow for calculation of the area of steel that remains effective depending on the axis distance of the bar.

3.3.3 Fire Collars

Refer to the Fielders website for the latest Fact File on fire collars to ensure you access the latest information on fire collars that have been tested with SlimDek 210®.

Fire testing has been undertaken by Fire Science Research Group (Adelaide Division) to show that a 100mm uPVC pipe using a Promat PROMASEAL Green Cast in Collar Green100 on a 95mm thick concrete slab (minimum concrete depth over ribs) with SlimDek 210® will achieve a rating of 120 minutes for insulation and integrity.

Retro fit fire collar testing has been undertaken by Exova Warringtonfire Australia Pty Ltd using Snap Fire Systems LP100R-D collars with 100mm HDPE and 100mm UPVC pipe sizes in stack configuration. 40mm and 50mm UPVC pipes have been tested in stack configuration using LP50R collars. The LP100R-D retrofit collar has been tested with a 100mm UPVC pipe in a floorwaste application. All of these collars have achieved a rating of 120 minutes for insulation and integrity with a 95mm thick concrete slab.

Further information can be obtained by contacting the fire collar manufacturers. Information and details for the installation of the cast in fire collars on SlimDek 210® can be found in *Appedix E: Installation of Cast in Fire Collars (page 67)*.

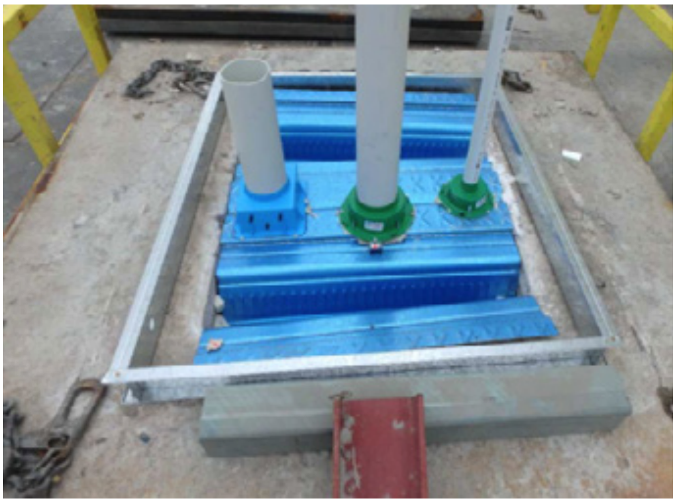


Figure 16 Promat fire collars installed to SlimDek 210® prior to pouring test sample

3.4 Natural Frequency and Vibration Control

The design of long span floor systems may be governed by vibration. Where the use of a building is sensitive to vibration, a rigorous approach should be used to calculate the dynamic floor response of the slab and beam system. Alternatively, a simplified method to asses vibration performance may be adopted. The fundamental frequency of a composite slab defines its vibration response. This frequency can be estimated by using the formula given below.

The fundamental frequency of the floor is compared to internationally accepted limits for the occupancy type. In typical applications (offices, shopping malls, etc.) structures should be designed so that the fundamental frequency of the slab is greater than 5Hz. Areas sensitive to vibration (operating theatres, imaging rooms, dance floors etc.) may require further assessment.

The Natural Frequency is determined in accordance with Clause 3.4 of the AISC Steel Design Guide Series 11.

$$\text{Lowest Natural Frequency } (f_n) = 0.18\sqrt{\frac{g}{\Delta}}$$

Where,

g = Acceleration due to gravity = 9806mm^2/s^2

Δ = Deflection in mm under self-weight and super imposed dead load

4 Beam Design

In SlimFlor® construction the design of ASB's for ultimate limit state assumes no composite action between the steel beam and the surrounding concrete. Any longitudinal shear transfer between the concrete and steel beam is ignored. As the top (compressive) flange is encased in concrete it is considered to be fully effective. Hence, the beams are designed in accordance with the methods outlined in AS 4100-1998 Steel Structures assuming full lateral restraint along the member enabling section capacity to be achieved. The design needs to consider the various stages of construction as the restraints and loading configurations vary significantly.

The design of ASB's at serviceability limit state assumes composite action between the steel beam and surrounding concrete when calculating the stiffness of the beam. This is internationally accepted practice as outlined in SCI Publication P248 and associated testing.

4.1 Construction Stage

ASB's are designed in accordance with AS/NZS 2327:2017. Construction loads to be considered in the formwork design are as per Appendix A of AS/NZS 2327:2017.

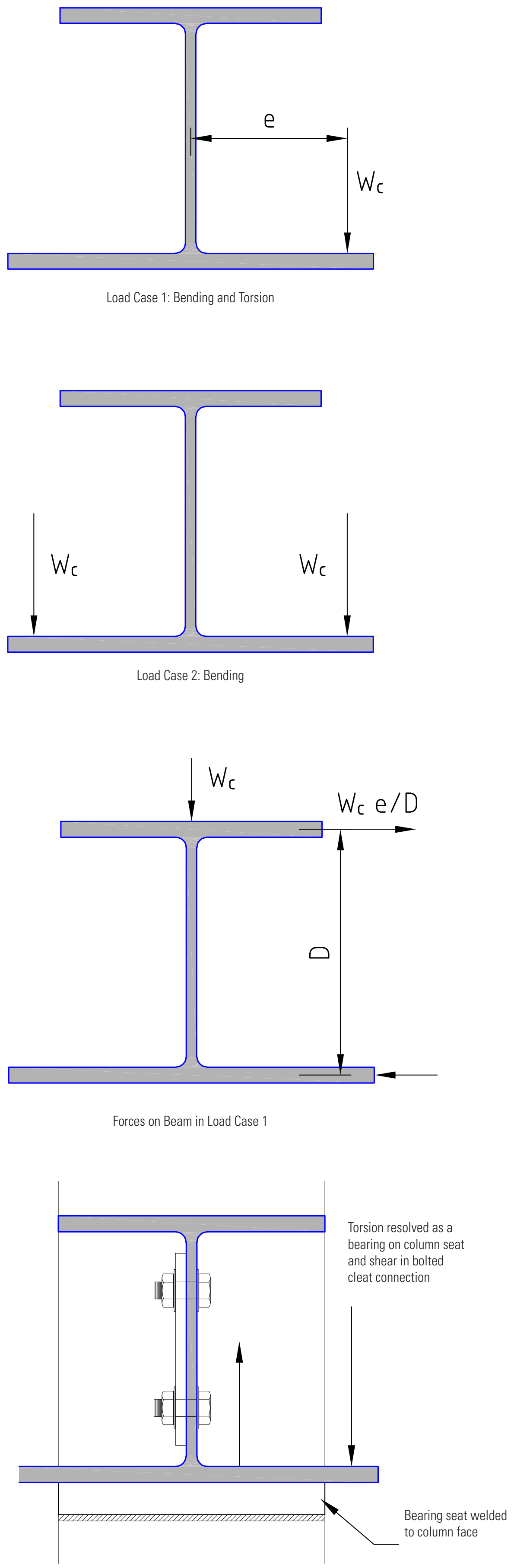
During the construction period care should be taken to minimise any asymmetric loading. However, it is inevitable that asymmetric loading of the beam will occur due to the structural layout and construction process. The resulting torsion being applied to the beam and end connections must be considered using the appropriate standards or guidelines.

The torsion in the beam during construction is resisted at it's ends by a couple formed between the tip of the bottom flange in bearing on the seat and the shear capacity of the bolted cleat connection.

4.1.1 Flexural Capacity of Unrestrained Beam

During construction the beams are subject to traditional loading that is about the primary axis. Typically the beams at this stage have minimal lateral restraint, so the unrestrained member effects such as lateral torsional buckling need to be considered. The capacity of the ASB members are determined utilising the methods outlined in AS 4100, calculating member capacity without full lateral restraint and with unequal flanges (Clause 5.6) while using the appropriate effective length. When considering the effective length the partial restraint offered by the beam end connections is considered, along with the beneficial stabilising effects of the bottom flange loading.

The KingBeam® design software undertakes a combined bending and torsion check during the construction stage. The KingBeam® design software will calculate and display the magnitude of induced construction stage torsion for connection design.



Load Case 1: Bending and Torsion

Load Case 2: Bending

Forces on Beam in Load Case 1

Torsion at column connection during construction

Figure 17 Combined Bending and Torsion on ASB during Construction

4.1.2 Bottom Flange Loading, Torsional Effects, Web and Flange Bending

In SlimFlor® construction the bottom flange is loaded at an eccentricity from the web creating torsion, web and flange bending. This is a result of the stage of the construction process where concrete will be placed on one side of the beam only. These moments are resisted by the torsional rigidity of the beam and by the connections at the ends of the beams. While all care should be taken to minimise these effects, it is recognised that in most cases they are unavoidable. Methods for calculating torsional capacity can be found in "*SCI-P385 - Design of Steel Beams in Torsion*" by the Steel Construction Institute.

The eccentric loading of the bottom flange will also induce local bending stress in the bottom flange and web. These local effects are in addition to the flexural stresses due to the beam in bending. The KingBeam® design software carries out a check to ensure that the combined stresses do not exceed yield stress of the bottom flange.

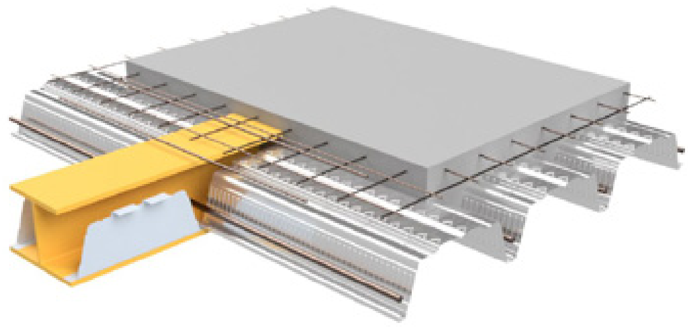


Figure 18 Internal Asymmetric Steel Beam

4.1.3 Temporary Propping

The designer may choose to specify propping of ASB's to limit the total deflection. It is important to note that the ultimate and serviceability design vastly differs for propped and unpropped situations.

In the unpropped situation the beam will deflect due to the weight of concrete prior to the concrete setting. This means prior to the service loading being applied, there is no stress in the concrete and the beam alone is carrying the weight of the concrete. The weight of the concrete does not contribute to the incremental and total deflection of the top surface of the slab along the beam.

In the propped situation the beam will not deflect due to weight of the concrete. Once the concrete has reached 15MPa, composite action is achieved and props are removed resulting in immediate deflection of the composite section. The dead load of the steel beam and concrete is now resisted by the composite section with stress in both the steel and concrete. The dead load of the concrete contributes to the incremental and total deflection of the top surface of the slab along the beam.

Defining the propping arrangement in KingBeam® design software will account for these effects.

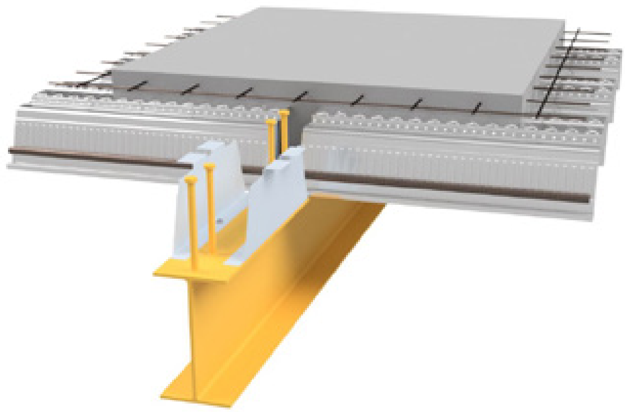


Figure 19 Internal Down-stand Beam

4.2 Ultimate Limit State Design

4.2.1 Internal Beams

The strength of an internal ASB is determined assuming the member is fully restrained against both local and global buckling across the span and that there is no longitudinal shear transfer between the slab and the steel beam.

The diaphragms placed on the ends of the SlimDek 210® are located along the line of the bottom flange of the ASB and as a result, a solid concrete beam as wide as the bottom flange and deep as the slab, encases the steel beam. While the contribution of the concrete to the bending strength of the composite beam is ignored, the design of ASB's at serviceability limit state assumes composite action between the steel beam and surrounding concrete when calculating the stiffness of the beam.

4.2.2 Edge Beams

There are various alternatives for edge beams in SlimDek 210® construction (refer to Construction Details). These are;

- Conventional down stand beams
- Asymmetric Steel Beams (ASB)
- Rectangular Hollow Section Floor Beams (RHSFB)

The conventional down stand beams are the most cost-effective solutions where they can be accommodated within the depth of the perimeter wall. However, where the designer has to maintain the floor slab thickness at the perimeter of the building, RHSFB edge beams are the most effective because of their enhanced torsional properties. ASB's may also be used in this situation, provided that the torsional effect due to eccentric loading on the beams is taken into account.

The designer must also be aware of the design issues that affect edge beams, in particular:

- Extra transverse reinforcement may be required in the form of U bars.
- Deflection limits may need to be reduced for brittle finishes, cladding or façade.
- Torsional effects due to eccentric loading have to be considered in combination with lateral torsional buckling.
- The beam may project above the slab in longer spanning applications.

4.2.3 Deep SlimFlor® Beams

Where it is architecturally feasible, packers may be used off the bottom flange of an ASB to create deep SlimFlor® beams. This results in more efficient beam design without unnecessary increase in slab depths.

Thin gauge RHS sections can be hit-miss welded to the bottom flange to offset the SlimDek 210® slab to the required depth. (up to 150mm max). If this method is used, the RHS will remain hollow and the design of the slab should consider the reduced width of concrete block around the SlimFlor® beam at the support. In addition the area of steel in the bottom flange under the RHS packer may need to be ignored for fire design as it is not completely encased in concrete.

Alternatively, cold formed C channel packers with stiffeners may be shot fired to the bottom flange to provide the necessary deck offset. (up to 200mm max). This method will allow concrete to fill under the packer and not affect the fire design of the steel beams. Refer to construction details for suggested arrangements.

4.2.4 Down-stand Composite Beams

SlimDek 210® can be used in traditional composite down-stand applications where the top flange width of the supporting beam is greater than 190mm wide.

Testing has been undertaken using the shear stud layout and reinforcement detail shown in *Figure 22* utilising the buttressing effect of deep ribs to ensure the full yield capacity of shear studs may be achieved prior to splitting failure.

The down-stand beam may also be designed as steel only without reliance on composite action. This will eliminate specific detailing requirements. Shear studs can be nominally spaced at 750mm centres to provide full lateral restraint to the top compression flange under in-service loading.

KingBeam® software allows for composite down-stand design using SlimDek 210®. The software will assume an average shear stud spacing of 300mm to reflect the shear stud set-out.

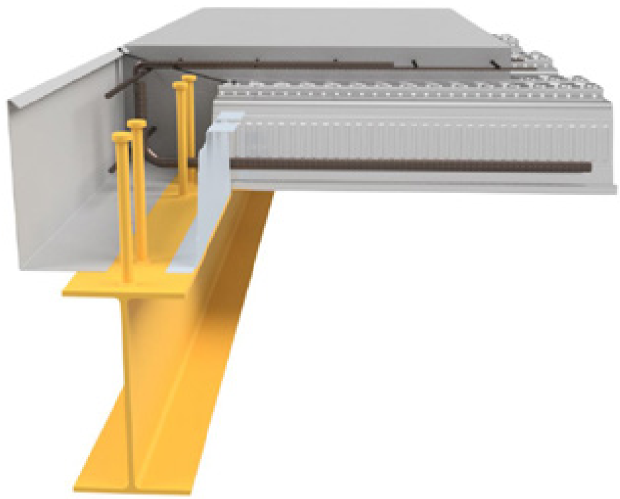


Figure 20 Conventional Down-stand Beams

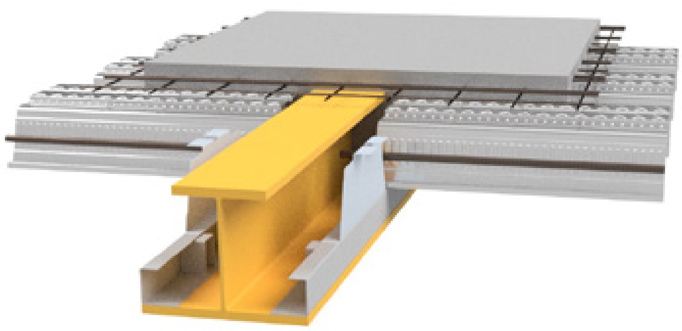


Figure 21 SlimFlor® beam cold formed packer details

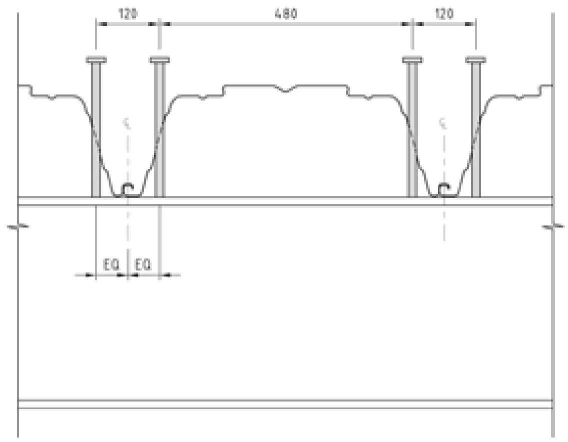


Figure 22 Shear stud layout in SlimDek 210® composite down-stand.

4.2.5 ASB Web Penetrations

Services can be integrated into the structural depth of the slab by running parallel to the ribs and penetrating the webs of the ASB. Refer to *Section 5 Services Design (page 18)* for detailing rules of openings.

Shear transfer in ABS's with web penetrations occurs by Vierendeel bending of the web-flange sections on either side of the penetration. This is the primary mechanism of shear transfer across the penetration. The concrete encasement of the ASB significantly improves the shear and bending resistance.

The designer should pay careful attention to the shear transfer in thin web ASB sections with penetrations. Web openings and associated behaviour are not considered in the design software and should be accessed independently.

The impact of web penetrations on flexural stiffness of ASB's is minor as the centre of the penetration will be located close to the elastic and plastic neutral axes of the beam.

The maximum length of elongated penetrations is governed by the local flexural resistance of the upper composite web-flange section in Vierendeel bending.

Circular penetrations do not rely on Vierendeel action for shear transfer and as such may be located closer to the supports.

The effect of web penetrations on shear and bending resistance of concrete encased ASB sections is quantified with the following empirical formulae:

$$V_{c,o} = V_c\left(1 - {D_o}/{D}\right)$$

$$M_{c,o} = M_c\left(1 - 0.4\,{D_o}/{D}\right)$$

$$I_{c,o} = I_c\left(1 - 0.2\,{D_o}/{D}\right)$$

Where:

V_c shear resistance of the unperforated section

$V_{c,o}$ shear resistance of the perforated section

M_c ending resistance of the unperforated composite section

$M_{c,o}$ bending resistance of the perforated composite section

I_c second moment of area of the unperforated composite section

$I_{c,o}$ second moment of area of the perforated composite section

D_o diameter of the penetration

D beam depth

4.3 Serviceability Limit State Design

4.3.1 Deflections

As SlimFlor® construction is relatively slender compared to traditional down-stand composite systems, the deflection limits are likely to govern the design.

The design of ASB's at serviceability limit state assumes composite action between the steel beam and surrounding concrete when calculating the stiffness of the beam. Under service loads the second moment of area is considered to be the full elastic section capacity of the concrete steel composite section. This is internationally accepted practice as outlined in SCI Publication P248 and associated testing.

Continuity can be considered in accordance with AS/NZS 2327:2017 in order to improve the deflection performance of the composite beam.

For composite design using unpropped construction, the total deflection at the slab surface is the sum of the deflections arising from superimposed dead load, live load and long term effects due to creep and shrinkage. The sustained load for creep does not include the dead load resulting from the wet concrete. The beam soffit deflection should be checked to ensure that required clearances are satisfied as the beam soffit deflection will be greater than the slab surface deflection.

For composite design using propped construction, the total deflection at the slab surface is the sum of the construction stage deflection of the steel section due to removal of props; plus the deflections arising from superimposed dead load, live load, and long term effects due to creep and shrinkage. The sustained load for creep needs to include the load resulting from the removal of the props.

Beams may be pre-cambered to reduce total deflections of the beam soffit.

4.3.2 Durability

ASB's utilised in SlimFlor® construction are encased in concrete on all faces except the underside of the bottom flange. There is a low risk of corrosion of structural steel in internal humidity controlled environments, therefore corrosion protection is not required. Coatings can be applied to the exposed bottom flange if required. ASB sections do not require grit blasting prior to encasement. The ASB must not be painted on faces in contact with the concrete.

For RHSFB used compositely (using shear studs), the sections should not be painted or galvanised where studs are to be welded on site. However, in most cases the studs are welded in the factory, and if necessary, galvanising or painting could be used. In edge beam locations, where the section is partly built into the cladding system, the edges and the underside of the bottom flange or plate should be painted.

4 Beam Design

4.4 Fire Design – Beams

Due to the nature of the SlimDek 210® resting on the bottom flange of the ASB and encasing the beam in concrete (leaving only the underside of the bottom flange exposed), the beam is provided with a degree of fire protection. Higher levels of fire protection can be achieved by painting the bottom flange of the ASB with an intumescent paint, vermiculite spray or fire rated plaster board. Specifications for the paint are detailed below.

4.4.1 Fire Retardant Paint Specifications, Certification and Warranty Requirements

- All materials, primer, intumescent, topcoat shall be obtained from one manufacturer AkzoNobel – International Paints
- The intumescent coating shall have been tested and assessed to the requirements of AS 1530.4:2014 and AS 4100:1998.
- The intumescent coating shall have 3rd Party certification (i.e. Certifire, LPCB).
- All materials used shall be documented in the independent NATA laboratory assessment (i.e. BRANZ, Exova etc).
- A 10 year warranty is offered by the manufacturer in consideration of the durability guidelines in AS 2312:2014.

4.4.1.1 Applicator and Application Requirements

- There must be a documented audit trail to record the installation of the intumescent coating. This must be registered with the building owner and paint supplier.
- Applicators must be able to demonstrate competence and experience in the application of intumescent paints.
- Application of all materials should be as per the manufacturers technical data sheet and application guidance notes.

4.4.1.2 Surface Preparation

- Abrasive blast clean to Sa2.5 (ISO 8501-1:2007) or SSPCSP10. If oxidation has occurred between blasting and application, the surface should be re-blasted to the specified visual standard. Surface defects revealed by the blast cleaning process, should be ground, filled, or treated in the appropriate manner.
- A sharp, angular surface profile of 50-75 microns (2-3 mils).
- All corners, edges should have a 2mm radius.
- Stripe coats should be applied to all welds, lap joints, plate edges, corners, sharp edges, and any other areas.
- All surfaces should be clean dry and free from any contamination prior to painting.

4.4.1.3 Coating Systems

- Internal dry atmosphere steelwork (C1 or C2) – up to 120 minutes
- Intercure 200..........75 microns dft (shop application)
- Interchar 1260.........dft as per section size (site application)
- Interthane 870........75 microns dft per coat (site application)
- Internal C3 environments should have 2 coats of Interthane 870 applied

4.4.1.4 Product Descriptions

- Intercure 200..........Epoxy Zinc Phosphate primer
- Interchar 1260......... Water based Acrylic Intumescent
- Interthane 870........Semi-gloss polyurethane topcoat

Steel thickness single sided plate protection	HpA	CCT Deg C	Interchar 1260 mm dft 60/-/-	Interchar 1260 mm dft 90/-/-	Interchar 1260 mm dft 120/-/-
10 mm	100	620	0.28	0.59	0.90
12 mm	84	620	0.23	0.52	0.80
14 mm	71	620	0.20	0.49	0.77
10 mm	100	650	0.24	0.53	0.83
12 mm	84	650	0.20	0.47	0.74
14 mm	71	650	0.20	0.42	0.71
10 mm	100	700	0.20	0.46	0.73
12 mm	84	700	0.20	0.40	0.65
14 mm	71	700	0.20	0.36	0.62
10 mm	100	750	0.20	0.39	0.64
12 mm	84	750	0.20	0.34	0.57
14mm	71	750	0.20	0.30	0.55

Any plate greater than 14mm in thickness will use the same data as 14mm.

Table 6 Coating Thickness for Paint System and Plate Thickness

5 Services Design

5.1 Services Integration

The void area between the ribs of the SlimDek 210® profile allows for services to run within the structural depth parallel to the ribs. Ribs of the SlimDek 210® cannot be cut or penetrated without further structural detailing. Service runs perpendicular to the span can be accommodated by dropping the services below the ribs.

It is possible to raise the soffit of a SlimFlor® slab where spans are short by using a shallow decking profile such as KF70. This allows service reticulation transverse to the ribs whilst maintaining services in the structural depth of the SlimFlor® arrangement.

5.2 Service Penetrations Through ASB Sections

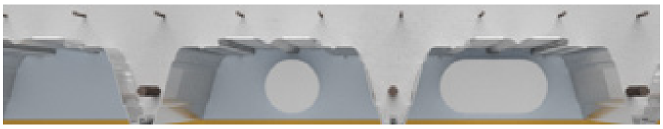
Service penetrations through the webs of ASB's are typically cut during fabrication. A corresponding hole will be cut in the diaphragm section with a sleeve placed through prior to pouring the concrete. Ducts may be placed in the sleeve and sealed externally.

Guidance on the maximum permissible opening in the web of an ASB has been established based on full-scale testing. It has been shown that concrete encased ASB's have enhanced shear and flexural capacity when compared with bare steel sections.

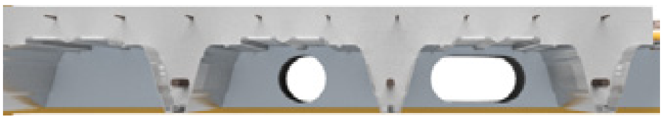
STEP 1: Cutouts in ASB

STEP 2: Cutouts in Diaphragm

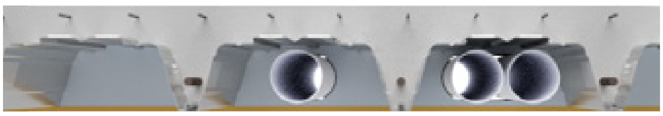
STEP 3: Insert Reo and polystyrene blockouts



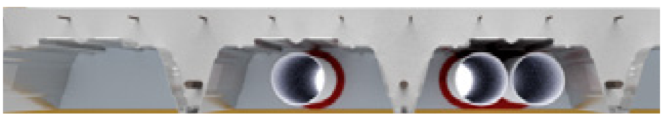
STEP 4: Pour concrete



STEP 5:Remove polystyrene blocks

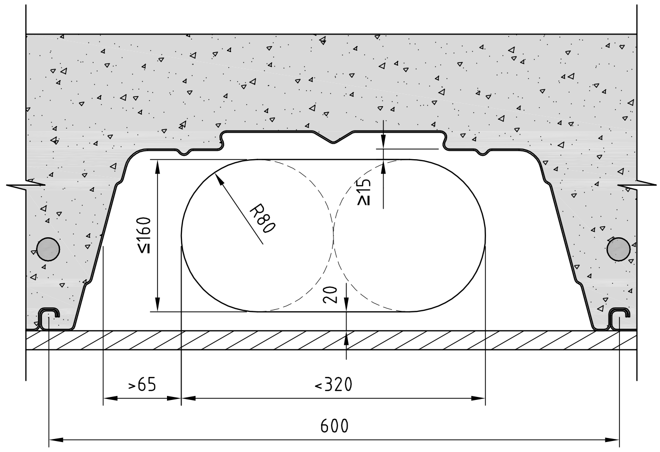


STEP 6: Insert piping or ductwork

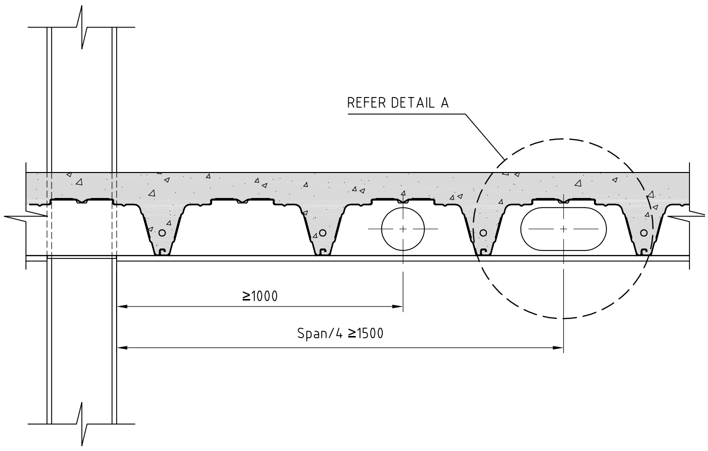


STEP 7: Insert fire collar if required

Figure 23 ASB Web Penetrations



DETAIL A



MAX SIZE OF OPENING

Figure 24 Web Penetration Rules

5.2 Service Penetrations through ASB Sections
continued

The permissible size and shape of web penetrations in ASB's is outlined below:

- 160mm deep x 320mm oval penetrations located centrally between ribs. These penetrations cannot be closer than 1500mm or Span/4 from a support.
- Round penetrations up to 160mm in diameter cannot be closer than 1000mm from a support

These rules do not apply to ASB's with web thicknesses less than 10mm. These cases should be checked on an individual basis.

Where fire separation is required, fire collars may be placed around the pipe as shown in *Figure 25*.

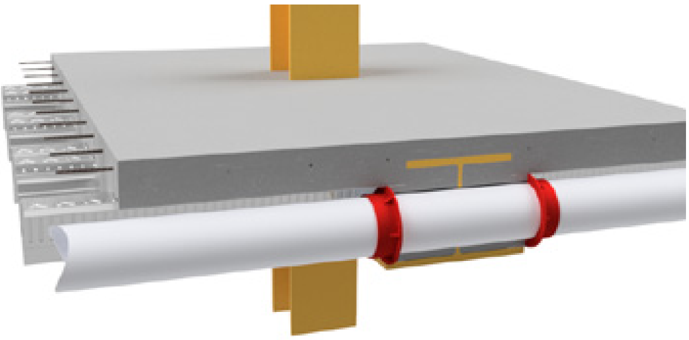


Figure 25 Fire Collar Service Penetration

5.3 Hydraulic and Electrical Slab Penetrations

The SlimDek 210® profile has an allowable penetrations zone 400mm wide between the ribs. Vertical penetrations (up to 300mm x 300mm) through the slab should be located in this zone such that the structural integrity of the deep ribs is maintained. The two options of locating the penetrations within the allowable zone are:

- Move services penetration to suit existing SlimDek 210® layout
- Adjust the SlimDek 210® layout by cutting and lapping a sheet along its length (refer to *Section 9 Construction Details page 28*)

For information on how to treat larger penetrations, refer to *Section 7.2 page 22*.

A close grouping of penetrations transverse to the span direction of the deck should be treated as a single penetration and may therefore require additional steelwork.

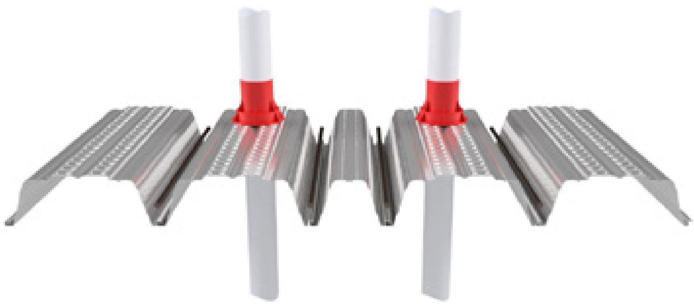


Figure 26 Lapped SlimDek 210® sheet for services coordination

6 Acoustic Design of SlimFlor®

6.1 Understanding the Transfer of Noise

Acoustics and noise transfer in buildings are important issues in building design. Noise is an airborne vibration, which has an effect on the eardrum. Noise has two characteristics: its level and its frequency.

There are two types of noise: airborne and impact sound. Airborne sounds are those that are transferred in the air. These noises include traffic, conversations, and music. Impact sounds are those that are propagated in the walls and floors of a building and include noise such as footsteps and drills. Most noises encountered in a building consist of both airborne and impact sounds.

The two major influences in the transfer of noise are absorption and reflection. There are three main areas in a room that influence the transfer of the noise, ceiling, walls and floor (for a suspended floor).

- The ceiling is the major sound surface in many rooms. As the room size increases so does the importance of the ceiling. Ceilings in a commercial application are often constructed from or covered by some form of sound absorbing mineral tile. However, ceiling tiles do not provide a uniform surface (e.g. joints between tiles, and also light fittings, either recessed or suspended). Flat lucite/Perspex lenses over fluorescent tubes are poor acoustical fittings for sound reflection. Parabolic, deep cell diffusers are the best for sound absorption.
- Walls – these are usually the next most influential surface. Their importance increases as room sizes decrease. Typically, walls have very poor sound absorbing qualities and this is often made worse by putting sound reflectors against the walls e.g. filing cabinets.
- Floor – carpeting the floor will only slightly increase the NRC (Noise Reduction Coefficient). Moving to thicker carpeting is often not a cost-effective solutions because much of the floor area is covered with furniture with a worse NRC. Carpeting will however reduce impact noise.

It must be understood that the decibel rating is a logarithmic scale. The mass law equation predicts that each time the frequency of measurement or the mass per unit area of a single layer wall is doubled, the transmission loss increases by about 6dB.

6.2 National Construction Code

The National Construction Code 2016 (NCC) stipulates the acoustical requirements that must be met for floors. This can be found in Volume 1 Part 5 for class 2 – 9 buildings, and Volume 2 Part 3.8.6 for class 1 & 10 buildings. When considering acoustics in buildings sound can be split into airborne and impact sound insulation. Sound insulation is also split into direct and flanking. Direct sound transmission goes directly through the separating structure, whilst flanking transmission is when sound travels around the separating element. Both direct and flanking transmission can be controlled by mass, isolation and sealing.

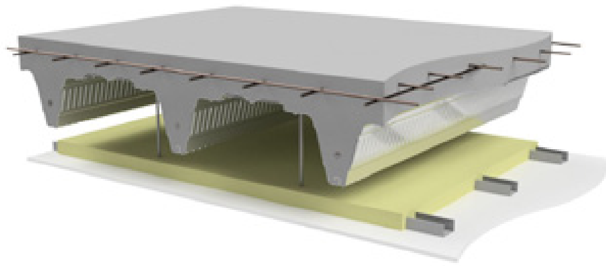
The mass law however does not apply to layered construction, particularly where a degree of isolation is achieved between the various layers. In these cases, a better degree of sound isolation can be achieved than the mass law would suggest. This is where separation barriers, services detailing and jointing becomes important.

Some ways to minimise flanking transmission are;

- Fill gaps between the bottom of the deck and tops of walls with mineral wool and seal at edges.
- Don't allow columns to bridge separating elements.
- Avoid exposed steel elements in internal spaces.
- All gaps should be filled with acoustic sealant.
- Leave gaps between elements where possible.
- Provide appropriate acoustic detailing for all services.

Testing of the SlimFlor® profile was undertaken at the British Gypsum's Building Test Centre in Leics, United Kingdom. The results from these tests identified that a light weight flooring structure can meet the requirements of the NCC when a layered floor system is utilised. The results are as detailed in *Table 7 – Acceptable forms of SlimFlor® Construction*. These values correlate with those detailed in the NCC. As a guide it is recommended that a 5dB difference can be considered for in infield testing when comparing to a laboratory tests such as these. For more detailed advice consult an acoustics engineer.

6 Acoustic Design of SlimFlor®

Description	$D_{nTw} + C_{tr}$	Construction
290mm SlimDek 210® slab with: (a) Carpet with underlay (b) 75mm thick 11kg/m³ Glasswool insulation (40mm min thickness under ribs) (c) One Layer of 13mm plasterboard ceiling	47	

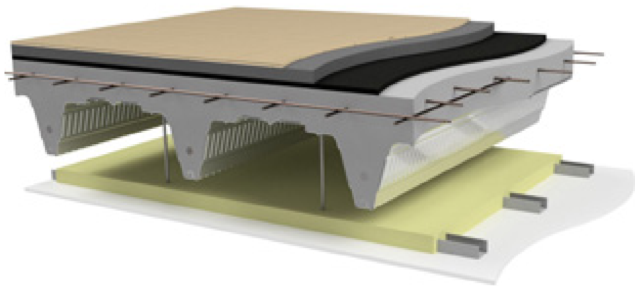
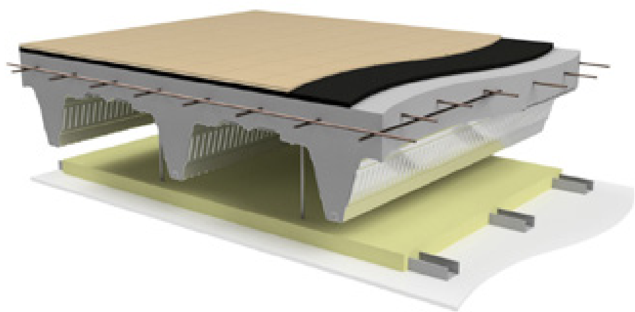
Description	L'nTw	L'nTw + C1	Construction
290mm SlimDek 210® slab with: (a) Tiles (b) 10mm Vibramat (c) Screed (d) 75mm thick 11kg/m³ Glasswool insulation (40mm min thickness under ribs) (e) One layer of 13mm thick plasterboard ceiling	52	48	
290mm SlimDek 210® slab with: (a) Tiles (b) 10mm Vibramat (c) 75mm thick 11kg/m³ Glasswool insulation (40mm min thickness under ribs) (d) One layer of 13mm thick plasterboard ceiling	54	48	

Table 7 – Acceptable forms of SlimFlor® Construction

7 Construction

All steel construction works shall be undertaken in accordance with AS/NZS 5131:2017; and in a safe manner in accordance with all local Work Safe requirements.

7.1 Storage and Handling

Panels will be delivered to the building site or specified storage area in strapped bundles. If not required for immediate use, bundles should be neatly stacked clear of the ground with a fall for drainage and protected by waterproof covers. Do not allow rain or condensation to be trapped between panels.

To minimise damage to the sheets, break open bundles of SlimDek 210® only when installation is due to commence. Check to ensure that any temporary supports required are in place prior to installing the decking.

When lifting, it is recommended that an appropriate beam with several lifting points and carefully located and packed slings, be used. 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. Bundles must never be lifted using the metal banding.

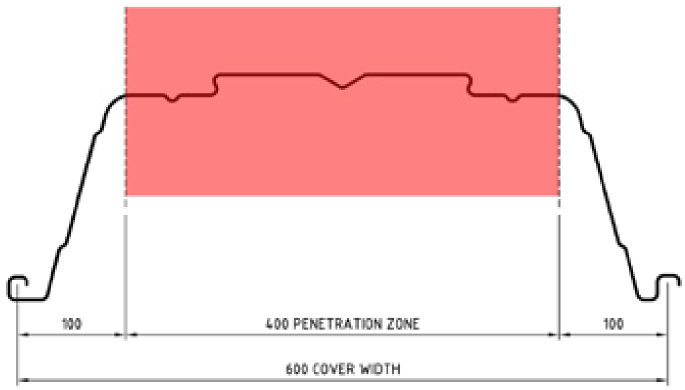


Figure 27 Allowable Penetration Zone

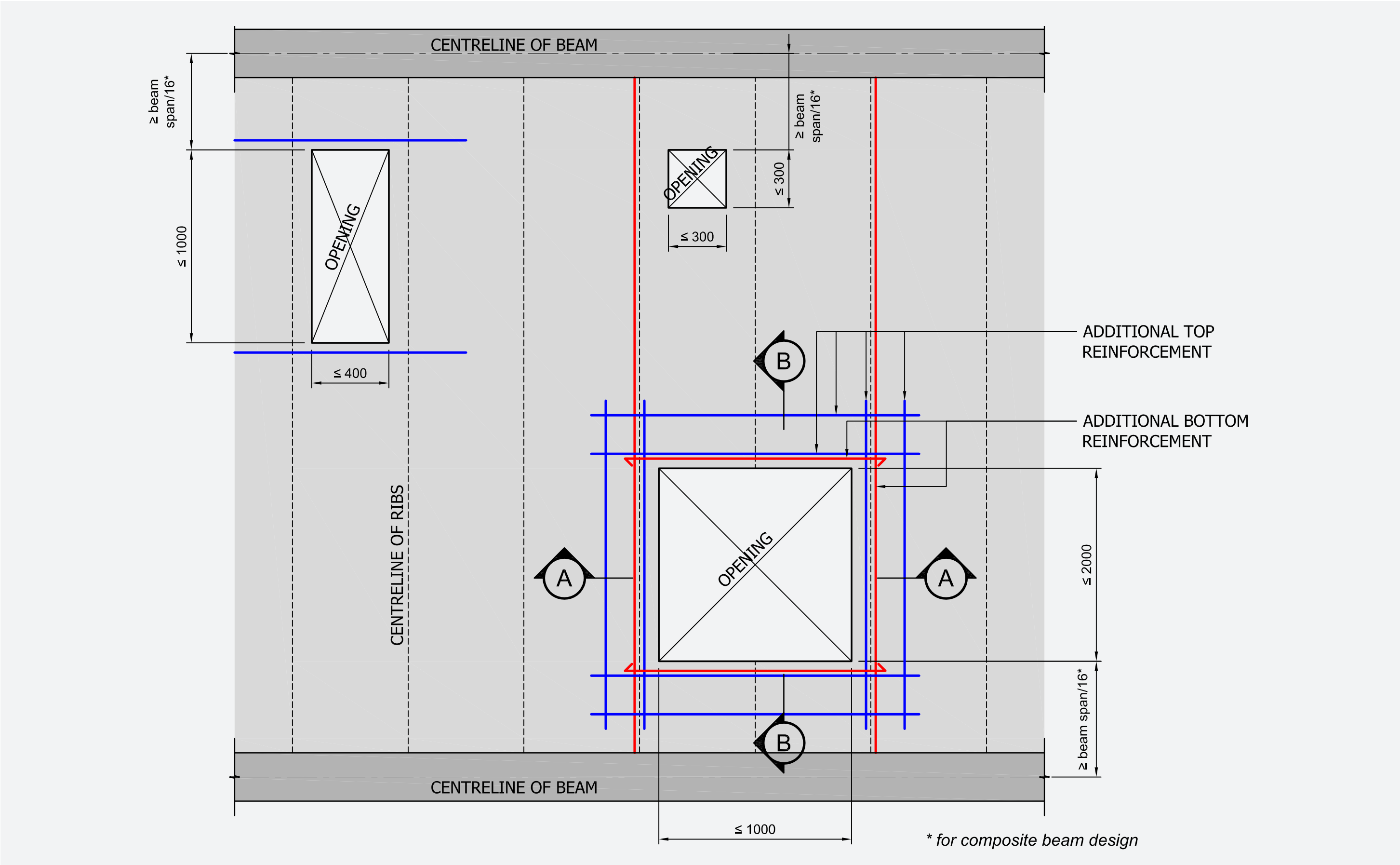
7.2 Slab Penetrations

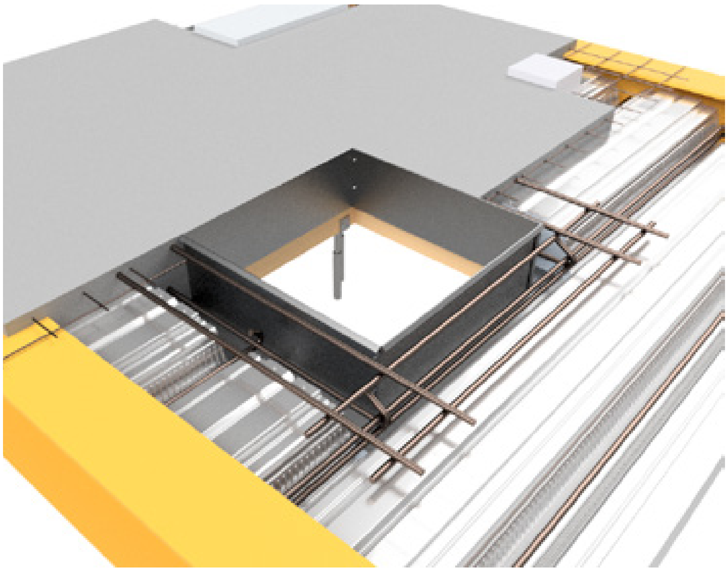
Penetrations up to 300mm x 300mm can be accommodated within the allowable penetration zone of the profile as shown in *Figure 28 (page 23)*. Additional reinforcement (other than the crack control reinforcement) is generally not required.

Penetrations up to 300mm x 700mm, running parallel to the ribs where no ribs are cut should be trimmed with additional reinforcement. This is also the case if the penetrations are placed close together.

Penetrations up to 1000mm wide x 2000mm long can be accommodated where the penetration is positioned so that only 1 rib is removed. Edge form should be used to form the perimeter of the penetration and form a trimming beam containing additional reinforcement to transfer the load from the discontinuous rib. Additional crack control reinforcement may be required. Temporary propping surrounding the penetration will be required; to temporary works engineer's details.

Larger penetrations will require secondary steelwork back to the primary support beams.





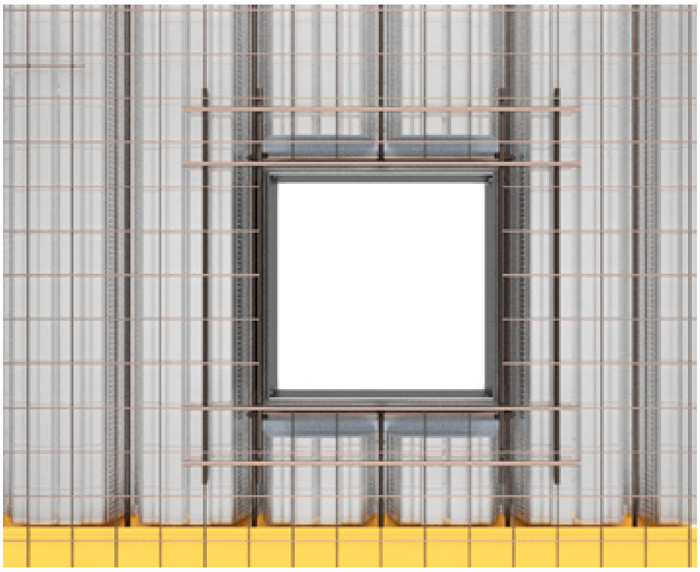


Figure 28 Slab Penetration Details

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

1. The distance between the penetration and the unsupported edge must be greater than 500mm or W, whichever is the greater.
2. Penetrations must not be closer together than 1.5W (of the largest penetration) or 300mm, whichever is the greater. If they are closer they must be considered as one penetration.
3. Not more than ¼ width of any bay is to be removed by penetrations.
4. Not more than ¼ width of deck span is to be removed by penetrations.

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

If the penetration falls within the usual effective breadth of concrete flange of any composite beams (typically Span/8 each side of the beam centre line), the beam resistance should be checked assuming an appropriately reduced effective width of slab.

7 Construction

7.3 Cutting of Metal Deck

Panels are supplied at the required lengths to minimise on-site cutting. Where necessary, panels can be cut using a power saw with an abrasive disc or a metal cutting friction blade. Where holes are to be cut for pipes and penetrations, the use of a plasma cutter is recommended. Alternatively a hole saw can be used.

There are two methods of creating penetrations in SlimDek 210® composite slabs:

- By boxing out prior to pouring concrete and cutting out the deck after concrete has cured from the underside to prevent delamination of the decking from the concrete
- By propping around the penetration, cutting the deck and then forming the perimeter of the penetration with edge form

The SlimDek 210® sheeting is not to be cut without adequate propping approved by the temporary works engineer. If the slab has not been propped, the sheeting can be cut only after the concrete has reached 15MPa.

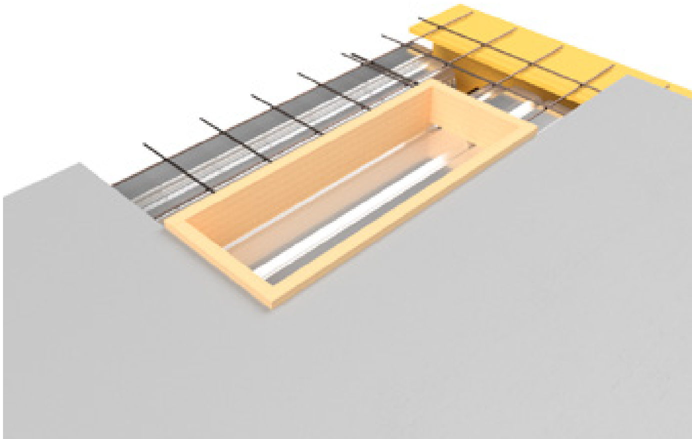


Figure 29 Large Penetration in SlimDek 210®

7.4 Installation

The diaphragms are fixed to the bottom flange of the ASB prior to laying the SlimDek 210® deck using a minimum of one shot fired pin at 600 max centres. It is recommended to fix the diaphragms to the bottom flange of the ASB prior to erection of the steel frame. Diaphragms are fixed to both sides of internal beams with the face of the diaphragm aligning with the outside edge of the bottom flange.

A bundle of SlimDek 210® sheets is craned into position. The sheets are then lifted individually and placed onto the end diaphragms.

Provision should be made so that all panels have full end and intermediate bearing support on the building framework of a minimum of 50mm unless otherwise stated on the structural drawings.

Panels should be accurately aligned as per the shop drawings. Side laps shall be fully lapped and stitched at 500mm centres with 10-16 Tek® screws. The SlimDek 210® sheets are fixed to the top lip of the diaphragms with two 10-16 Tek® screws.

Sheeting shall only terminate at ends into a permanent support (i.e. steel beam).

The propping supports shall be effectively rigid such that their vertical deflection during the construction phase can be ignored. It is the contractor's responsibility to engage a temporary works engineer to ensure that the vertical props have sufficient strength to withstand the construction load, are braced and secured appropriately to withstand all incidental and construction loads.

Structure	Fastener Details
Sheet metal to steel beams	Shot Fired Fixings – RAMSET SBR9
Sheet metal to sheet metal	10-16 TEK Screws
Sheet metal to masonry/concrete	RAMSET WERCS 10mm ANKASCREWS

Table 8 SlimDek 210® Fastener Details

7.5 Edge Form and Closure Flashing

Edge form and closure flashings are folded from 1.2-3mm BMT galvanised steel sheeting. They are used to retain the wet concrete and form vertical edges of the slab. The top of the edge form should be set at the finished structural floor level of the slab. Closure flashings are used where the 600mm profile of the deck does not align with the parallel support member. In this instance the SlimDek 210® is cut along its length and lapped with the top lip of the closure flashing. Fixings to be 10-16 Tek® screws at 600mm centres.

Where inadequate permanent support is provided to edge forms and closure flashings, temporary propping will be required. 25mm x 1.0mm galvanised steel strap is used to support the top lip of the edge forms. The strap is fixed with 10-16 Tek® screws to the top of the SlimDek 210® profile at 600mm centres.

7.6 Sealing Joints

In application where the soffit will be visible in the final case it is recommend to seal the joints between the SlimDek 210® sheeting and the diaphragms to avoid slurry from bleeding through during the concrete pour. Joints can be taped up prior to the reinforcement installation or they can be sealed with a clear water based silicone sealant. It is also possible to use a pressure cleaner from underneath during the concrete pour to clean any slurry soon after placement of the concrete.

7.7 Slab Set-downs

Slab set down areas can be created by replacing the SlimDek 210® sheeting with a composite deck profile such as fielders KF70 in the area where the set-down is required see *Figure 30*. The shallow decking section will typically require propping in the construction case.

Shallow wet area set-downs can be detailed in a manner similar to *Figure 31*, or alternatively to eliminate the requirement for propping, SlimDek 210® can be used, sitting on a bearing plate welded below the bottom flange of the ASB. U profile closure flashing will be required where the SlimDek 210® sheets step.

A Typical Balcony set-down can be achieved by using a shallow deck profile for the balcony as per *Figure 32*. Depending on spans this may require temporary propping. One advantage of this detail is the soffit remains constant from inside to outside resulting in a clean and consistent ceiling line.

7.8 Concrete Placing

When placing concrete on SlimDek 210®, heaping of concrete should be kept to a minimum to prevent excessive deflections. As always, proper vibration practices should be observed particularly around the beams to ensure adequate encasement of the steel beams. Where barrowing of concrete is necessary, barrows should run over on 20mm plywood boards to protect the metal decking.

The finished surface will typically need to be flat and level. Both the decking and ASB's will experience deflection during the concrete pour. This means that the concrete will be thicker at the mid-span of the beam and slab panels. Top surface should be determined with the use of a laser level as opposed to measuring the depth off the deck.

Adding water to concrete trucks on site is strictly prohibited as the composite performance of the slab will be severely affected.

7.9 Curing

Concrete curing shall be undertaken in accordance with the structural engineer's specifications.

7.10 Brittle Elements

Do not install brittle elements (such as masonry walls, floor finishes, façade elements etc.) on the concrete structure until it has cured and all props have been removed. When the props are removed, the slab will deflect which will create the potential for cracking of brittle elements. Consult with structural engineer for advice.

7.11 Construction Loading

Refer to structural drawings for limits on construction loading in various areas of the structure. Consult with structural engineer for further advice.

7.12 Propping of Beams

The temporary works engineer should specify requirements for the propping of beams where required by the structural engineer.

7.13 Specifications - NATSPEC Branded Worksection

Fielders have prepared a detailed NATSPEC branded Worksection template which is available on request from your Fielders representative.

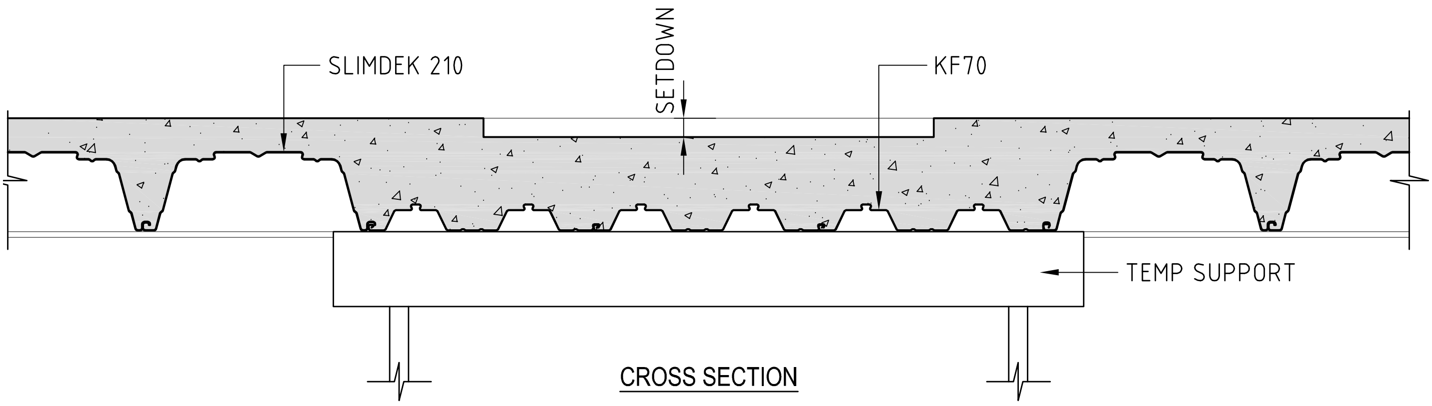


Figure 30 Slab Set-down using KF70®

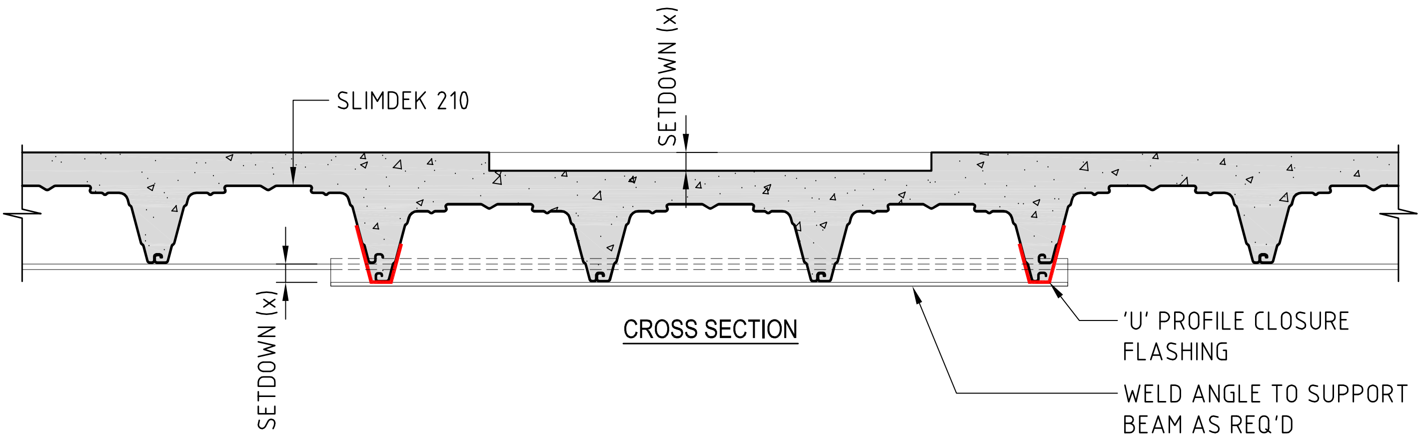


Figure 31 Wet Area set-down using SlimDek 210®

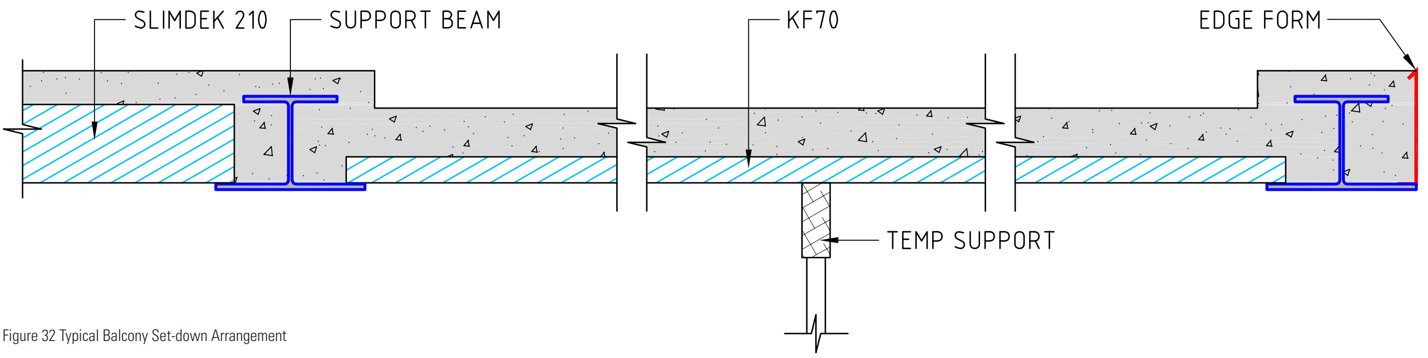


Figure 32 Typical Balcony Set-down Arrangement

8 Fielders Composite Design Software

8.1 KingSlab® Software

Fielders KingSlab® software can be used to achieve the optimal slab design. KingSlab® software is a state of the art design tool that allows for the optimum design to be reached quickly, easily and efficiently. The user simply inputs the project specific parameters then KingSlab® software will generate a graphical display of the design results and print a full summary of calculations and results. KingSlab® software allows the designer maximum flexibility in the selection of design parameters. It considers the four main areas of slab design; formwork, composite, serviceability, fire design. The software allows design of all Fielders steel decking profiles including RF55®, KF57®, KF40®, KF70® and SlimDek 210®

KingSlab® software is available for download at specifying.fielders.com.au

8.2 KingBeam® Software

Fielders KingBeam® software can be used to design composite steel beams using SlimDek 210® in both SlimFlor® or traditional downstand beam applications. The software allows design in all Fielders steel decking profiles including RF55®, KF57®, KF40®, KF70® and SlimDek 210®.

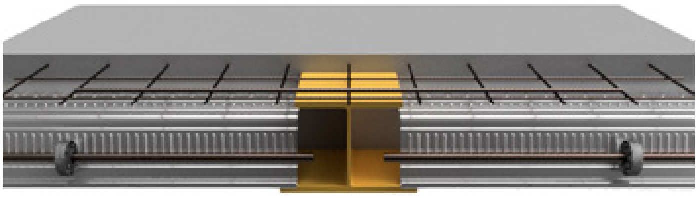
KingBeam® software will undertake ultimate and serviceability design checks in both the construction and composite case; with consideration to effects such as construction stage torsion, combined bending and torsion, local flexural effects of the bottom flange, short and long-term deflections, etc.
All design checks are carried out in accordance with Australian Standards. Where design checks are not covered in detail within the standards (e.g. torsion), published literature and design guides are used. These are referenced in the sample calculation document, available with the KingBeam® download.

KingBeam® software is available for download at specifying.fielders.com.au

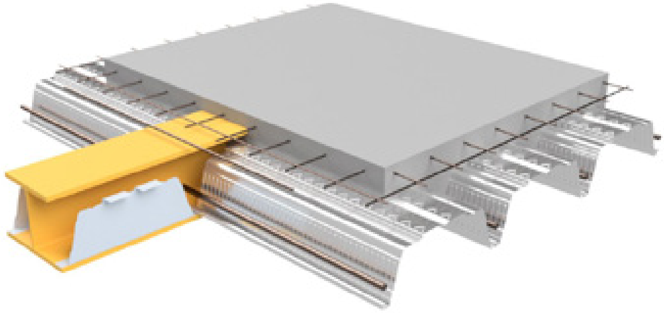
9 Construction Details

A variety of SlimDek 210® and SlimFlor® construction details have been included below. All details are available as BIM files for download and should be used for guidance purposes only. For further information please contact your local Fielders representative on 1800 182 255.

9.1 SlimFlor® with Asymmetric Steel Beam Continuous Details

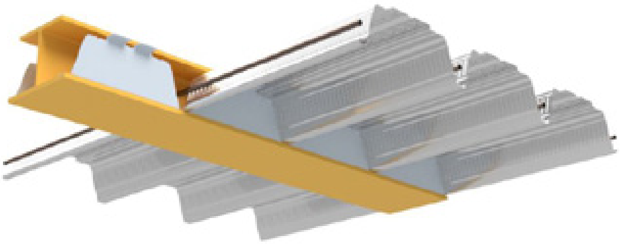


Typical continuous SlimDek 210® slab supported on ASB



Typical continuous SlimDek 210® slab supported on ASB

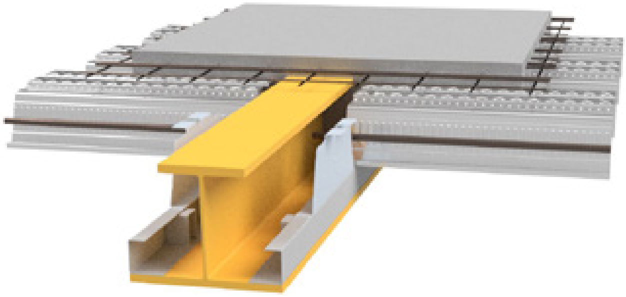
ASB with continuous bottom compression reinforcement through web



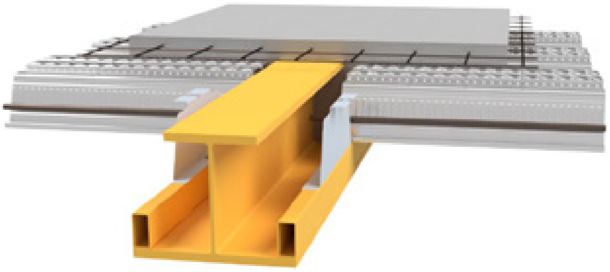
ASB continuous SlimDek 210® slab supported on ASB bottom view

SlimDek 210® supported on ASB with change of SlimDek 210® spanning direction

SlimDek 210® supported on UB with welded support plates



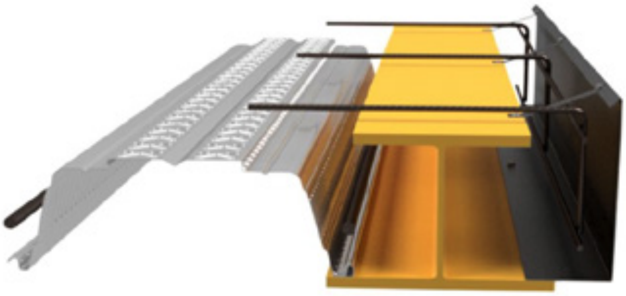
SlimFlor® beam cold formed packer details



SlimFlor® beam RHS packer details

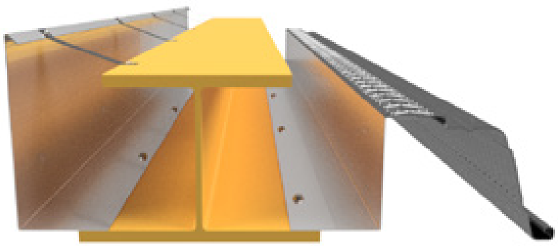
9 Construction Details

9.2 SlimFlor® Asymmetric Steel Beam Edge Details



Edge beam with edge form SlimDek 210® parallel to beam

Edge beam with edge form SlimDek 210®
perpendicular to beam



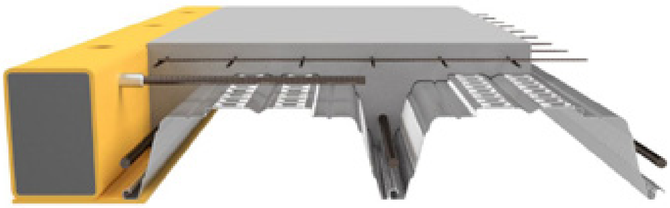
Edge beam with edge form SlimDek 210®
cut along its length with closure flashing

Edge beam with edge form SlimDek 210®
full sheet parallel to beam with closure plate

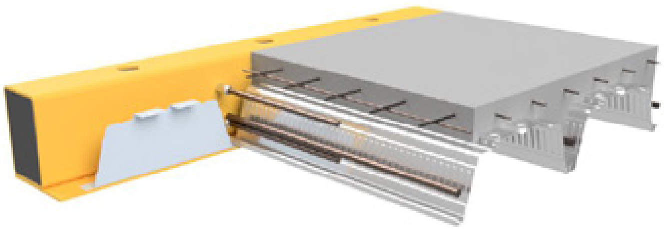
Images of SlimDek 210® are for illustration purposes only final product may vary to the images shown.

9 Construction Details

9.3 SlimFlor® Rectangular Hollow Section Floor Beams Edge Details



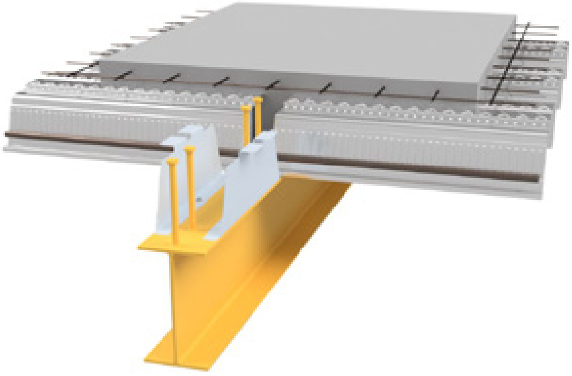
RHS edge beam SlimDek 210® parallel



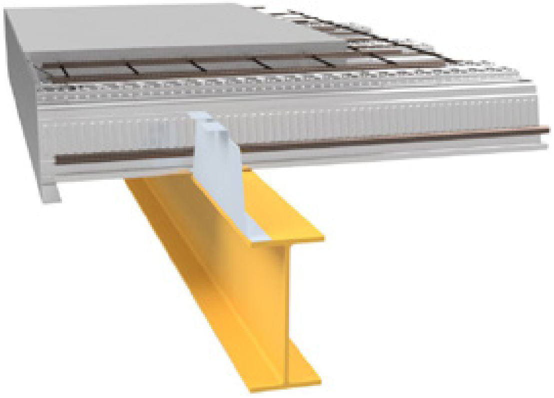
RHS edge beam SlimDek 210® perpendicular

Images of SlimDek 210® are for illustration purposes only final product may vary to the images shown.

9.4 SlimDek 210® with Downstand Beam Details

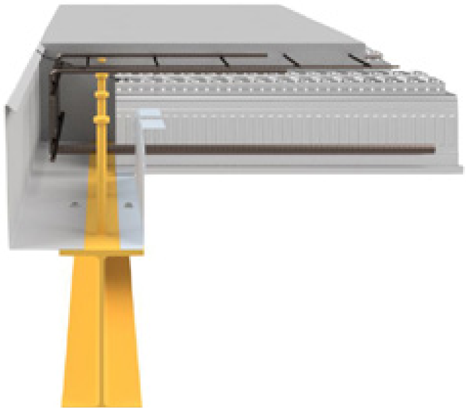


Downstand beam with SlimDek 210® composite slab continuous



Downstand beam edge detail with cantilever

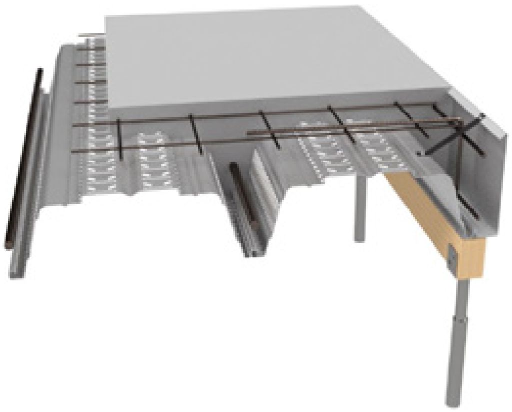
Downstand beam edge detail with SlimDek 210®
parallel to beam



Downstand beam edge detail with SlimDek 210®
perpendicular to beam

9 Construction Details

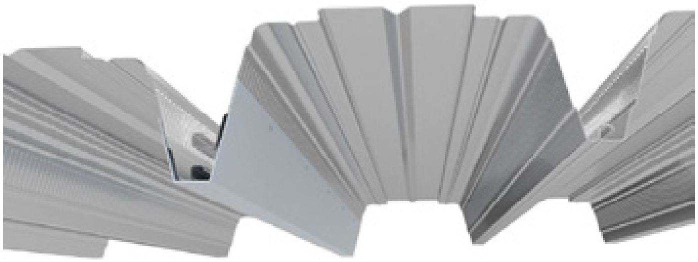
9.5 SlimDek 210® Unsupported Edge Details



Unsupported edge detail full sheet with edge form - propping required

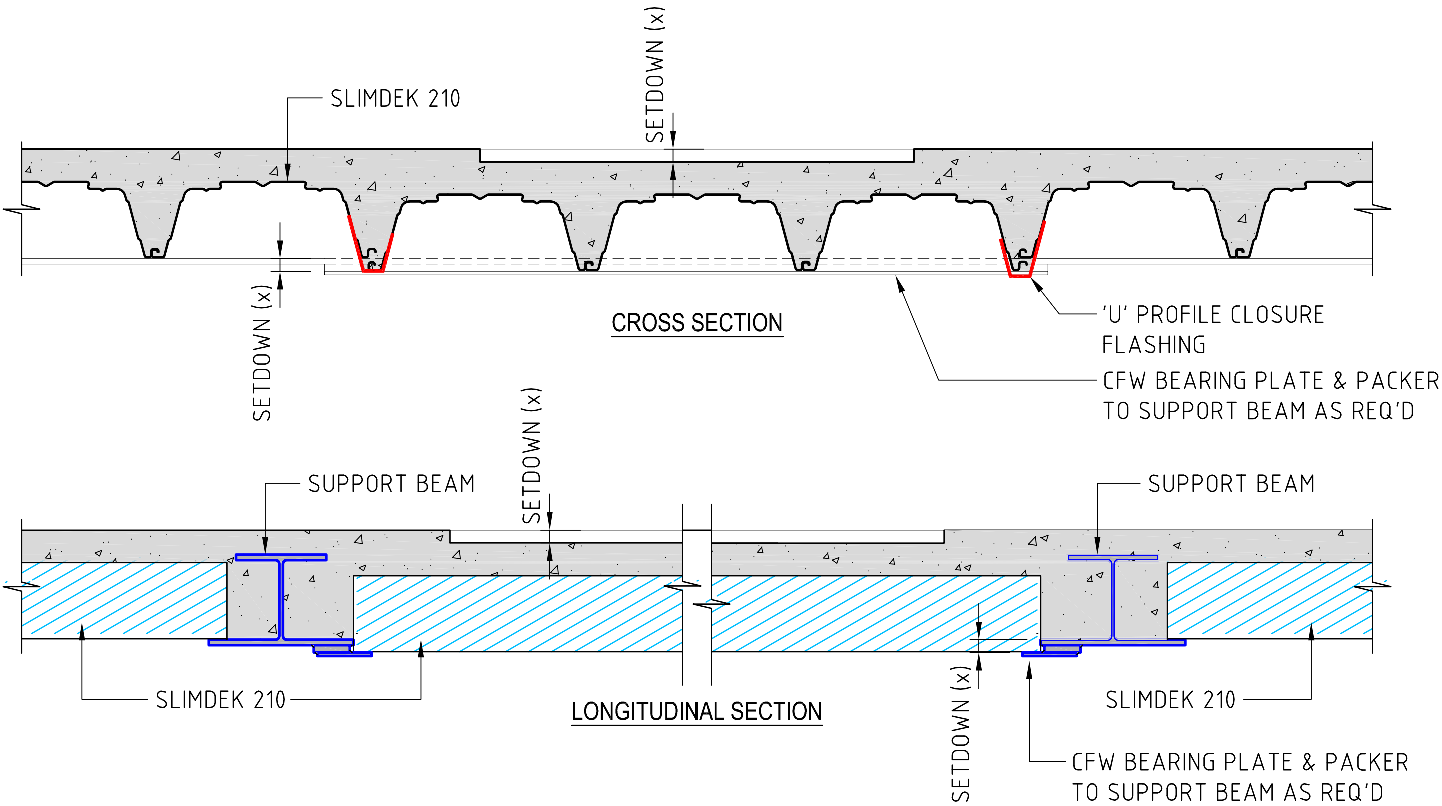
Unsupported edge detail ripped sheet with closure flashing and edge form - propping required

9.6 SlimDek 210® Wet Area Setdowns



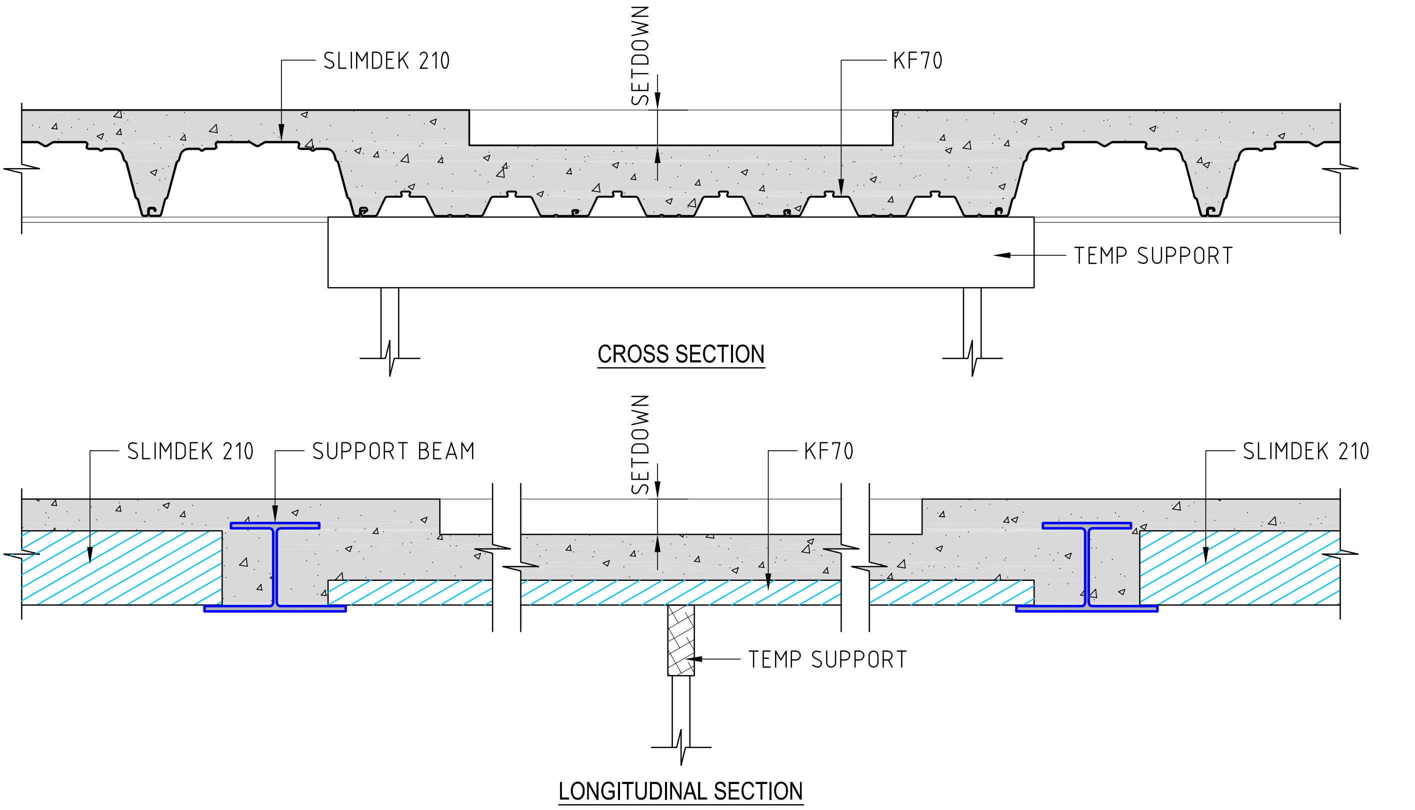
Wet area setdown U-Flashing

Wet area setdown additional bearing plate

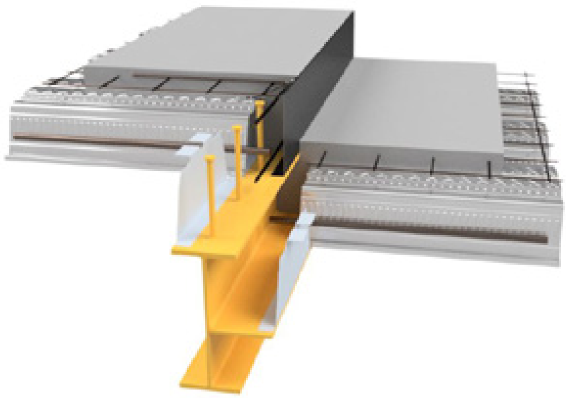


TYPICAL SMALL SETDOWN USING STRUCTURAL PLATE

9.6 SlimDek 210® Wet Area Setdowns continued

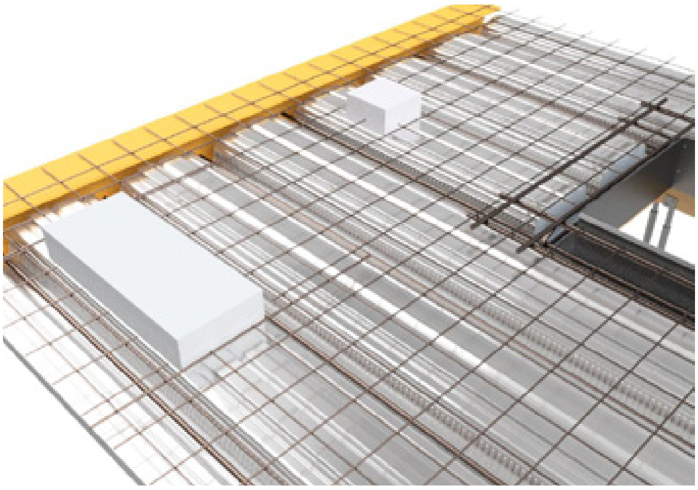


TYPICAL SLAB SETDOWN USING KF70

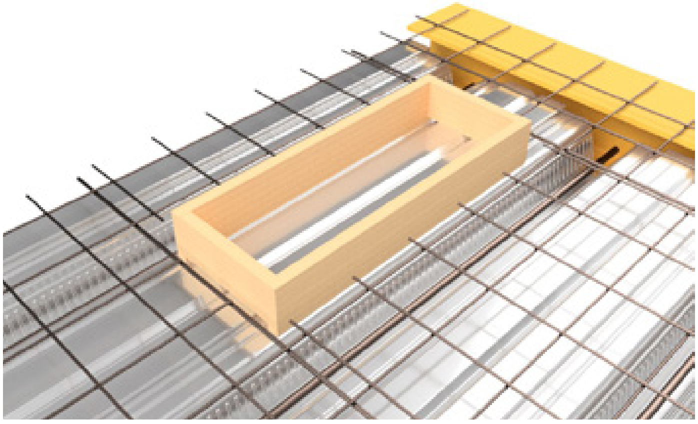


Setdown at downstand beam

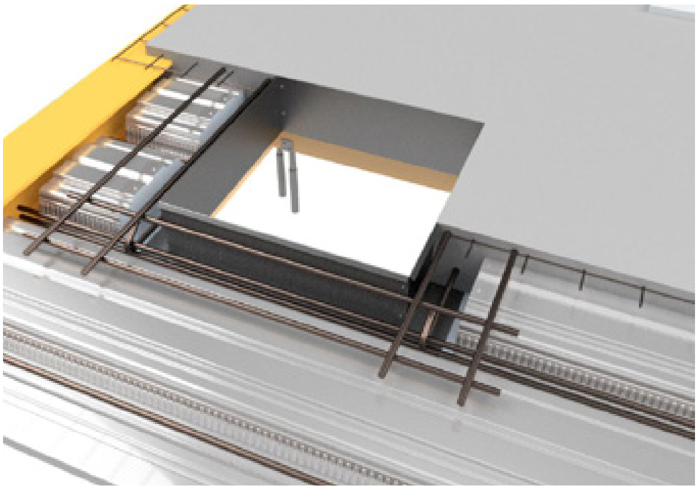
9.7 SlimDek 210® Penetrations



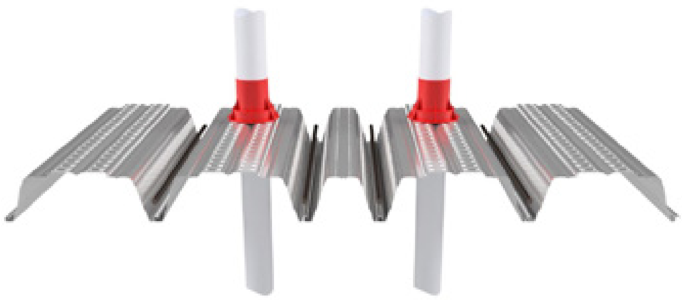
Max 400mm x 1000mm small penetrations not cutting SlimDek 210® ribs with styrofoam blockouts



Max 400mm x 1000mm small penetrations not cutting SlimDek 210® ribs with timber form blockout

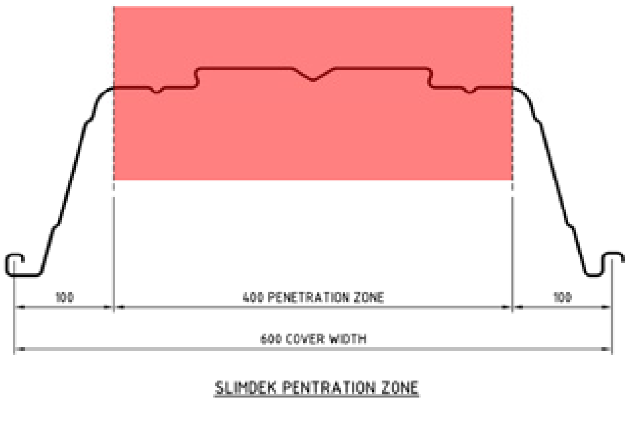


Large penetrations cutting maximum 1 x SlimDek 210® ribs - reinforcement view

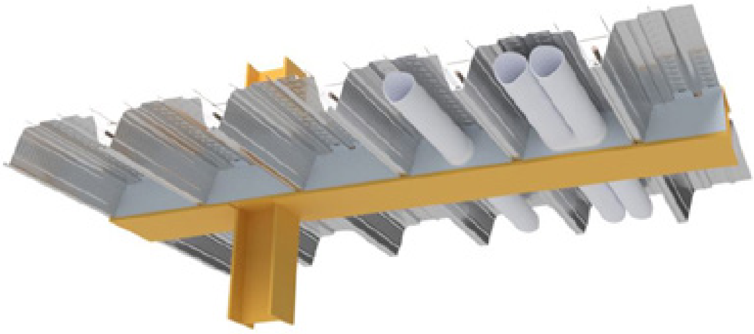


Service penetrations with 2 x ripped and stitched SlimDek 210® sheets

Large penetrations cutting maximum 1 x SlimDek 210® ribs - propping view



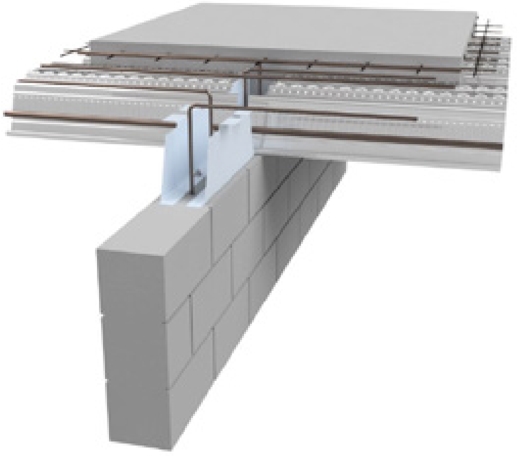
9.8 SlimDek 210® Penetrations in ASB's Details



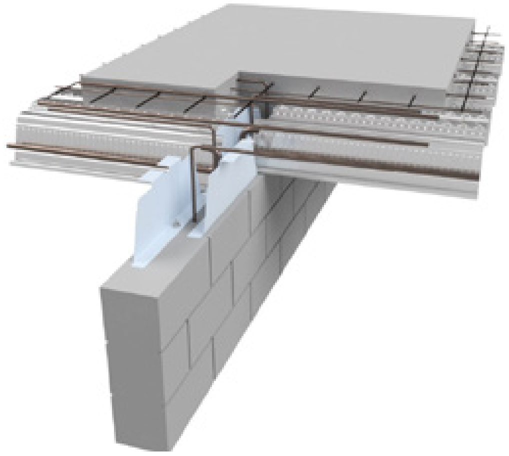
Penetration in ASB

Penetration in ASB with fire collars installed

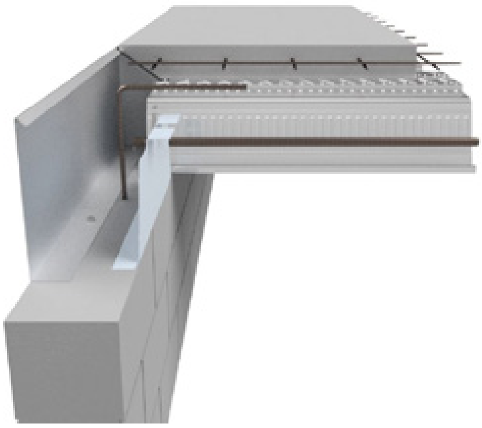
9.9 SlimDek 210® on Masonry/Concrete Walls



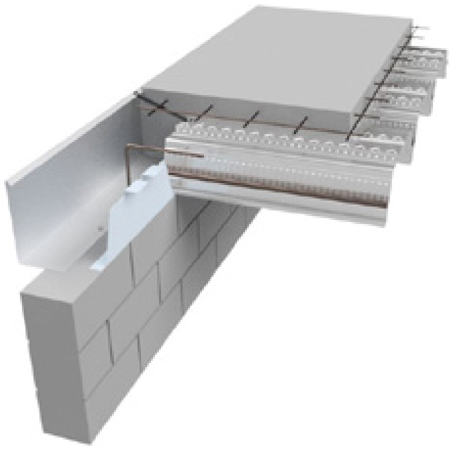
SlimDek 210® continuous over wall



SlimDek 210® continuous over wall offset diaphragms

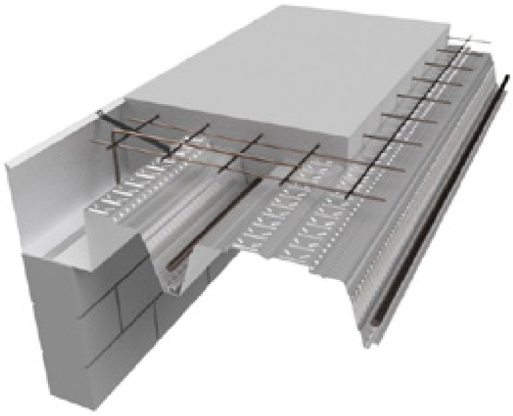


SlimDek 210® perpendicular to wall with edge form



SlimDek 210® perpendicular to wall with cantilever edge form

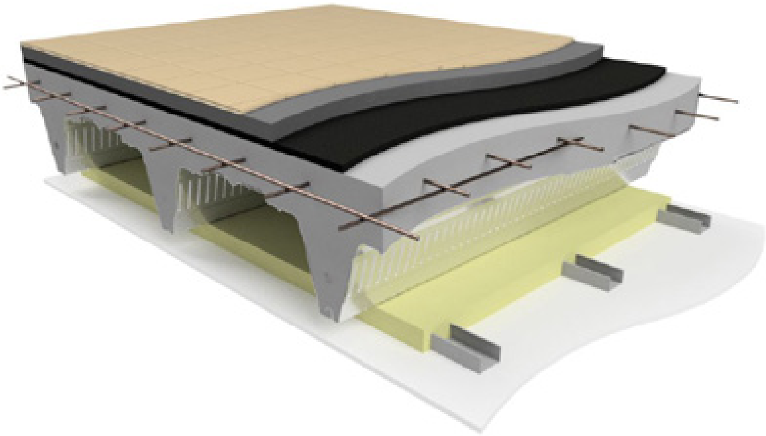
SlimDek 210® parallel to wall full sheet with edge form



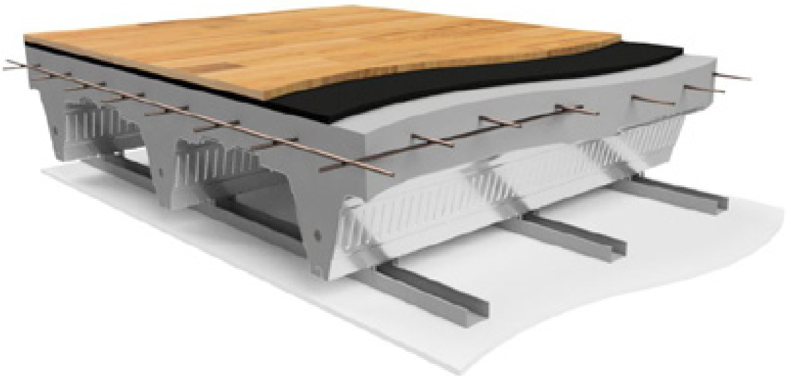
SlimDek 210® parallel to wall ripped sheet with edge form

9 Construction Details

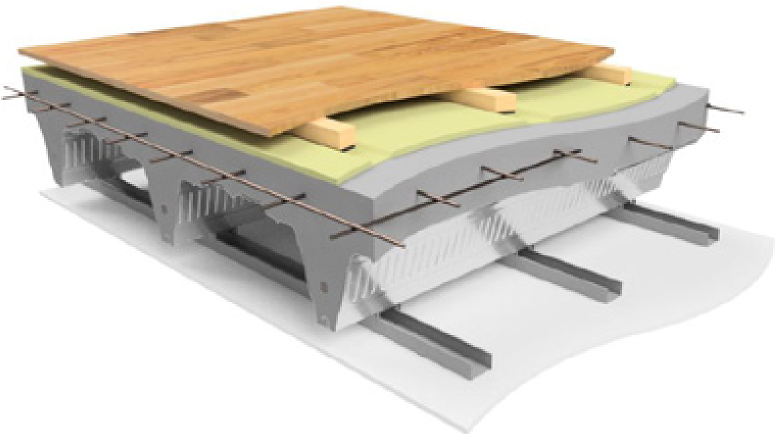
9.10 SlimDek 210® Acoustic Sections



Tiled floor wet area with insulation



Layered resilient floor



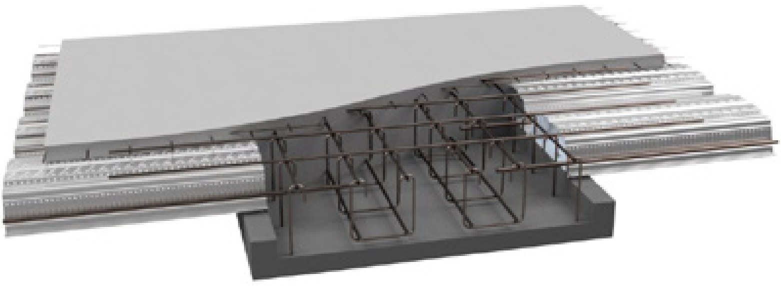
Battened layered resilient floor

Images of SlimDek 210® are for illustration purposes only final product may vary to the images shown.

9 Construction Details

9.11 Miscellaneous Details

SlimDek 210® free form tapered sheet



SlimDek 210® supported by precast band beams shells for use with traditional PT band beams

Images of SlimDek 210® are for illustration purposes only final product may vary to the images shown.

APPENDIX

APPENDIX A: SlimDek 210® Formwork Span Tables

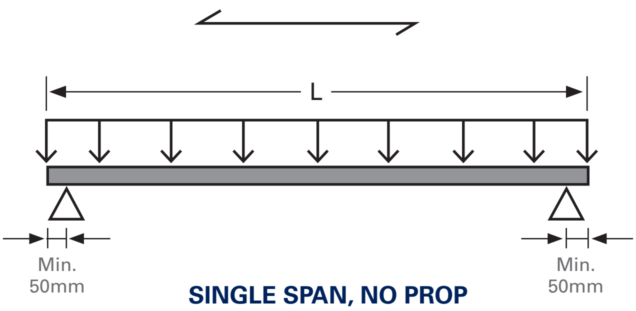
Table A1:
Single Slab Span (L) on Steel Support (mm)
Formwork Deflection Limit L/130

Slab Depth (mm) D	1.00 BMT No. of props per span		1.20 BMT No. of props per span		1.50 BMT No. of props per span	
	0	1	0	1	0	1
280	5350	9400	6200	10520	7000	N/A
290	5200	9040	6050	10240	6800	N/A
300	5050	8760	5900	10000	6650	[11680]
310	4900	8440	5600	9760	6500	11440
320	4750	8160	5400	9520	6400	[11640]
330	4650	7880	5300	9320	6250	11400
340	4550	7640	5150	9120	6150	11160
350	4450	7400	5050	8920	6050	10960
360	4350	7200	4950	8760	5900	10760
370	4250	7000	4850	8560	5800	10560
380	4150	6800	4750	8400	5700	10400
390	4050	6640	4650	8240	5650	10240
400	4000	6520	4600	8080	5550	10080

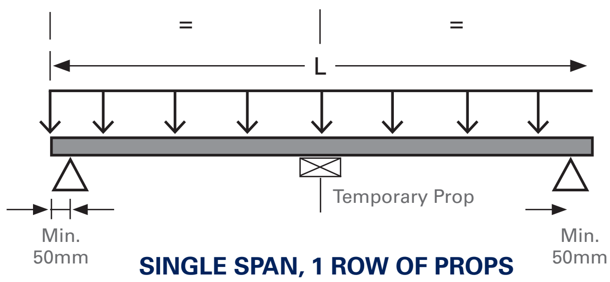
Table A2:
Single Slab Span (L) on Steel Support (mm)
Formwork Deflection Limit L/240

Slab Depth (mm) D	1.00 BMT No. of props per span		1.20 BMT No. of props per span		1.50 BMT No. of props per span	
	0	1	0	1	0	1
280	5350	9400	5800	10520	6150	N/A
290	5200	9040	5650	10240	6000	N/A
300	5050	8760	5500	10000	5900	N/A
310	4900	8440	5400	9760	5750	N/A
320	4750	8160	5250	9520	5650	[11640]
330	4650	7880	5150	9320	5550	11400
340	4550	7640	5050	9120	5450	11160
350	4450	7400	4950	8920	5350	10960
360	4350	7200	4900	8760	5250	10760
370	4250	7000	4800	8560	5150	10560
380	4150	6800	4750	8400	5100	10400
390	4050	6640	4650	8240	5000	10240
400	4000	6520	4600	8080	4950	10080

Note: Span values that are equal in both tables are governed by strength



SINGLE SPAN, NO PROP



SINGLE SPAN, 1 ROW OF PROPS

Overall Sheet Length L = Clear span + Min. 50mm bearing width each end

Design Assumptions

- Concrete density: 24kN/m³
- SlimDek 210® strength and serviceability capacities are based on full scale test results.
- An additional concrete weight due to ponding of (0.7x deflection limit) 24.0kN/m³ has been considered for strength and serviceability limit states.
- The spans in the above table include a minimum bearing width of 50mm on each end support.
- Supports shall be effectively rigid and strong to support construction loads.
- Do not cantilever SlimDek 210® over end supports.
- The information contained in this publication is intended for guidance only. This information should only be use by a qualified structural engineer.
- The practical limit for span to slab depth ratio is considered to be 35 for single spans, values above these limits are listed in [ ] brackets.
- Side laps of SlimDek 210® need to be stitched by metal screws at 500mm intervals.
- The spans in the tables are based on the condition that SlimDek 210® sheets are fixed to the end diaphagms as per Fielder's typical details.
- Construction live loads used for the formwork span tables are in accordance with AS/NZS 2327:2017 Appendix A

  Stage 2: 1.0kPa Workmen and equipment and;
  2.5kPa Stacked materials (to be clearly stated on construction drawings)

  Stage 3: 1.0kPa Workmen and equipment or;
  2.0kPa Mounding of concrete over an area of 1.6 x 1.6m²
- The values in the tables do not consider axial loading on the sheeting.

APPENDIX B: Composite Slab and Fire Tables

Notes and Design Assumptions

Notation

D_{CS} - Depth of composite slab

Span

'L' - Span between permanent supports

Adjacent spans shouldn't differ by more than 5%.

Mesh

Top face mesh based on moderate degree of crack control.
Mesh primary bars shall be orientated in the transverse direction.

Bottom Bar

Bottom face bars assume bars are located in each rib.
(e.g. at 600mm centres)

Compression Bar at Support

Bottom bar requirement at support locations. In SlimFlor® applications, this bar is assumed to be placed through an oversized hole in the bottom of the web at the appropriate cover. Bars should be placed at 600mm centres to align with ribs in SlimDek 210®. Compression reinforcement should extend L/3 into each span.

Adding compression reinforcement at the supports may lead to reduced slab depths. Conversely, increasing the slab depth may reduce or eliminate compression reinforcement

Negative Support Bar

Top reinforcement placed over the supports.
Reinforcement should extend L/3 into each span.

Prop

Temporary propping, if required, during concrete pour.

Loading Arrangement

'Simply Supported Spans' - Simply supported span with no continuity.

'Continuous Spans' - 2 or more continuous spans

Fire Resistance Level

Structural Adequacy / Integrity / Insulation

Concrete Properties

Concrete Strength f'c = 40MPa

Exposure classification A1.

Cover to top reinforcement is 20mm.

Cover to top reinforcement for car parks is 30mm.

FRL (min)	Clear cover to bottom bar (mm)
0	70
60	70
90	85
120	120

Deflection Criteria

Total Deflection Limit <L/250

Formwork Deflection Limit <L/130

Incremental deflection not assessed. If design is sensitive to incremental deflection, refer to KingSlab® software.

Loads

Additional load due to ponding has been considered.

Stage 1 stacked material load - 3.0kPa

Stage 1 stacked material load assumption of 3.0kPa should be clearly indicated on project documentation.

Controls on site should be undertaken to ensure live loads due to stacked materials don't exceed the allowable limits.

Once concrete has been poured, construction live load limit is 1.0kPa.

The following loads have been assumed as common-place for their respective applications and are generally in accordance with requirements outlined in AS/NZS 1170.1:2002. Project specific loading may differ to these values and should be checked using software.

Residential

Live Load = 2.0kPa

Superimposed Dead Load = 1.5kPa

Commercial

Live Load = 3.0kPa

Superimposed Dead Load = 1.6kPa

Retail

Live Load = 5.0kPa

Superimposed Dead Load = 2.5kPa

Carpark

Live Load = 2.5kPa

Superimposed Dead Load = 0.5kPa

Optimal Design Solution

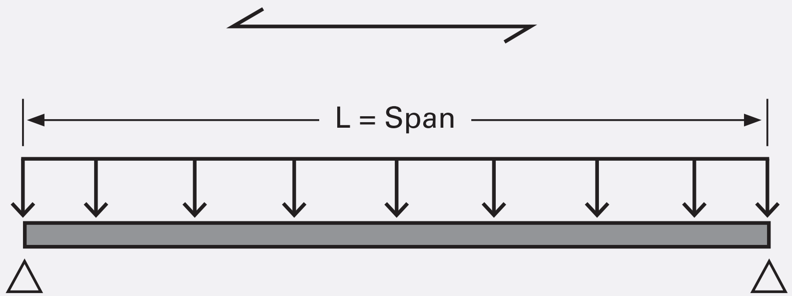
Valid Design, however a more optimal solution exists (either unpropped or thinner slab)

No valid design available. Refer to KingSlab® software

DISCLAIMER

These span tables are for preliminary design only for the purposes of establishing a structural scheme. The values shown here should not be used for construction drawings. Detailed design of all elements must be undertaken by a suitable qualified structural engineer.

Table B1: SlimDek 210® Composite Slab - Simply Supported Spans 0 FRL



1.0mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - -/-/- FRL																
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop
4000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-
4500	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N12	-
5000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N20	-	280	SL92	N12	-
5500	290	SL92	N12	1	310	SL102	N12	1	350	RL1018	N20	1	280	SL92	N12	1
6000	330	RL818	N12	1	350	RL1018	N16	1	390	RL1018	N24	1	310	SL102	N12	1
6500	370	RL1018	N16	1	390	RL1018	N20	1	430	RL1118	N28	1	350	RL1018	N12	1
7000	410	RL1018	N16	1	430	RL1118	N20	1	470	RL1218	N28	1	390	RL1018	N16	1
7500	450	RL1118	N20	1	470	RL1218	N24	1	-	-	-	-	440	RL1118	N20	1
8000	490	RL1218	N24	1	-	-	-	-	-	-	-	-	480	RL1218	N24	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Images of SlimDek 210® are for illustration purposes only final product may vary to the images shown.

APPENDIX B: Composite Slab and Fire Tables

1.2mm BMT SlimDek 210® Composite Slab - Simply Supported Spans - -/-/- FRL

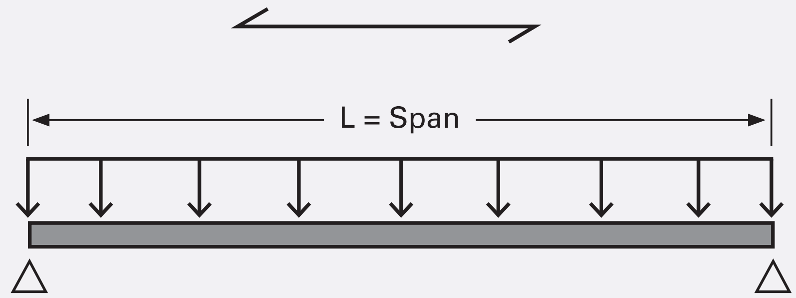
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop
4000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-
4500	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N12	-
5000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N20	-	280	SL92	N12	-
5500	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N24	-	280	SL92	N12	-
6000	280	SL92	N16	-	280	SL92	N16	-	300	SL102	N24	-	280	SL92	N12	-
6500	360	RL1018	N16	1	380	RL1018	N16	1	420	RL1118	N28	1	340	RL1018	N12	1
7000	400	RL1018	N16	1	420	RL1118	N20	1	450	RL1118	N28	1	380	RL1018	N16	1
7500	440	RL1118	N20	1	460	RL1118	N24	1	-	-	-	-	430	RL1118	N20	1
8000	490	RL1218	N24	1	500	RL1218	N28	1	-	-	-	-	470	RL1218	N24	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.5mm BMT SlimDek 210® Composite Slab - Simply Supported Spans - -/-/- FRL

Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop
4000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-
4500	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N12	-
5000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N20	-	280	SL92	N12	-
5500	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N24	-	280	SL92	N12	-
6000	280	SL92	N12	-	280	SL92	N16	-	300	SL102	N28	-	280	SL92	N12	-
6500	280	SL92	N16	-	280	SL92	N20	-	320	RL818	N28	-	280	SL92	N12	-
7000	280	SL92	N16	-	410	RL1018	N20	1	450	RL1118	N28	1	280	SL92	N16	-
7500	430	RL1118	N20	1	450	RL1118	N24	1	490	RL1218	N32	1	410	RL1018	N16	1
8000	470	RL1218	N20	1	490	RL1218	N24	1	-	-	-	-	450	RL1118	N20	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Table B2: SlimDek 210® Composite Slab - Simply Supported Spans 60 FRL



1.0mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 60/60/60 FRL																
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop
4000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-
4500	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N12	-
5000	280	SL92	N16	-	280	SL92	N16	-	280	SL92	N20	-	280	SL92	N12	-
5500	290	SL92	N16	1	310	SL102	N16	1	350	RL1018	N20	1	280	SL92	N16	1
6000	330	RL818	N20	1	350	RL1018	N20	1	390	RL1018	N24	1	310	SL102	N16	1
6500	370	RL1018	N20	1	390	RL1018	N20	1	430	RL1118	N28	1	350	RL1018	N20	1
7000	410	RL1018	N20	1	430	RL1118	N20	1	470	RL1218	N32	1	390	RL1018	N20	1
7500	450	RL1118	N24	1	470	RL1218	N24	1	-	-	-	-	440	RL1118	N20	1
8000	490	RL1218	N24	1	-	-	-	-	-	-	-	-	480	RL1218	N24	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

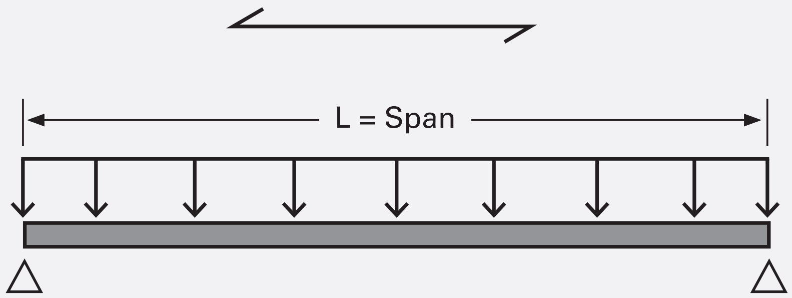
APPENDIX B: Composite Slab and Fire Tables

1.2mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 60/60/60 FRL																
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop
4000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N12	-
4500	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N12	-
5000	280	SL92	N16	-	280	SL92	N16	-	280	SL92	N20	-	280	SL92	N12	-
5500	280	SL92	N16	-	280	SL92	N16	-	280	SL92	N24	-	280	SL92	N16	-
6000	280	SL92	N20	-	280	SL92	N20	-	300	SL102	N24	-	280	SL92	N16	-
6500	360	RL1018	N20	1	380	RL1018	N20	1	420	RL1118	N28	1	340	RL1018	N16	1
7000	400	RL1018	N20	1	420	RL1118	N20	1	460	RL1118	N32	1	380	RL1018	N20	1
7500	450	RL1118	N24	1	460	RL1118	N24	1	-	-	-	-	430	RL1118	N20	1
8000	490	RL1218	N24	1	500	RL1218	N28	1	-	-	-	-	470	RL1218	N24	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.5mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 60/60/60 FRL																
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop
4000	280	SL92	N12	-	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N12	-
4500	280	SL92	N12	-	280	SL92	N16	-	280	SL92	N16	-	280	SL92	N12	-
5000	280	SL92	N16	-	280	SL92	N16	-	280	SL92	N20	-	280	SL92	N16	-
5500	280	SL92	N16	-	280	SL92	N16	-	280	SL92	N24	-	280	SL92	N16	-
6000	280	SL92	N20	-	280	SL92	N20	-	300	SL102	N24	-	280	SL92	N16	-
6500	280	SL92	N20	-	280	SL92	N20	-	320	RL818	N28	-	280	SL92	N20	-
7000	280	SL92	N24	-	290	SL92	N24	-	450	RL1118	N28	1	280	SL92	N20	-
7500	430	RL1118	N24	1	440	RL1118	N24	1	490	RL1218	N32	1	420	RL1118	N20	1
8000	470	RL1218	N24	1	480	RL1218	N24	1	-	-	-	-	460	RL1118	N24	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Table B3: SlimDek 210® Composite Slab - Simply Supported Spans 90 FRL



1.0mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 90/90/90 FRL																
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop
4000	290	SL92	N16	-	290	SL92	N16	-	290	SL92	N16	-	290	SL92	N12	-
4500	290	SL92	N16	-	290	SL92	N16	-	290	SL92	N20	-	290	SL92	N16	-
5000	290	SL92	N20	-	290	SL92	N20	-	290	SL92	N24	-	290	SL92	N16	-
5500	290	SL92	N20	1	310	SL102	N20	1	350	RL1018	N24	1	290	SL92	N20	1
6000	330	RL818	N24	1	350	RL1018	N24	1	390	RL1018	N28	1	310	SL102	N20	1
6500	370	RL1018	N24	1	390	RL1018	N24	1	430	RL1118	N28	1	350	RL1018	N24	1
7000	420	RL1118	N28	1	430	RL1118	N28	1	480	RL1218	N32	1	390	RL1018	N24	1
7500	460	RL1118	N28	1	470	RL1218	N28	1	-	-	-	-	440	RL1118	N28	1
8000	500	RL1218	N32	1	-	-	-	-	-	-	-	-	480	RL1218	N28	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

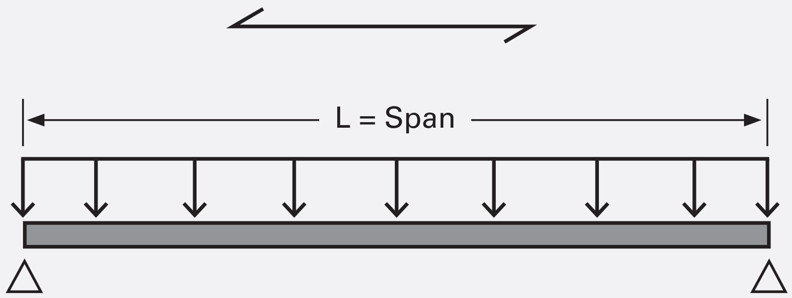
APPENDIX B: Composite Slab and Fire Tables

Span (mm)	Residential				Commercial				Retail				Carpark			
1.2mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 90/90/90 FRL																
	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop
4000	290	SL92	N16	-	290	SL92	N16	-	290	SL92	N20	-	290	SL92	N12	-
4500	290	SL92	N20	-	290	SL92	N20	-	290	SL92	N20	-	290	SL92	N16	-
5000	290	SL92	N20	-	290	SL92	N20	-	290	SL92	N24	-	290	SL92	N20	-
5500	290	SL92	N24	-	290	SL92	N24	-	290	SL92	N28	-	290	SL92	N20	-
6000	290	SL92	N24	-	290	SL92	N24	-	300	SL102	N28	-	300	SL102	N24	-
6500	360	RL1018	N24	1	380	RL1018	N28	1	420	RL1118	N28	1	340	RL1018	N24	1
7000	400	RL1018	N28	1	420	RL1118	N28	1	460	RL1118	N32	1	380	RL1018	N24	1
7500	440	RL1118	N28	1	460	RL1118	N28	1	-	-	-	-	420	RL1118	N28	1
8000	480	RL1218	N32	1	-	-	-	-	-	-	-	-	470	RL1218	N28	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Span (mm)	Residential				Commercial				Retail				Carpark			
1.5mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 90/90/90 FRL																
	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop
4000	290	SL92	N16	-	290	SL92	N16	-	290	SL92	N16	-	290	SL92	N12	-
4500	290	SL92	N16	-	290	SL92	N16	-	290	SL92	N20	-	290	SL92	N16	-
5000	290	SL92	N20	-	290	SL92	N20	-	290	SL92	N24	-	290	SL92	N16	-
5500	290	SL92	N20	-	290	SL92	N24	-	290	SL92	N24	-	290	SL92	N20	-
6000	290	SL92	N24	-	290	SL92	N24	-	300	SL102	N28	-	290	SL92	N24	-
6500	290	SL92	N28	-	290	SL92	N28	-	320	RL818	N32	-	290	SL92	N24	-
7000	290	SL92	N28	-	290	SL92	N32	-	450	RL1118	N32	1	290	SL92	N28	-
7500	430	RL1118	N28	1	450	RL1118	N32	1	490	RL1218	N32	1	410	RL1018	N28	1
8000	470	RL1218	N32	1	490	RL1218	N32	1	-	-	-	-	450	RL1118	N28	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Table B4: SlimDek 210® Composite Slab - Simply Supported Spans 120 FRL



1.0mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 120/120/120 FRL																
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop	D_{cs}	Mesh	Bottom Bar	Prop
4000	305	SL102	N16	-	305	SL102	N20	-	305	SL102	N20	-	305	SL102	N16	-
4500	305	SL102	N20	-	305	SL102	N20	-	305	SL102	N24	-	305	SL102	N16	-
5000	305	SL102	N20	1	305	SL102	N24	1	310	SL102	N24	1	305	SL102	N20	1
5500	305	SL102	N24	1	305	SL102	N24	1	350	RL1018	N28	1	305	SL102	N20	1
6000	330	RL818	N28	1	350	RL1018	N28	1	390	RL1018	N28	1	305	SL102	N24	1
6500	370	RL1018	N28	1	390	RL1018	N28	1	430	RL1118	N32	1	350	RL1018	N28	1
7000	410	RL1018	N28	1	430	RL1118	N32	1	470	RL1218	N32	1	400	RL1018	N28	1
7500	450	RL1118	N32	1	470	RL1218	N32	1	-	-	-	-	440	RL1118	N28	1
8000	-	-	-	-	-	-	-	-	-	-	-	-	480	RL1218	N32	1
8500	-	-	-	-	-	-	-	-	-	-	-	-		-		
9000	-	-	-	-	-	-	-	-	-	-	-	-		-		

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

APPENDIX B: Composite Slab and Fire Tables

1.2mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 120/120/120 FRL

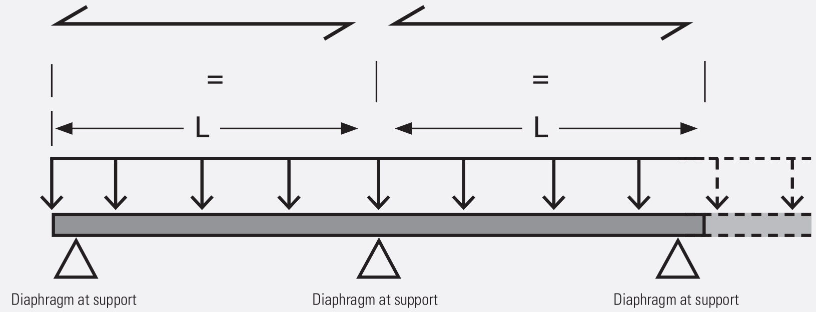
Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop
4000	305	SL102	N16	-	305	SL102	N16	-	305	SL102	N20	-	305	SL102	N16	-
4500	305	SL102	N20	-	305	SL102	N20	-	305	SL102	N24	-	305	SL102	N16	-
5000	305	SL102	N20	-	305	SL102	N24	-	305	SL102	N24	-	305	SL102	N20	-
5500	305	SL102	N24	-	305	SL102	N24	-	305	SL102	N28	-	305	SL102	N24	-
6000	305	SL102	N24	-	305	SL102	N28	-	305	SL102	N32	-	305	SL102	N24	-
6500	360	RL1018	N28	1	380	RL1018	N28	1	420	RL1118	N32	1	340	RL1018	N24	1
7000	410	RL1018	N28	1	420	RL1118	N32	1	470	RL1218	N32	1	390	RL1018	N28	1
7500	450	RL1118	N32	1	460	RL1118	N32	1	-	-	-	-	430	RL1118	N28	1
8000	490	RL1218	N32	1	500	RL1218	N32	1	-	-	-	-	470	RL1218	N32	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1.5mm BMT SlimDek 210® Composite Slab -Simply Supported Spans - 120/120/120 FRL

Span (mm)	Residential				Commercial				Retail				Carpark			
	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop	D_{CS}	Mesh	Bottom Bar	Prop
4000	305	SL102	N16	-	305	SL102	N16	-	305	SL102	N20	-	305	SL102	N16	-
4500	305	SL102	N20	-	305	SL102	N20	-	305	SL102	N24	-	305	SL102	N16	-
5000	305	SL102	N20	-	305	SL102	N24	-	305	SL102	N24	-	305	SL102	N20	-
5500	305	SL102	N24	-	305	SL102	N24	-	305	SL102	N28	-	305	SL102	N20	-
6000	305	SL102	N28	-	305	SL102	N28	-	305	SL102	N32	-	305	SL102	N24	-
6500	350	RL1018	N28	1	370	RL1018	N28	1	410	RL1018	N32	1	330	RL818	N28	1
7000	390	RL1018	N28	1	410	RL1018	N32	1	450	RL1118	N32	1	370	RL1018	N28	1
7500	430	RL1118	N32	1	450	RL1118	N32	1	-	-	-	-	420	RL1118	N28	1
8000	470	RL1218	N32	1	490	RL1218	N32	1	-	-	-	-	460	RL1118	N32	1
8500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Table B5 SlimDek 210® Composite Slab - Continuous Spans 0 FRL



1.0mm BMT SlimDek 210® Composite Slab - Continuous Spans - -/-/- FRL

Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-
4500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-
5000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-400	-	280	SL92	N12	N12-400	-
5500	280	SL92	N12	N12-400	1	280	SL92	N12	N12-400	1	280	SL92	N16	N12-200	1	280	SL92	N12	N12-400	1
6000	280	SL92	N12	N12-400	1	280	SL92	N12	N12-400	1	300	SL102	N20	N16-250	1	280	SL92	N12	N12-400	1
6500	280	SL92	N12	N12-400	1	290	SL92	N12	N12-300	1	330	RL818	N24	N16-200	1	280	SL92	N12	N12-400	1
7000	300	SL102	N12	N12-400	1	320	RL818	N16	N12-200	1	360	RL1018	N24	N16-100	1	280	SL92	N12	N12-400	1
7500	330	RL818	N12	N12-300	1	360	RL1018	N16	N16-300	1	390	RL1018	N24	N16-100	1	310	SL102	N12	N12-300	1
8000	370	RL1018	N16	N12-250	1	390	RL1018	N20	N16-200	1	-	-	-	-	-	350	RL1018	N16	N12-200	1
8500	400	RL1018	N16	N16-250	1	420	RL1118	N20	N16-150	1	-	-	-	-	-	390	RL1018	N16	N16-300	1
9000	430	RL1118	N20	N16-150	1	470	RL1218	N24	N16-100	2	-	-	-	-	-	420	RL1118	N16	N16-200	1

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

APPENDIX B: Composite Slab and Fire Tables

1.2mm BMT SlimDek 210® Composite Slab - Continuous Spans - -/-/- FRL

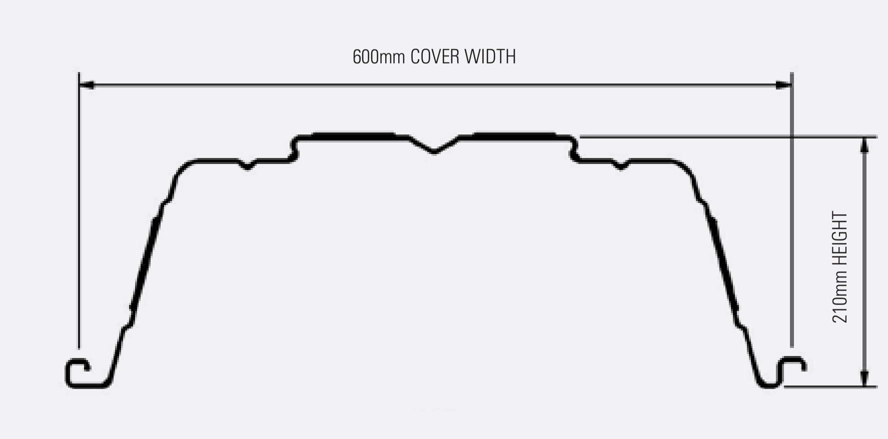
Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-
4500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-
5000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-400	-	280	SL92	N12	N12-400	-
5500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-200	-	280	SL92	N12	N12-400	-
6000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	300	SL102	N20	N16-250	-	280	SL92	N12	N12-400	-
6500	280	SL92	N12	N12-400	1	280	SL92	N12	N12-300	1	330	RL818	N24	N16-200	1	280	SL92	N12	N12-400	1
7000	290	SL92	N12	N12-300	1	305	SL102	N16	N12-200	1	360	RL1018	N24	N16-100	1	280	SL92	N12	N12-300	1
7500	320	RL818	N12	N12-250	1	340	RL1018	N16	N16-300	1	380	RL1018	N24	N16-100	1	300	SL102	N12	N12-250	1
8000	360	RL1018	N16	N12-200	1	380	RL1018	N20	N16-200	1	-	-	-	-	-	340	RL1018	N16	N12-200	1
8500	390	RL1018	N16	N16-250	1	410	RL1018	N20	N16-150	1	-	-	-	-	-	380	RL1018	N16	N16-300	1
9000	430	RL1118	N20	N16-150	1	440	RL1118	N24	N16-100	1	-	-	-	-	-	410	RL1018	N20	N16-200	1

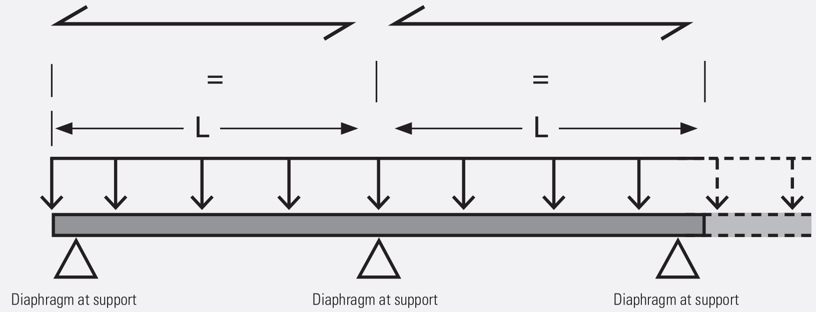
1.5mm BMT SlimDek 210® Composite Slab - Continuous Spans - -/-/- FRL

Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12- 400	-
4500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12- 400	-
5000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-300	-	280	SL92	N12	N12- 400	-
5500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-200	-	280	SL92	N12	N12- 400	-
6000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	300	SL102	N20	N16-250	-	280	SL92	N12	N12- 400	-
6500	280	SL92	N12	N12-400	-	280	SL92	N16	N12-300	-	330	RL818	N24	N16-200	1	280	SL92	N12	N12- 400	-
7000	280	SL92	N12	N12-300	-	290	SL92	N16	N12-200	-	360	RL1018	N24	N16-100	1	280	SL92	N12	N12-300	-
7500	310	SL102	N12	N12-300	1	330	RL818	N16	N16-300	1	380	RL1018	N24	N16-100	1	290	SL92	N12	N12-250	1
8000	350	RL1018	N16	N12-200	1	360	RL1018	N20	N16-200	1	-	-	-	-	-	320	RL818	N16	N12-200	1
8500	380	RL1018	N16	N16-250	1	400	RL1018	N20	N16-100	1	-	-	-	-	-	360	RL1018	N16	N16-300	1
9000	410	RL1018	N20	N16-200	1	430	RL1118	N24	N16-100	1	-	-	-	-	-	390	RL1018	N20	N16-200	1

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Table B6 SlimDek 210® Composite Slab - Continuous Spans 60 FRL





1.0mm BMT SlimDek 210® Composite Slab - Continuous Spans - 60/60/60 FRL

Span (mm)	Residential					Commercial						Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Compression Reo at Support	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	-
4500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	-
5000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-400	-	280	SL92	N12	N12-400	-	-
5500	280	SL92	N12	N12-400	1	280	SL92	N12	N12-400	1	280	SL92	N16	N12-200	1	280	SL92	N12	N12-400	1	1
6000	280	SL92	N16	N12-400	1	280	SL92	N16	N12-300	1	300	SL102	N20	N16-250	1	280	SL92	N12	N12-400	1	1
6500	280	SL92	N16	N12-400	1	290	SL92	N16	N12-250	1	330	RL818	N24	N16-200	1	280	SL92	N12	N12-400	1	1
7000	300	SL102	N16	N12-300	1	320	RL818	N16	N12-200	1	360	RL1018	N24	N16-100	1	280	SL92	N16	N12-300	1	1
7500	330	RL818	N16	N12-300	1	360	RL1018	N16	N16-300	1	390	RL1018	N24	N16-100	1	310	SL102	N16	N12-250	1	1
8000	370	RL1018	N20	N12-250	1	390	RL1018	N20	N16-150	1	-	-	-	-	-	350	RL1018	N16	N12-250	1	1
8500	400	RL1018	N20	N16-250	1	420	RL1118	N20	N16-150	1	-	-	-	-	-	390	RL1018	N16	N16-300	1	2
9000	430	RL1118	N20	N16-150	1	470	RL1218	N24	N16-100	2	-	-	-	-	-	420	RL1118	N16	N16-200	1	2

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

APPENDIX B: Composite Slab and Fire Tables

1.2mm BMT SlimDek 210® Composite Slab - Continuous Spans - 60/60/60 FRL

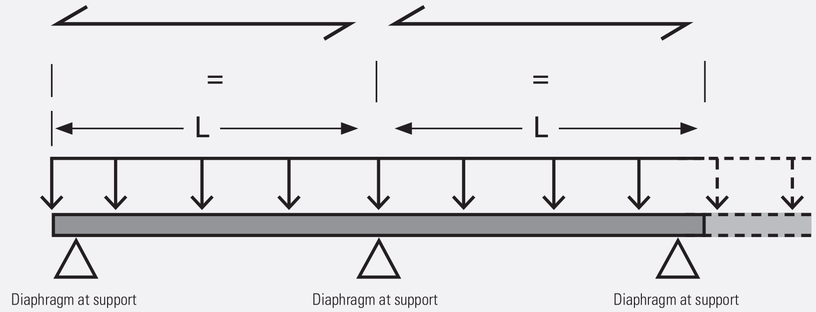
Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-
4500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-
5000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-400	-	280	SL92	N12	N12-400	-
5500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-200	-	280	SL92	N12	N12-400	-
6000	280	SL92	N16	N12-400	-	280	SL92	N16	N12-300	-	305	SL102	N20	N16-250	-	280	SL92	N12	N12-400	-
6500	280	SL92	N16	N12-400	1	280	SL92	N16	N12-250	1	330	RL818	N24	N16-200	1	280	SL92	N12	N12-400	1
7000	290	SL92	N16	N12-300	1	310	SL102	N16	N12-200	1	360	RL1018	N24	N16-100	1	280	SL92	N16	N12-300	1
7500	330	RL818	N20	N12-300	1	350	RL1018	N16	N16-300	1	380	RL1018	N24	N16-100	1	300	SL102	N16	N12-250	1
8000	360	RL1018	N20	N16-200	1	380	RL1018	N20	N16-200	1	-	-	-	-	-	340	RL1018	N16	N12-200	1
8500	390	RL1018	N20	N16-250	1	410	RL1018	N20	N16-150	1	-	-	-	-	-	370	RL1018	N16	N16-200	1
9000	430	RL1118	N20	N16-150	1	450	RL1118	N24	N16-100	1	-	-	-	-	-	410	RL1018	N20	N16-200	1

1.5mm BMT SlimDek 210® Composite Slab - Continuous Spans - 60/60/60 FRL

Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{CS}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12- 400	-
4500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N12	N12- 400	-
5000	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-400	-	280	SL92	N12	N12- 400	-
5500	280	SL92	N12	N12-400	-	280	SL92	N12	N12-400	-	280	SL92	N16	N12-200	-	280	SL92	N12	N12- 400	-
6000	280	SL92	N16	N12-400	-	280	SL92	N16	N12-300	-	305	SL102	N20	N16-250	-	280	SL92	N12	N12- 400	-
6500	280	SL92	N16	N12-400	-	290	SL92	N16	N12-250	-	330	RL818	N24	N16-200	1	280	SL92	N12	N12- 400	-
7000	280	SL92	N16	N12-300	-	300	SL102	N16	N12-200	1	360	RL1018	N24	N16-100	1	280	SL92	N16	N12-300	-
7500	310	SL102	N20	N12-300	1	330	RL818	N16	N16-300	1	380	RL1018	N24	N16-100	1	290	SL92	N16	N12-250	1
8000	350	RL1018	N20	N12-250	1	360	RL1018	N16	N16-200	1	-	-	-	-	-	330	RL818	N16	N12-250	1
8500	380	RL1018	N20	N16-250	1	400	RL1018	N20	N16-150	1	-	-	-	-	-	360	RL1018	N16	N16-300	1
9000	410	RL1018	N20	N16-200	1	430	RL1118	N24	N16-100	1	-	-	-	-	-	390	RL1018	N16	N16-200	1

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Table B7 SlimDek 210® Composite Slab - Continuous Spans 90 FRL



1.0mm BMT SlimDek 210® Composite Slab - Continuous Spans - 90/90/90 FRL

Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	290	SL92	N12	N12- 400	-	290	SL92	N12	N12- 400	-	290	SL92	N16	N12- 400	-	290	SL92	N12	N12- 400	-
4500	290	SL92	N12	N12- 400	-	290	SL92	N12	N12- 400	-	290	SL92	N16	N12- 400	-	290	SL92	N12	N12- 400	-
5000	290	SL92	N12	N12- 400	-	290	SL92	N16	N12- 400	-	290	SL92	N20	N12- 400	-	290	SL92	N12	N12- 400	-
5500	290	SL92	N16	N12- 400	1	290	SL92	N20	N12- 400	1	290	SL92	N24	N12-200	1	290	SL92	N16	N12- 400	1
6000	290	SL92	N20	N12- 400	1	290	SL92	N20	N12-300	1	300	SL102	N28	N16-200	1	290	SL92	N16	N12- 400	1
6500	290	SL92	N20	N12- 400	1	290	SL92	N24	N12-250	1	330	RL818	N28	N16-200	1	290	SL92	N20	N12- 400	1
7000	300	SL102	N24	N12-300	1	310	SL102	N24	N12-200	1	370	RL1018	N32	N16-100	1	290	SL92	N20	N12- 300	1
7500	320	RL818	N24	N12- 200	1	350	RL1018	N24	N12-200	1	390	RL1018	N32	N16-100	1	305	SL102	N20	N12-200	1
8000	360	RL1018	N24	N12- 200	1	380	RL1018	N24	N16-200	1	-	-	-	-	-	340	RL1018	N24	N12-200	1
8500	390	RL1018	N24	N16-200	1	410	RL1018	N32	N16-150	1	-	-	-	-	-	380	RL1018	N24	N16-300	1
9000	430	RL1118	N28	N16-150	1	460	RL1118	N32	N16-100	1	-	-	-	-	-	410	RL1018	N24	N16-200	1

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

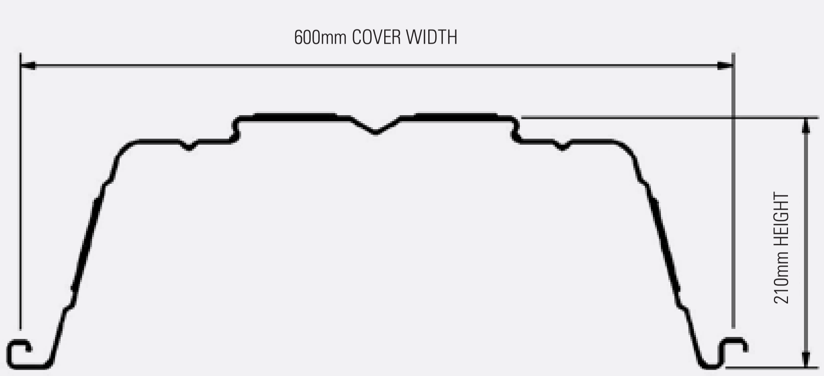
APPENDIX B: Composite Slab and Fire Tables

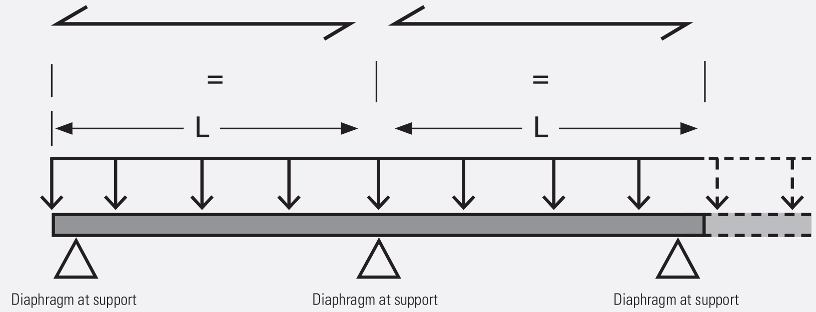
1.2mm BMT SlimDek 210® Composite Slab - Continuous Spans - 90/90/90 FRL																				
Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	290	SL92	N12	N12-400	-	290	SL92	N12	N12-400	-	290	SL92	N16	N12- 400	-	290	SL92	N12	N12- 400	-
4500	290	SL92	N12	N12-400	-	290	SL92	N12	N12-400	-	290	SL92	N16	N12- 400	-	290	SL92	N12	N12- 400	-
5000	290	SL92	N12	N12-400	-	290	SL92	N16	N12-400	-	290	SL92	N20	N12- 400	-	290	SL92	N12	N12- 400	-
5500	290	SL92	N16	N12-400	-	290	SL92	N20	N12- 400	-	290	SL92	N24	N12-200	-	290	SL92	N16	N12- 400	-
6000	290	SL92	N20	N12- 400	-	290	SL92	N20	N12- 400	-	300	SL102	N28	N16-200	-	290	SL92	N20	N12- 400	-
6500	290	SL92	N20	N12-400	1	290	SL92	N24	N12-300	1	330	RL818	N28	N16-200	1	290	SL92	N20	N12- 400	1
7000	290	SL92	N24	N12-300	1	310	SL102	N24	N12-200	1	370	RL1018	N32	N16-100	1	290	SL92	N20	N12- 400	1
7500	330	RL818	N24	N12-200	1	340	RL1018	N24	N16-300	1	390	RL1018	N32	N16-100	1	310	SL102	N24	N12- 300	1
8000	360	RL1018	N24	N12-200	1	380	RL1018	N24	N16-200	1	-	-	-	-	-	340	RL1018	N24	N12-200	1
8500	390	RL1018	N24	N16-200	1	420	RL1118	N32	N16-150	1	-	-	-	-	-	370	RL1018	N24	N16-300	1
9000	420	RL1118	N24	N16-150	1	440	RL1118	N32	N16-100	1	-	-	-	-	-	410	RL1018	N24	N16-200	1

1.5mm BMT SlimDek 210® Composite Slab - Continuous Spans - 90/90/90 FRL																				
Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	290	SL92	N12	N12- 400	-	290	SL92	N12	N12- 400	-	290	SL92	N16	N12- 400	-	290	SL92	N12	N12- 400	-
4500	290	SL92	N12	N12- 400	-	290	SL92	N12	N12- 400	-	290	SL92	N16	N12- 400	-	290	SL92	N12	N12- 400	-
5000	290	SL92	N16	N12- 400	-	290	SL92	N16	N12- 400	-	290	SL92	N20	N12- 400	-	290	SL92	N12	N12- 400	-
5500	290	SL92	N16	N12- 400	-	290	SL92	N20	N12- 400	-	290	SL92	N24	N12-200	-	290	SL92	N16	N12- 400	-
6000	290	SL92	N20	N12- 400	-	290	SL92	N20	N12- 400	-	300	SL102	N28	N16-200	-	290	SL92	N20	N12- 400	-
6500	290	SL92	N24	N12- 400	-	290	SL92	N24	N12-300	-	330	RL818	N28	N16-200	1	290	SL92	N20	N12- 400	-
7000	290	SL92	N24	N12-300	-	290	SL92	N28	N16-300	-	370	RL1018	N32	N16-100	1	290	SL92	N24	N12- 400	-
7500	320	RL818	N24	N12-200	1	330	RL818	N28	N16-300	1	390	RL1018	N32	N16-100	1	290	SL92	N24	N12-300	1
8000	350	RL1018	N24	N12-200	1	370	RL1018	N28	N16-200	1	-	-	-	-	-	330	RL818	N24	N12-200	1
8500	380	RL1018	N24	N16-200	1	400	RL1018	N32	N16-150	1	-	-	-	-	-	360	RL1018	N24	N16-300	1
9000	410	RL1018	N24	N16-200	1	430	RL1118	N32	N16-100	1	-	-	-	-	-	400	RL1018	N24	N16-200	1

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

Table B8 SlimDek 210® Composite Slab - Continuous Spans 120 FRL





1.0mm BMT SlimDek 210® Composite Slab - Continuous Spans - 120/120/120 FRL																				
Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	305	SL102	N12	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N12	N12-400	-
4500	305	SL102	N12	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N12	N12-400	-
5000	305	SL102	N16	N12-400	1	305	SL102	N16	N12-400	1	305	SL102	N24	N12-400	1	305	SL102	N16	N12-400	1
5500	305	SL102	N20	N12-400	1	305	SL102	N20	N12-400	1	305	SL102	N28	N12-200	1	305	SL102	N16	N12-400	1
6000	305	SL102	N24	N12-400	1	305	SL102	N24	N12-400	1	310	SL102	N28	N16-300	1	305	SL102	N20	N12-400	1
6500	305	SL102	N24	N12-400	1	305	SL102	N24	N12-200	1	340	RL1018	N32	N16-150	1	305	SL102	N24	N12-400	1
7000	305	SL102	N28	N12-400	1	330	RL818	N32	N12-200	1	370	RL1018	N32	N16-100	1	305	SL102	N24	N12-400	1
7500	330	RL818	N28	N12- 200	1	360	RL1018	N32	N16-200	1	410	RL1018	N32	N16-100	1	310	SL102	N28	N12-200	1
8000	370	RL1018	N32	N12- 200	1	390	RL1018	N32	N16-200	1	-	-	-	-	-	350	RL1018	N32	N12-200	1
8500	420	RL1118	N32	N16-200	1	430	RL1118	N32	N16-100	1	-	-	-	-	-	390	RL1018	N32	N16-200	1
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	420	RL1118	N32	N16-200	1

Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

APPENDIX B: Composite Slab and Fire Tables

1.2mm BMT SlimDek 210® Composite Slab - Continuous Spans - 120/120/120 FRL

Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	305	SL102	N12	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N12	N12-400	-
4500	305	SL102	N12	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N12	N12-400	-
5000	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N20	N12-400	-	305	SL102	N12	N12-400	-
5500	305	SL102	N20	N12-400	-	305	SL102	N20	N12-400	-	305	SL102	N28	N12-200	-	305	SL102	N16	N12-400	-
6000	305	SL102	N24	N12-400	-	305	SL102	N24	N12-400	-	310	SL102	N32	N16-200	-	305	SL102	N20	N12-400	-
6500	305	SL102	N24	N12-400	1	305	SL102	N24	N12-400	1	340	RL1018	N32	N16-150	1	305	SL102	N24	N12-400	1
7000	305	SL102	N28	N12-300	1	320	RL818	N32	N12-200	1	370	RL1018	N32	N16-100	1	305	SL102	N24	N12-400	1
7500	330	RL818	N32	N12-200	1	350	RL1018	N32	N16-300	1	410	RL1018	N32	N16-100	1	305	SL102	N28	N12-300	1
8000	360	RL1018	N28	N12-200	1	390	RL1018	N32	N16-200	1	-	-	-	-	-	340	RL1018	N32	N12-200	1
8500	400	RL1018	N32	N16-200	1	440	RL1118	N32	N16-100	1	-	-	-	-	-	380	RL1018	N32	N16-300	1
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	420	RL1118	N32	N16-200	1

1.5mm BMT SlimDek 210® Composite Slab - Continuous Spans - 120/120/120 FRL

Span (mm)	Residential					Commercial					Retail					Carpark				
	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop	D_{cs}	Mesh	Bottom Bar	Negative Support Bar	Prop
4000	305	SL102	N12	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N12	N12-400	-
4500	305	SL102	N12	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N12	N12-400	-
5000	305	SL102	N16	N12-400	-	305	SL102	N16	N12-400	-	305	SL102	N24	N12-400	-	305	SL102	N16	N12-400	-
5500	305	SL102	N20	N12-400	-	305	SL102	N20	N12-400	-	305	SL102	N28	N12-200	-	305	SL102	N20	N12-400	-
6000	305	SL102	N24	N12-400	-	305	SL102	N24	N12-400	-	310	SL102	N32	N16-200	-	305	SL102	N20	N12-400	-
6500	305	SL102	N24	N12-400	-	305	SL102	N24	N12-200	-	340	RL1018	N32	N16-150	1	305	SL102	N24	N12-400	-
7000	305	SL102	N28	N12-400	1	305	SL102	N28	N12-200	1	370	RL1018	N32	N16-100	1	305	SL102	N24	N12-400	1
7500	310	SL102	N28	N12-400	1	340	RL1018	N32	N16-200	1	410	RL1018	N32	N16-100	1	305	SL102	N28	N12-300	1
8000	350	RL1018	N32	N12-200	1	390	RL1018	N32	N16-200	1	-	-	-	-	-	330	RL818	N32	N12-200	1
8500	390	RL1018	N32	N16-200	1	410	RL1018	N32	N16-100	1	-	-	-	-	-	370	RL1018	N32	N16-200	1
9000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	420	RL1118	N32	N16-200	1

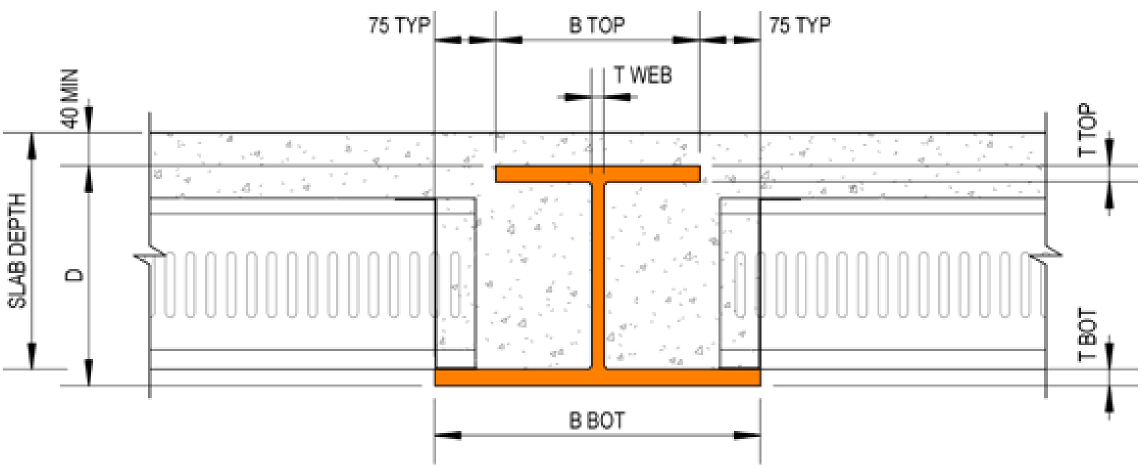
Optimal Design Solution. Valid Design, however a more optimal solution exists (either unpropped or thinner slab). No valid design available. Refer to KingSlab® software. **Notes:** Refer to Page 43 for full notes.

APPENDIX C: ASB Section Properties

Table C1: Custom ASB Sizes

Beam ID	Depth of Beam (mm)	Width of Top Flange (mm)	Width of Bottom flange (mm)	Thickness of Top flange (mm)	Thickness of Bottom flange (mm)	Thickness of Web (mm)	Steel Grade	Mass of Section (kg/m)	Φ M_{sx} (kN.m)
	D	B_{top}	B_{bot}	T_{top}	T_{bot}	T_{web}			
258ASB43.3	258	180	330	8	8	6	350	43.3	141
258ASB46.2	258	180	330	10	8	6	350	46.2	179
260ASB54.1	260	180	330	12	10	6	350	54.1	220
260ASB61.3	260	200	350	12	10	8	350	61.3	244
262ASB70.5	262	200	350	12	12	10	350	70.5	265
262ASB76.1	262	230	380	12	12	10	350	76.1	278
262ASB80.9	262	220	370	16	12	10	350	80.9	347
262ASB87.4	262	250	400	16	12	10	350	87.4	373
266ASB99.1	266	220	370	20	16	10	350	99.1	426
266ASB111.2	266	250	400	20	16	12	350	111.2	482
266ASB125.3	266	300	450	20	16	12	350	125.3	548
270ASB139.4	270	300	450	20	20	12	350	139.4	573
270ASB150.7	270	300	450	25	20	12	350	150.7	676
275ASB175.2	275	300	450	28	25	12	350	175.2	762
278ASB194.8	278	300	450	32	28	12	350	194.8	853
282ASB234.1	282	350	500	32	32	12	350	234.1	995

Typical ASB Section



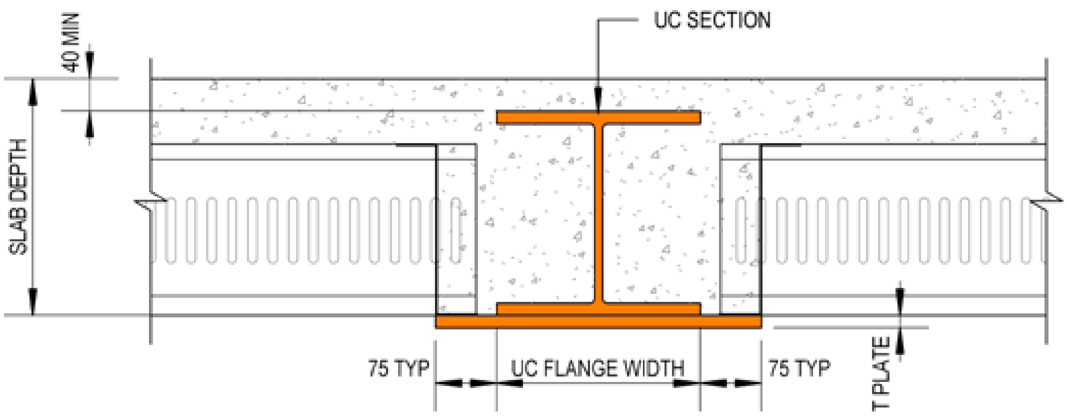
APPENDIX C: ASB Section Properties

Table C2: Custom ASB (UC) Sizes

Beam ID	UC Size	Width of Bottom Plate (mm)	Thickness of Bottom Plate (mm)	Steel Grade	Mass of Section (kg/m)	Φ M_{sx} (kN.m)
			B_{bot}			
210ASB(UC)73.6	200UC46.2	350	10	350	73.6	179
210ASB(UC)79.9	200UC52.2	350	10	350	79.9	210
210ASB(UC)86.9	200UC59.5	350	10	350	86.9	243
220ASB(UC)114.4	200UC59.5	350	20	350	114.4	266
260ASB(UC)104.3	250UC72.9	400	10	350	104.3	348
260ASB(UC)120.9	250UC89.5	400	10	350	120.9	442
266ASB(UC)139.7	250UC89.5	400	16	350	139.7	460
275ASB(UC)168.0	250UC89.5	400	25	350	168	490
282ASB(UC)190.0	250UC89.5	400	32	350	190	515
320ASB(UC)132.1†	310UC96.8	450	10	350	132.1	540
320ASB(UC)153.3†	310UC118	450	10	350	153.3	689
320ASB(UC)172.3†	310UC137	450	10	350	172.3	813
320ASB(UC)193.3†	310UC158	450	10	350	193.3	945
326ASB(UC)214.5†	310UC158	450	16	350	214.5	975
335ASB(UC)246.3†	310UC158	450	25	350	246.3	1023
342ASB(UC)271.0†	310UC158	450	32	350	271	1062

† indicates a packer is required to achieve the require cover to the top of the beam. Refer to *page 15* section 4.2.3 Deep SlimFlor® Beams.

Typical ASB UC Section



APPENDIX D: ASB SPAN TABLES

The following span tables have been prepared considering the following design assumptions. For designs outside these assumptions refer to KingFlor® Designer Suite or contact Fielders on 1800 182 255.

Notation

(PC#) - Upward pre-camber amount in millimetres

Nomenclature - 258ASB43.3; three plate welded section, 258mm overall beam depth; 43.3kg/m

Nomenclature - 210ASB(UC)78.0; UC with bottom plate, 210mm overall beam depth; 78.0kg/m

Notes and Design Assumptions

1. Assumes fully unpropped slab construction.
2. Additional load due to ponding in slab panel has been considered.
3. Stage 2 stacked material load = 3.0kPa.
4. Stage 2 stacked material load assumption of 3.0kPa should be clearly indicated on project documentation.
5. Controls on site should be undertaken to ensure live loads due to stacked materials don't exceed the allowable limits.
6. Once concrete has been poured, construction live load limit is 1.0kPa.
7. All ASB(UC) designs in the following tables have assumed a beam camber to eliminate dead load deflection.
8. The following loads have been assumed as common-place for their respective applications and are generally in accordance with requirements outlined in AS/NZS 1170.1:2002. Project specific loading may differ to these values and should be checked using Fielders' KingBeam® software.

Residential
Assumed Slab Depth = 290mm
Live Load = 2.0kPa
Superimposed Dead Load = 1.5kPa

Commercial
Assumed Slab Depth = 305mm
Live Load = 3.0kPa
Superimposed Dead Load = 1.6kPa

Retail
Assumed Slab Depth = 305mm
Live Load = 5.0kPa
Superimposed Dead Load = 2.5kPa

Carpark
Assumed Slab Depth = 290mm
Live Load = 2.5kPa
Superimposed Dead Load = 0.5kPa

The design in the following span tables accounts for construction stage effects as described in Section 4.1.

Concrete Properties
Concrete Strength f'c = 40 MPa
Concrete Density 2500kg/m^3

Deflection Limits
Total deflection limit - L/250
Incremental deflection limit - L/500

The following span tables do not consider or make allowance for specific fire rating requirements. Passive fire protection will have to be applied to steelwork to meet the assumed limiting temperature. Contact your local Fielders engineer for further assistance in design optimisation.

DISCLAIMER
These span tables are for preliminary design only for the purposes of establishing a structural scheme. The values shown here should not be used for construction drawings. Detailed design of all elements must be undertaken by a suitable qualified structural engineer.

APPENDIX D: ASB SPAN TABLES

Table D1 Residential LL 2.0 kPa SDL 1.5 kPa Assumed slab depth 290mm

Slab Span (m)	Beam Span (m)						
	5	6	6.5	7	7.5	8	8.5
4	258ASB43.3 (PC10) 210ASB(UC)73.6	260ASB54.1 (PC10) 210ASB(UC)73.6	260ASB61.3 (PC10) 210ASB(UC)79.9	262ASB70.5 (PC20) 260ASB(UC)104.3	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)104.3	262ASB87.4 (PC30) 260ASB(UC)104.3
5	258ASB46.2 (PC10) 210ASB(UC)73.6	260ASB61.3 (PC10) 210ASB(UC)79.9	262ASB70.5 PC(20) 260ASB(UC)104.3	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB80.9 PC(30) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)120.9	266ASB99.1 (PC30) 260ASB(UC)120.9
5.5	260ASB54.1 (PC10) 210ASB(UC)73.6	262ASB70.5 (PC10) 210ASB(UC)86.9	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)120.9	266ASB99.1 PC(30) 260ASB(UC)120.9	266ASB111.2 (PC40) 275ASB(UC)168.0
6	260ASB54.1 (PC10) 210ASB(UC)79.9	262ASB70.5 PC(20) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)120.9	266ASB99.1 PC(30) 260ASB(UC)120.9	266ASB111.2 PC(30) 275ASB(UC)168.0	266ASB125.3 (PC40) 320ASB(UC)132.1†
6.5	260ASB54.1 (PC10) 210ASB(UC)79.9	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(20) 260ASB(UC)104.3	266ASB99.1 PC(20) 260ASB(UC)120.9	266ASB99.1 PC(30) 266ASB(UC)139.7	266ASB125.3 PC(30) 320ASB(UC)132.1†	270ASB139.4 (PC40) 320ASB(UC)153.3†
7	260ASB54.1 (PC10) 210ASB(UC)86.9	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(20) 260ASB(UC)120.9	266ASB99.1 PC(20) 260ASB(UC)120.9	266ASB111.2 PC(30) 275ASB(UC)168.0	266ASB125.3 PC(40) 320ASB(UC)153.3†	270ASB150.7 (PC40) 320ASB(UC)153.3†

† indicates a packer is required to achieve the require cover to the top of the beam. Refer to *page 15* section 4.2.3 Deep SlimFlor® Beams.

Notes: Refer to Page 62 for full notes.

Table D2 Carpark LL 2.5 kPa SDL 0.5 kPa Assumed slab depth 290mm

Slab Span (m)	Beam Span (m)						
	5	6	6.5	7	7.5	8	8.5
4	258ASB43.3 (PC10) 210ASB(UC)73.6	260ASB54.1 (PC10) 210ASB(UC)73.6	260ASB61.3 (PC10) 210ASB(UC)79.9	262ASB70.5 (PC20) 260ASB(UC)104.3	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)104.3	262ASB87.4 (PC30) 260ASB(UC)104.3
5	258ASB46.2 (PC10) 210ASB(UC)73.6	260ASB61.3 (PC10) 210ASB(UC)79.9	262ASB70.5 PC(20) 260ASB(UC)104.3	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB80.9 PC(30) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)120.9	266ASB99.1 (PC30) 260ASB(UC)120.9
5.5	260ASB54.1 (PC10) 210ASB(UC)73.6	262ASB70.5 (PC10) 210ASB(UC)86.9	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)120.9	266ASB99.1 PC(30) 260ASB(UC)120.9	266ASB111.2 (PC40) 275ASB(UC)168.0
6	260ASB54.1 (PC10) 210ASB(UC)79.9	262ASB70.5 PC(20) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)120.9	266ASB99.1 PC(30) 260ASB(UC)120.9	266ASB111.2 PC(30) 275ASB(UC)168.0	266ASB125.3 (PC40) 320ASB(UC)132.1†
6.5	260ASB54.1 (PC10) 210ASB(UC)79.9	262ASB76.1 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(20) 260ASB(UC)104.3	266ASB99.1 PC(20) 260ASB(UC)120.9	266ASB99.1 PC(30) 266ASB(UC)139.7	266ASB125.3 PC(30) 320ASB(UC)132.1†	270ASB139.4 (PC40) 320ASB(UC)153.3†
7	260ASB54.1 (PC10) 210ASB(UC)86.9	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(20) 260ASB(UC)120.9	266ASB99.1 PC(20) 260ASB(UC)120.9	266ASB111.2 PC(30) 275ASB(UC)168.0	266ASB125.3 PC(40) 320ASB(UC)153.3†	270ASB150.7 (PC40) 320ASB(UC)153.3†

† indicates a packer is required to achieve the require cover to the top of the beam. Refer to *page 15* section 4.2.3 Deep SlimFlor® Beams.

Notes: Refer to Page 62 for full notes.

Table D3 Commercial LL 3.0 kPa SDL 1.6 kPa Assumed slab depth 305mm

Slab Span (m)	Beam Span (m)						
	5	6	6.5	7	7.5	8	8.5
4	258ASB43.3 (PC10) 210ASB(UC)73.6	260ASB61.3 (PC10) 210ASB(UC)79.9	262ASB70.5 (PC10) 210ASB(UC)86.9	262ASB76.1 (PC20) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB87.4 PC(30) 260ASB(UC)120.9	266ASB99.1 (PC30) 260ASB(UC)120.9
5	260ASB54.1 (PC10) 210ASB(UC)73.6	262ASB70.5 (PC10) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)120.9	266ASB99.1 PC(20) 260ASB(UC)120.9	266ASB111.2 PC(30) 266ASB(UC)139.7	266ASB125.3 (PC30) 320ASB(UC)132.1†
5.5	260ASB54.1 (PC10) 210ASB(UC)79.9	262ASB76.1 (PC10) 260ASB(UC)104.3	262ASB80.9 PC(20) 260ASB(UC)104.3	266ASB99.1 PC(20) 260ASB(UC)120.9	266ASB111.2 PC(20) 260ASB(UC)120.9	266ASB125.3 PC(30) 282ASB(UC)190.0	270ASB139.4 PC(30) 320ASB(UC)153.3†
6	260ASB61.3 (PC10) 210ASB(UC)86.9	262ASB80.9 (PC10) 260ASB(UC)104.3	262ASB87.4 PC(20) 260ASB(UC)120.9	266ASB99.1 PC(20) 266ASB(UC)139.7	266ASB111.2 PC(30) 282ASB(UC)190.0	270ASB150.7 PC(30) 320ASB(UC)153.3†	270ASB150.7 (PC30) 320ASB(UC)153.3†
6.5	260ASB61.3 (PC10) 210ASB(UC)86.9	262ASB80.9 (PC10) 260ASB(UC)104.3	266ASB99.1 PC(20) 260ASB(UC)120.9	266ASB111.2 PC(20) 282ASB(UC)190.0	266ASB125.3 PC(30) 320ASB(UC)132.1†	270ASB150.7 PC(30) 320ASB(UC)153.3†	275ASB175.2 (PC40) 320ASB(UC)153.3†
7	262ASB70.5 (PC10) 260ASB(UC)104.3	262ASB87.4 PC(20) 260ASB(UC)120.9	266ASB111.2 PC(20) 260ASB(UC)120.9	266ASB125.3 PC(30) 320ASB(UC)132.1†	270ASB139.4 PC(30) 320ASB(UC)153.3†	270ASB150.7 PC(30) 320ASB(UC)153.3†	275ASB175.2 (PC40) 320ASB(UC)172.3†

† indicates a packer is required to achieve the require cover to the top of the beam. Refer to *page 15* section 4.2.3 Deep SlimFlor® Beams.

Notes: Refer to Page 62 for full notes.

Table D4 Retail LL 5.0 kPa SDL 2.5 kPa Assumed slab depth 305mm

Slab Span (m)	Beam Span (m)						
	5	6	6.5	7	7.5	8	8.5
4	260ASB54.1 (PC10) 210ASB(UC)73.6	262ASB76.1 (PC10) 260ASB(UC)104.3	262ASB80.9 (PC10) 260ASB(UC)104.3	262ASB87.4 (PC10) 260ASB(UC)120.9	266ASB111.2 PC(20) 260ASB(UC)120.9	266ASB125.3 PC(20) 320ASB(UC)132.1†	270ASB139.4 (PC30) 320ASB(UC)153.3†
5	262ASB70.5 (PC10) 210ASB(UC)79.9	262ASB80.9 (PC10) 260ASB(UC)104.3	266ASB99.1 PC(10) 260ASB(UC)120.9	266ASB111.2 PC(20) 275ASB(UC)168.0	266ASB125.3 PC(20) 320ASB(UC)132.1†	270ASB150.7 PC(20) 320ASB(UC)153.3†	275ASB175.2 (PC20) 320ASB(UC)172.3†
5.5	262ASB70.5 (PC10) 260ASB(UC)104.3	266ASB99.1 (PC10) 260ASB(UC)120.9	266ASB111.2 PC(20) 266ASB(UC)139.7	266ASB125.3 PC(20) 320ASB(UC)132.1†	270ASB150.7 PC(20) 320ASB(UC)153.3†	275ASB175.2 PC(20) 320ASB(UC)172.3†	278ASB194.8 (PC30) 320ASB(UC)172.3†
6	262ASB80.9 (PC10) 260ASB(UC)104.3	266ASB99.1 (PC10) 260ASB(UC)120.9	266ASB125.3 PC(20) 282ASB(UC)190.0	270ASB139.4 PC(20) 320ASB(UC)153.3†	270ASB150.7 PC(20) 320ASB(UC)153.3†	275ASB175.2 PC(20) 320ASB(UC)172.3†	278ASB194.8 (PC30) 320ASB(UC)193.3†
6.5	262ASB80.9 (PC10) 260ASB(UC)104.3	266ASB111.2 (PC10) 266ASB(UC)139.7	266ASB125.3 PC(20) 320ASB(UC)132.1†	270ASB150.7 PC(20) 320ASB(UC)153.3†	275ASB175.2 PC(30) 320ASB(UC)172.3†	278ASB194.8 PC(20) 320ASB(UC)193.3†	288ASB234.1 (PC30) 320ASB(UC)193.3†
7	262ASB80.9 (PC10) 260ASB(UC)104.3	266ASB125.3 PC(20) 282ASB(UC)190.0	270ASB150.7 PC(20) 320ASB(UC)153.3†	270ASB150.7 PC(20) 320ASB(UC)153.3†	278ASB194.8 PC(20) 320ASB(UC)172.3†	282ASB234.1 PC(30) 320ASB(UC)193.3†	288ASB234.1 (PC30) 335ASB(UC)246.3†

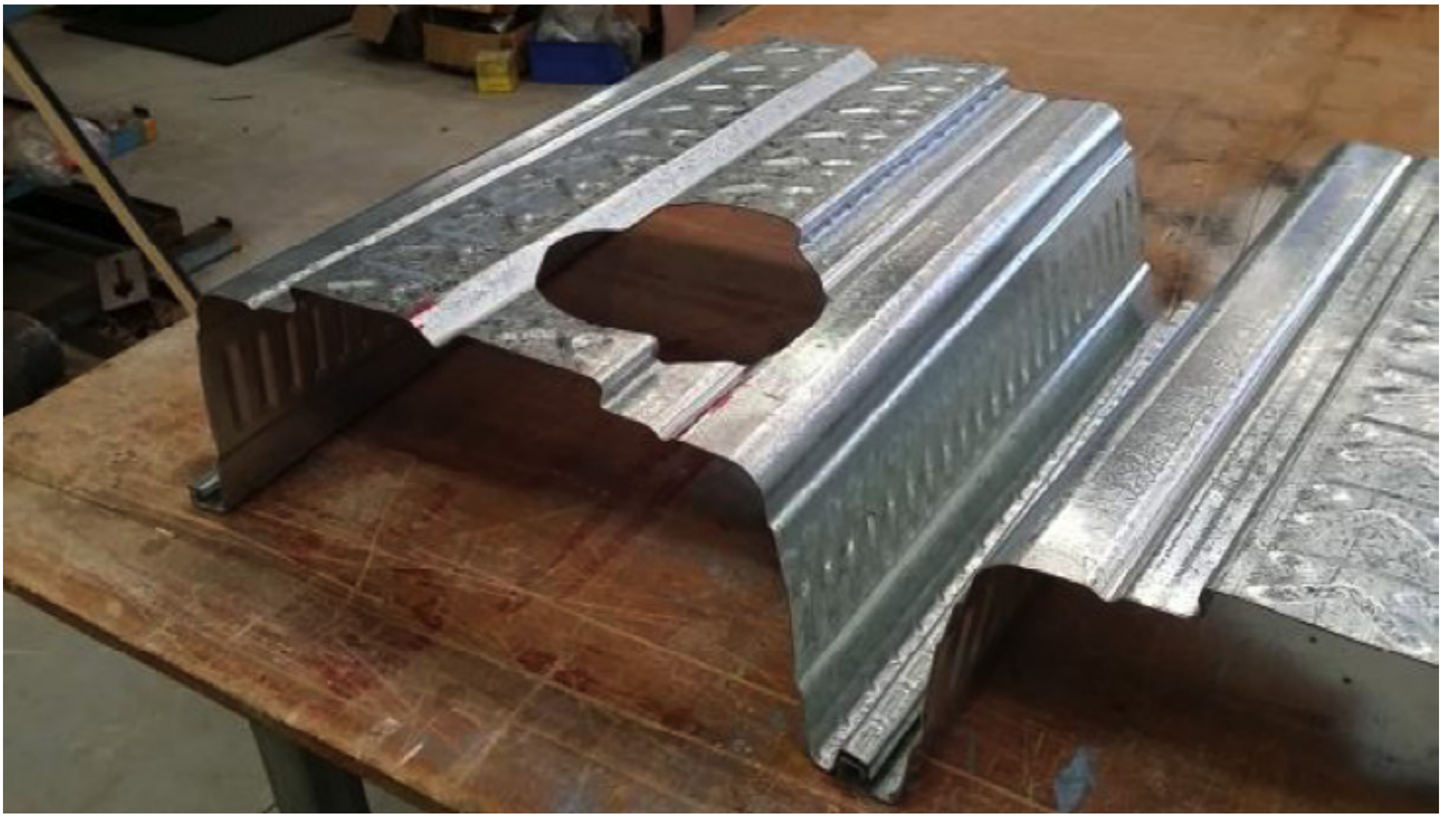
† indicates a packer is required to achieve the require cover to the top of the beam. Refer to *page 15* section 4.2.3 Deep SlimFlor® Beams.

Notes: Refer to Page 62 for full notes.

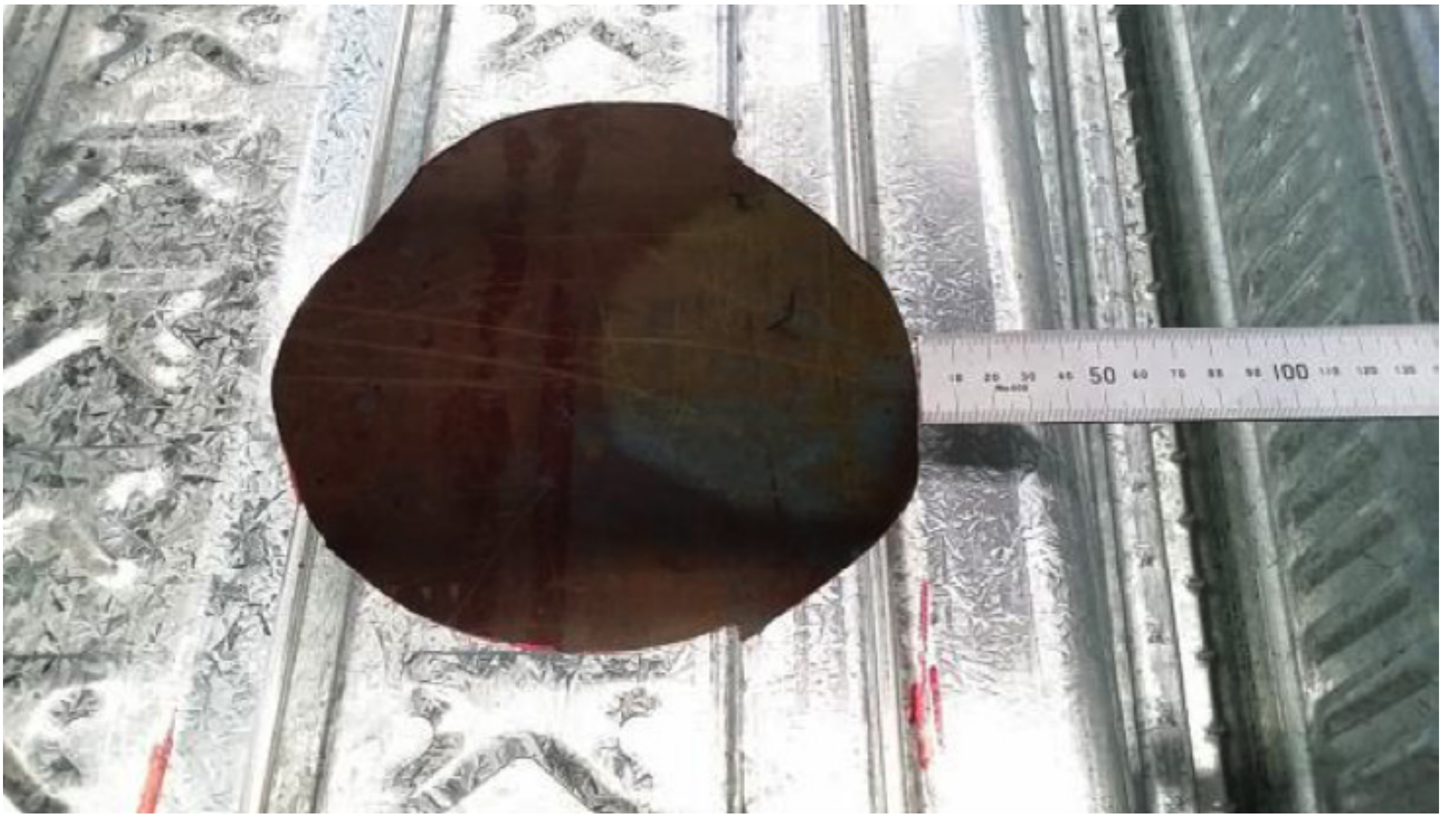
APPENDIX E: INSTALLATION OF FIRE COLLARS

Install Process for Cast In Fire Collars – SlimDek 210®

Step 1 – locate and cut hole. This is generally done with a hole saw, angle grinder or a plasma cutter.



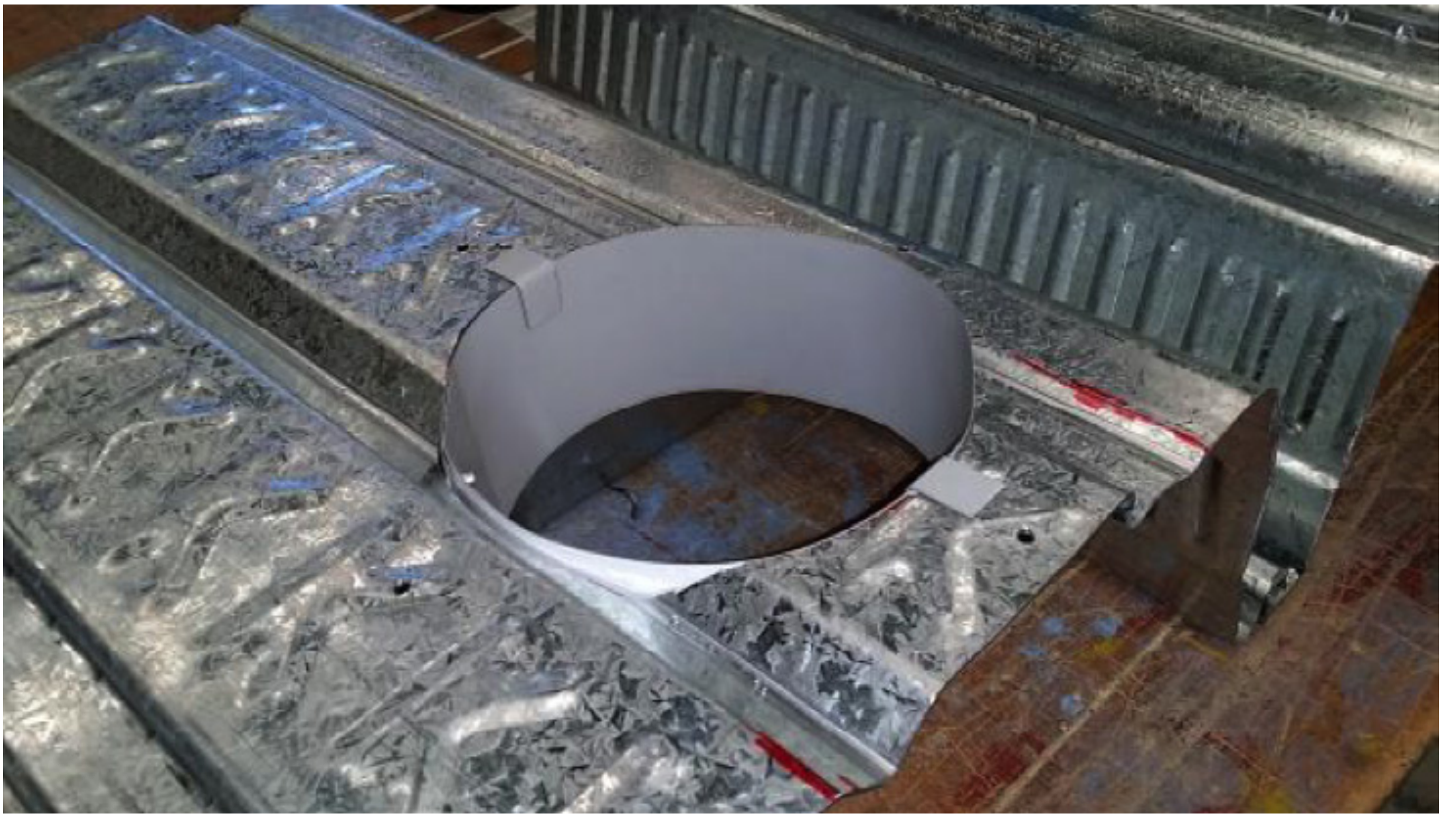
Step 2 – ensure edge distance is a minimum of 50mm from any edge of the profile.

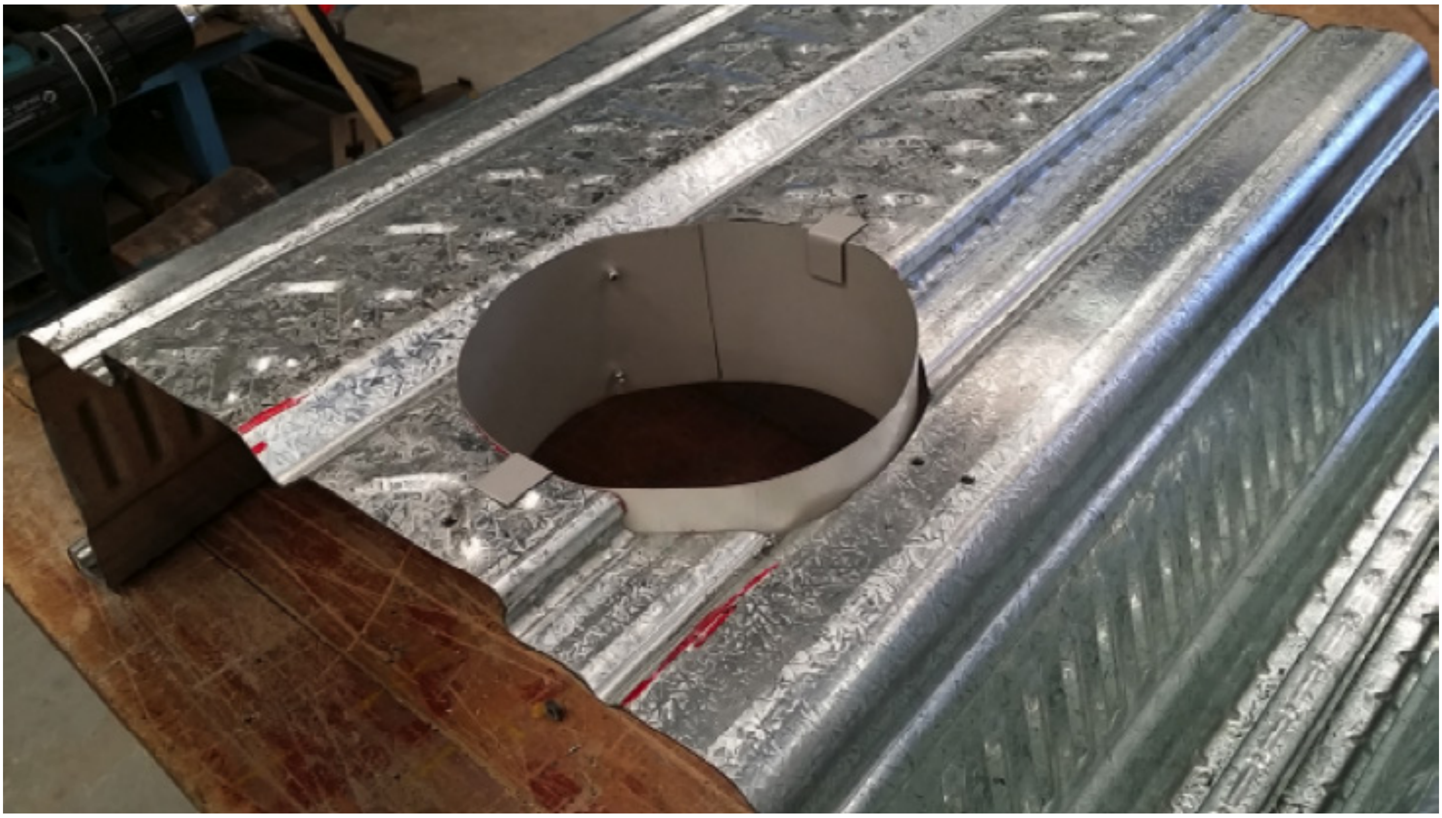


APPENDIX E: INSTALLATION OF FIRE COLLARS

Install Process for Cast In Fire Collars – SlimDek 210®

Step 3 – Insert formwork collar with support tabs(supplied by Bluescope)

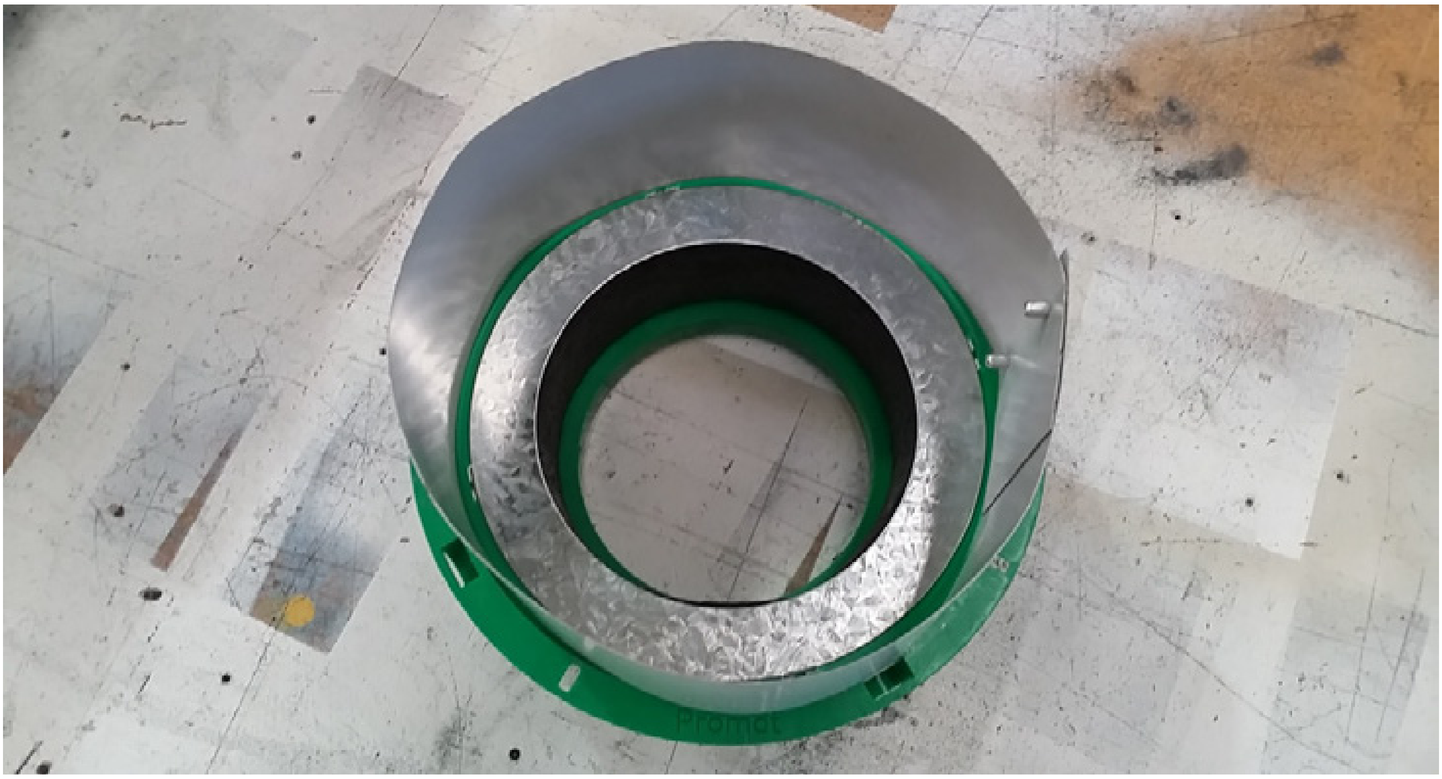




APPENDIX E: INSTALLATION OF FIRE COLLARS

Install Process for Cast In Fire Collars – SlimDek 210®

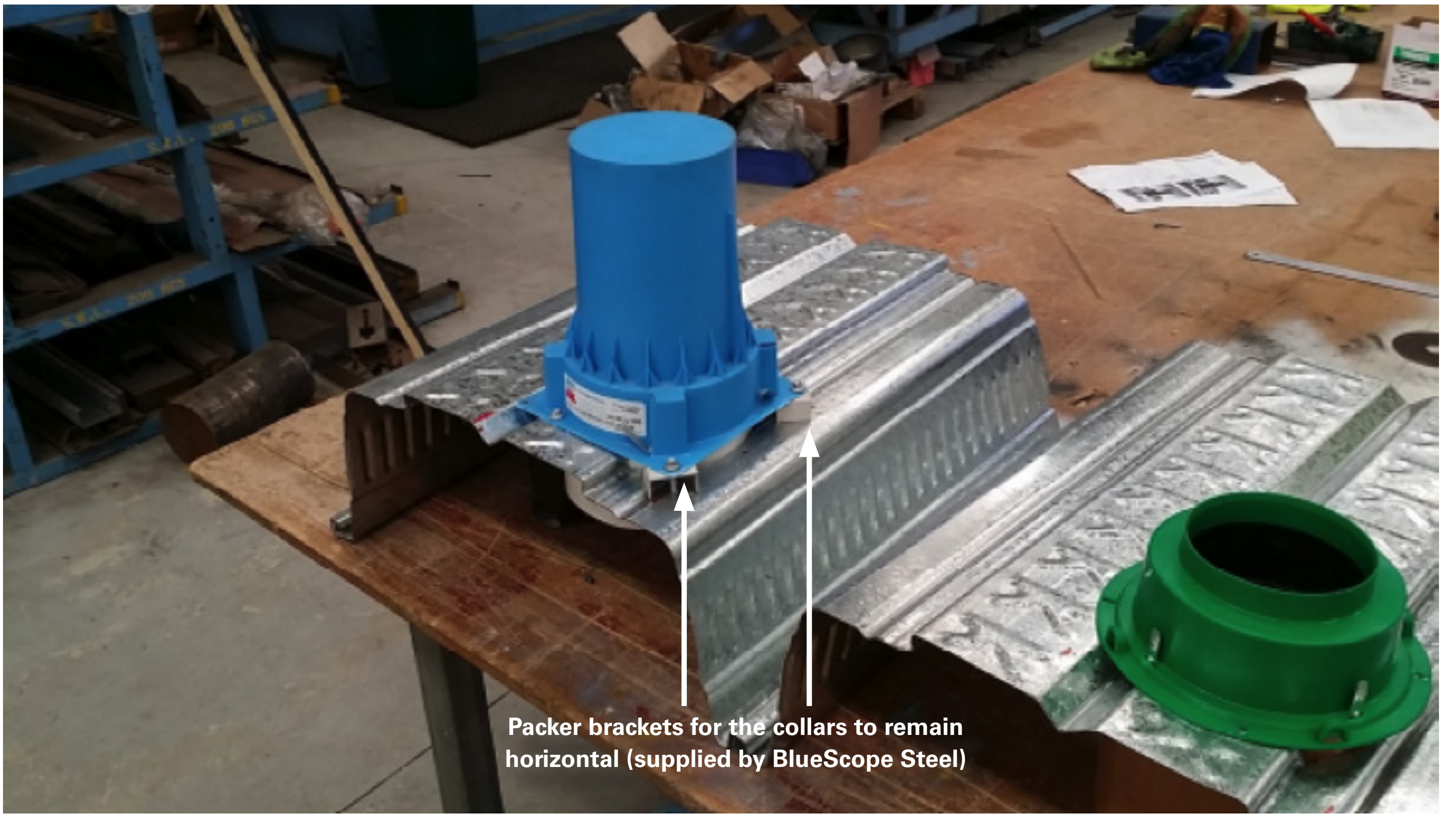
Step 4 – position collar, ensuring full metal ring is exposed on the underside



APPENDIX E: INSTALLATION OF FIRE COLLARS

Install Process for Cast In Fire Collars – SlimDek 210®

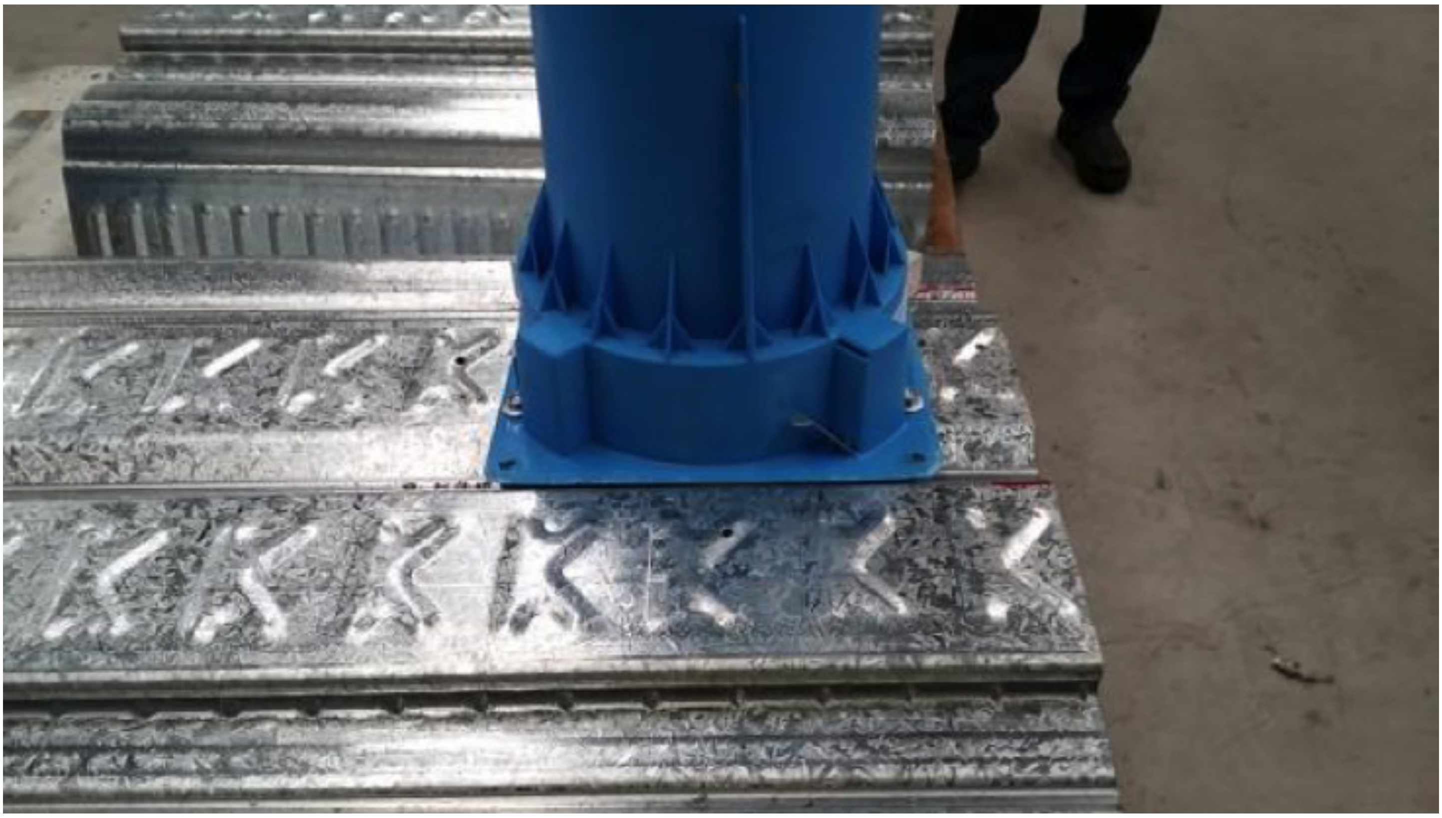
Step 5 - Position 20mm packer brackets and fix down the collar to the deck and to the deck through the brackets.



Images of SlimDek 210® are for illustration purposes only final product may vary to the images shown.

Install Process for Cast In Fire Collars – SlimDek 210®

Fire collars for both square base and circular base cast in collars



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