SPECIFIC DESIGN – HIBOND 80 FLOORING

DESIGN BASIS

The Hibond 80 flooring system must be designed in accordance with the procedures and limit states specified in AS/NZS 2327:2017 with Hibond 80 as formwork for concrete placement, incorporating the requirements, limitations and information given in this manual.

Compliance is based on detailed analysis by the Heavy Engineering Research Association (HERA) and comprehensive physical testing, enabling load/span capacities to be established for actions, load combinations and performance limitations in accordance with AS/NZS 2327:2017, based on the Hibond 80 steel decking sheet achieving partial shear connection, for

- Ultimate Limit State Capacity Factors to AS/NZS 1170.
- Serviceability Limit State deflection, vibration and cracking control.

Hibond 80 performance testing was carried out by :

- Imperial College London - structural tests to EN 1993-1-3 and EN 1994-1-1
- Exova Warringtonfire - fire resistance tests to EN 1365-2
- University of Auckland - Welded shear stud capacity.
  - Structural tests to AS/NZS 2327:2017

Data presented in this manual is intended for use by qualified structural engineers. Use of Hibond 80 in applications outside the scope of this manual will require specific structural design from first principles.

A minimum 28 day compressive strength of 25MPa for high grade concrete has been assumed.

The self weight of the Hibond 80 Flooring System (including the concrete) has been included in the load tables.

Hibond 80 Composite Floor Design Software

Comprehensive Hibond 80 Composite Floor Design Software is available to structural design engineers for use in optimising a Hibond 80 flooring system design in compliance with the design basis outlined above and covering the following design aspects:

- Construction Stage - formwork bending, crushing and shear load capacity and deflection.
- Composite Floor Slab - load capacity bending and shear, vibration, cantilever, point and line loads and fire ratings.

For the latest software, please download from the Dimond Structural website **www.dimondstructural.co.nz/software**

HIBOND 80 DESIGN CONSIDERATIONS

FORMWORK

The Hibond 80 flooring system is intended to support the following loads as formwork:

- Weight of wet concrete and the steel deck
- Construction loads in accordance with AS/NZS 2327:2017
- Effect of concrete ponding due to deflection of the steel decking sheets (typically 6-7% of the concrete volume)

Hibond 80 is designed to enable long spans without the need for additional support from temporary propping.

Verification of Hibond 80 formwork Ultimate Limit State capacity for bending (sagging and hogging), web crushing and vertical shear has been acheived by testing in accordance with AS/NZS 2327:2017.

Verification of Serviceability Limit State capacity deflection has been acheived for Hibond 80 by testing in accordance with AS/NZS 2327:2017.

Hibond 80 sheets must be laid in one continuous length between permanent supports. Short steel decking sheets must never be spliced together to achieve a span length between supports.

Formwork span limits are given in the Hibond 80 Load Span Tables 3.3.4, also refer General Design Considerations 3.2.1 and Handling and Storage 3.6.3 for guidance on steel decking sheet lengths for safe handling.

Cantilivered End Spans

Use of Hibond 80 flooring systems as cantilevered floor structures requires a propping line at the steel decking sheet ends to ensure a stable working platform during construction.

Additional ductile negative reinforcement is required to be designed to NZS 4671 to support all cantilevered composite floor slabs, and the contribution of the steel decking sheets is neglected in design.

Consideration must be given to overall composite floor slab thickness to ensure sufficient cover over the negative reinforcement is achieved in compliance with NZS 3101.

As a guide propping of the Hibond 80 sheets is not required for cantilevered end spans with a clear over-hang of,

Hibond 80 x 0.75mm: 400mm

Hibond 80 x 0.95mm: 500mm

Hibond 80 x 1.05mm: 550mm

Hibond 80 x 1.15mm: 600mm

These cantilever spans assume:

- The Hibond 80 sheets are securely fixed to the edge supporting member and the adjacent internal supporting member
- That Hibond 80 Edge Form at the end of the cantilever is secured with one self-drilling screw (or rivet) per Hibond 80 pan along with Edge Form Support Straps. Refer section 3.3.9.

Further guidance is available in SCI Publication P300 Composite Slabs and Beams using Steel Decking, 2009.

COMPOSITE FLOOR SLAB

Load capacity of the Hibond 80 flooring system is dependent on the shear bond between the concrete and the steel decking sheet. Shear bond is a combination of chemical bond between the concrete and the steel decking sheet surface, and mechanical bond between the concrete aggregate and the steel decking sheet embossments formed specifically for this purpose. It is important that the concrete is placed onto a clean galvanised steel surface free from any contamination or debris.

Information presented in this manual applies only to overall concrete floor slab thicknesses between 150mm and 230mm covering the following design aspects:

- Construction Stage - formwork bending, crushing and shear load capacity and deflection.
- Composite Floor Slab - load capacity bending and shear, vibration and Fire Ratings.

Verification of Ultimate Limit State capacity for bending and longitudinal and vertical shear had been acheived for Hibond 80 by testing and analysis in accordance with AS/NZS 2327 (sections 2.7.2, 2.7.4 and Appendix H) based on partial shear connection.

Verification of Ultimate limit state capacity for punching shear should be determined in accordance with AS/NZS 2327 (section 2.7.5) and NZS 3101.

Verification of Servicability Limit State capacity for short term deflection, creep deflection, shrinkage deflection and crack control has been determined for Hibond 80 in accordance with AS/NZS 2327 (section 2.8) and NZS 3101.

Appropriate imposed floor actions and load combinations should be determined in accordance with AS/NZS 1170. Load capacities for the Hibond 80 flooring system is given in the Hibond 80 Load Span Tables 3.3.4, which assume inclusion of the minimum top reinforcement mesh (refer Additional Reinforcement in this section).

Refer General Design Considerations 3.2.2.

Fire Design

Design of fire resistance of composite floor slabs is based on resistance to collapse (stability) prevention of flames passing through cracks in the composite floor slab (integrity) and limiting the temperature increase on the unexposed side of the composite floor slab (insulation).

Fire resistance of Hibond 80 flooring systems maybe achieved by several methods:

- Testing the fire resistance inherent in the composite floor slab as a basis for resistance ratings for combinations of span, load and composite floor slab thickness.
- Placement of additional reinforcement in a specified location within the composite floor slab.
- Installation of suspended ceilings.

Fire resistance ratings inherent in the Hibond 80 flooring system has been established by testing to EN 1365-2 by Exova Warringtonfire.

Fire Resistance Rating (FRR) of 60 minutes

FFR 60 is acheived for composite floor slabs designed within the limitations of the Hibond 80 Load Span Tables 3.3.4 which include the minimum mesh reinforcement (required also for crack control) and the additional positive fire reinforcement bars required for propped single spans.

The fire design tables include a superimposed dead load (G_{SDL}) of 0.5kPa in order that an imposed action (Q) can be compared with the tables in Section 3.3.4.

Fire Resistance Rating (FRR) of 90 and 120 minutes

FFR 90 and FRR 120 can be achieved with the addition of extra reinforcement mesh and bottom reinforcement bars, contact Dimond Structural on 0800 Roofspec (0800 766 377).

Fire rating of junctions with the composite floor slab underside can be achieved with the use of site-formed insulation that has appropriate tested fire rating, subject to specific design and detailing by the fire engineer.

Additional Reinforcement

The minimum amount of longitudinal and transverse reinforcement required in the top of the composite floor slab as outlined in AS/NZS 2327 (Sections 2.2.1 and 6.3).

The minimum D500MPa mesh or ductile reinforcement bar size each way to use as top reinforcement for unpropped and propped composite floor slabs enclosed within a building is -

Hibond 80	Unpropped		Propped	
Slab Thickness	Mesh	Bars (Each Way)	Mesh	Bars (Each Way)
150	SE82	HD10 @ 300	SE92	HD10 @ 250
160	SE82	HD10 @ 300	SE72 x 2	HD12 @ 300
170	SE82	HD10 @ 300	SE72 x 2	HD12 @ 300
180	SE92	HD10 @ 250	SE62 + SE92	HD12 @ 250
190	SE92	HD10 @ 250	SE62 + SE92	HD12 @ 250
200	SE92	HD10 @ 250	SE82 x 2	HD12 @ 200
210	SE92	HD10 @ 250	SE82 + SE92	HD12 @ 200
220	SE92	HD10 @ 250	SE82 + SE92	HD12 @ 200
230	SE72 x 2	HD12 @ 300	SE92 x 2	HD16 @ 300

Additional ductile reinforcement in the form of reinforcement bars or mesh may be required to:

- gain full continuity over supporting members in continuous spans.
- achieve the required fire performance.
- achieve the required seismic performance.
- control cracks caused by shrinkage during curing of the concrete, particularly for composite floor slabs exposed to the weather. For propped construction, increasing nominal continuity reinforcement over supports is required as indicated above given crack widths will increase when the props are removed.
- distribute loads around openings in composite floor slabs.
- provide necessary reinforcement for composite floor slabs used as cantilevers.

When specifying additional reinforcement the designer must ensure the composite floor slab thickness is adequate to achieve the required minimum concrete cover over the reinforcement in compliance with NZS 3101.

Shear Stud Design Resistance

Shear stud design resistance for Hibond 80 steel decking has been determined from physical testing of 19mm diameter x 125mm long (120mm LAW (length after welding)) shear connectors in accordance with AS/NZS 2327, as follows.

Shear Stud Design Resistance Per Connector (kN)

Shear Studs Per Pan	Concrete Strength, f'_c		
	25MPa	30MPa	≥ 35MPa
1	50.1	56.8	55.9
2	20.7	23.5	23.1

Note: f_U = 450MPa for through deck welded shear connectors.

Acoustic Performance

Estimated Sound Transmission Class (STC) and Impact Insulation Class (IIC) that can be achieved with different composite floor slab thicknesses and a range of ceiling and surface treatment additions to the Hibond 80 flooring system are provided in section 3.3.5, based on the Marshall Day Acoustics Report (Rp 001 2016284A).

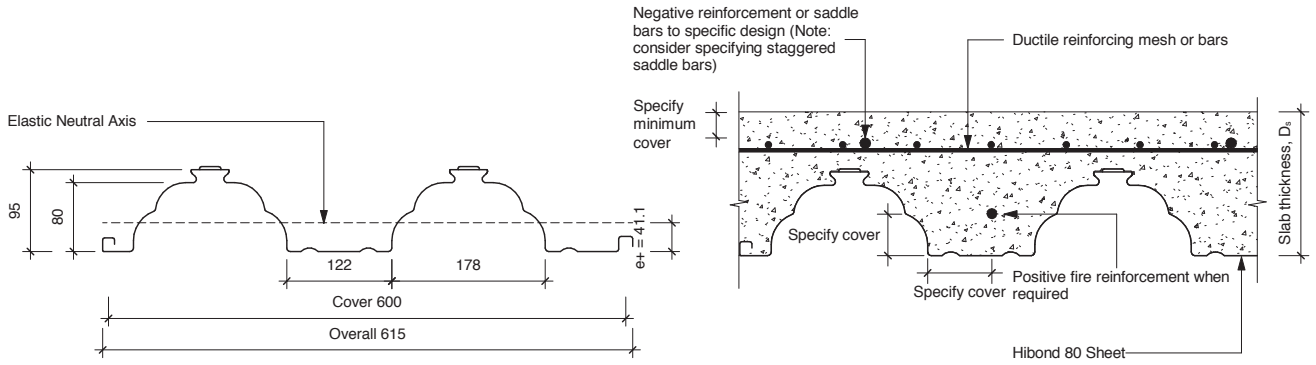
The STC and IIC values are based on tested performance of a 120mm Hibond 55 composite floor slab and known performance of concrete thickness, floor coverings, insulation and suspended ceilings.

As a guide, a bare 150mm Hibond 80 composite floor slab is expected to achieve STC 47dB and IIC 27dB. With the addition of a suspended GIB ceiling and a 75mm acoustic blanket it is reasonable to expect STC 67dB and IIC 46dB. The IIC can be further improved to as much as 80+dB with the addition of appropriate carpet and underlay.

Floor Vibration

As a guide to designers the spans expressed in the Hibond 80 Load Span Tables 3.3.4 represent the maximum span of the Hibond 80 composite floor slab recommended for in-service floor vibration based on a natural frequency limit of 5.0Hz using the cracked dynamic second moment of area and dead loads + 10% of the imposed loads (the proportion of imposed loads that may be considered permanent). This represents the dynamic response of the composite floor slab but does not account for the dynamic response of the supporting structure. Specific design is required to check the other types of floor use.

HIBOND 80 SECTION PROPERTIES



FORMWORK PROPERTIES

Hibond 80 Formwork Reliable Design Properties (per metre width unless noted otherwise)

Hibond 80 Thickness	0.75mm	0.95mm	1.05mm	1.15mm
Design Strength, fy (MPa)	550	550	500	500
Base metal thickness (mm)	0.75	0.95	1.05	1.15
Self weight (kN/m²)	0.093	0.117	0.129	0.141
$M_{c,Rd+}$ (kN/m)	10.34	15.85	18.31	21.22
$M_{c,Rd-}$ (kN/m)	8.03	11.81	13.72	15.75
I_{a+} (10^6 mm^4/m)	1.085	1.166	1.178	1.414
I_{a-} (10^6 mm^4/m)	0.910	1.091	1.256	1.527
Elastic Neutral Axis, e+ (mm)	41.1	41.1	41.1	41.1
$R_{w,Rd}$ (kN/m)	14.96	20.20	28.33	36.46

Notes
1. Design Values determined according to EN1990, Annex D.8 to account for material, profile shape and test result variations.
2. $M_{c,Rd+}$ and $M_{c,Rd-}$ are bending moments due to positive and negative bending respectively.
3. I_{a+} and I_{a-} are second moments of area for positive and negative sense respectively.
4. $R_{w,Rd}$ is web crushing resistance for an effective end bearing of 50mm.

COMPOSITE FLOOR SLAB PROPERTIES

0.75mm Hibond 80 Composite Floor Slab Properties (Per Metre Width)

D_s (mm)	Weight (kN/m)	I_g (10^6mm^4)		Y_g (mm)		I_{cr} (10^6mm^4)		Y_{cr} (mm)		I_{av} (10^6mm^4)	
		medium	long	medium	long	medium	long	medium	long	medium	long
150	2.63	12.9	9.2	65.5	68.6	11.8	7.8	45.4	51.9	12.3	8.5
160	2.86	15.7	11.1	70.2	73.4	13.5	9.2	49.9	56.2	14.6	10.1
170	3.09	18.8	13.2	74.9	78.2	15.5	10.8	54.5	60.7	17.2	12.0
180	3.32	22.5	15.7	79.6	83.0	17.6	12.5	59.2	65.3	20.1	14.1
190	3.55	26.8	18.4	84.4	87.9	19.9	14.3	63.9	69.9	23.3	16.4
200	3.78	31.6	21.6	89.2	92.7	22.3	16.3	68.7	74.6	27.0	18.9
210	4.01	37.1	25.1	94.0	97.6	25.0	18.5	73.5	79.3	31.0	21.8
220	4.24	43.3	29.0	98.8	102.5	27.8	20.9	78.3	84.1	35.5	25.0
230	4.47	50.2	33.4	103.7	107.4	30.8	23.4	83.1	88.8	40.5	28.4

0.95mm Hibond 80 Composite Floor Slab Properties (Per Metre Width)

D_s (mm)	Weight (kN/m)	I_g (10^6mm^4)		Y_g (mm)		I_{cr} (10^6mm^4)		Y_{cr} (mm)		I_{av} (10^6mm^4)	
		medium	long	medium	long	medium	long	medium	long	medium	long
150	2.65	14.2	10.3	66.6	70.2	13.7	9.1	47.7	55.2	13.9	9.7
160	2.88	17.1	12.4	71.3	75.1	15.8	10.7	52.2	59.5	16.4	11.5
170	3.11	20.6	14.7	76.0	80.0	18.1	12.5	56.7	64.0	19.3	13.6
180	3.34	24.5	17.4	80.8	84.9	20.6	14.5	61.3	68.5	22.5	15.9
190	3.57	29.0	20.4	85.6	89.8	23.3	16.7	66.0	73.1	26.1	18.5
200	3.81	34.1	23.8	90.4	94.7	26.2	19.1	70.7	77.8	30.2	21.4
210	4.04	39.9	27.6	95.2	99.6	29.4	21.7	75.5	82.5	34.6	24.6
220	4.27	46.4	31.8	100.1	104.6	32.8	24.5	80.3	87.2	39.6	28.1
230	4.50	53.6	36.5	105.0	109.5	36.4	27.5	85.1	92.0	45.0	32.0

1.05mm Hibond 80 Composite Floor Slab Properties (Per Metre Width)

D_s (mm)	Weight (kN/m)	I_g (10^6mm^4)		Y_g (mm)		I_{cr} (10^6mm^4)		Y_{cr} (mm)		I_{av} (10^6mm^4)	
		medium	long	medium	long	medium	long	medium	long	medium	long
150	2.66	14.8	10.9	67.1	71.0	14.5	9.7	48.8	56.7	14.7	10.3
160	2.90	17.9	13.0	71.8	75.9	16.8	11.4	53.2	61.0	17.3	12.2
170	3.13	21.4	15.4	76.6	80.8	19.3	13.3	57.8	65.5	20.3	14.4
180	3.36	25.4	18.2	81.4	85.7	22.0	15.5	62.3	70.0	23.7	16.8
190	3.59	30.0	21.3	86.2	90.7	24.9	17.8	67.0	74.6	27.5	19.6
200	3.82	35.3	24.8	91.0	95.6	28.0	20.3	71.7	79.3	31.7	22.6
210	4.05	41.2	28.8	95.9	100.6	31.4	23.1	76.5	84.0	36.3	25.9
220	4.28	47.9	33.1	100.7	105.5	35.1	26.1	81.3	88.7	41.5	29.6
230	4.51	55.3	38.0	105.6	110.5	39.0	29.3	86.1	93.5	47.1	33.6

1.15mm Hibond 80 Composite Floor Slab Properties (Per Metre Width)

D_s (mm)	Weight (kN/m)	I_g (10^6mm^4)		Y_g (mm)		I_{cr} (10^6mm^4)		Y_{cr} (mm)		I_{av} (10^6mm^4)	
		medium	long	medium	long	medium	long	medium	long	medium	long
150	2.68	15.4	11.4	67.6	71.7	15.4	10.2	49.9	58.1	15.4	10.8
160	2.91	18.6	13.6	72.3	76.7	17.8	12.1	54.3	62.4	18.2	12.8
170	3.14	22.2	16.1	77.1	81.6	20.4	14.1	58.8	66.9	21.3	15.1
180	3.37	26.4	19.0	81.9	86.6	23.3	16.3	63.3	71.4	24.8	17.7
190	3.60	31.1	22.2	86.7	91.6	26.4	18.8	68.0	76.1	28.7	20.5
200	3.83	36.5	25.9	91.6	96.5	29.8	21.5	72.7	80.7	33.1	23.7
210	4.06	42.5	29.9	96.5	101.5	33.4	24.5	77.4	85.4	38.0	27.2
220	4.29	49.3	34.4	101.3	106.5	37.3	27.7	82.2	90.2	43.3	31.0
230	4.52	56.9	39.4	106.2	111.5	41.5	31.1	87.0	94.9	49.2	35.2

Notes

1. D_s is the overall thickness of the composite floor slab.
2. Composite floor slab weights are based on a dry concrete density of 2350kg/m^3 with no allowance for ponding.
3. Section properties are presented in terms of equivalent steel units as follows:
   (a) Medium term superimposed loads are based on 2/3 short term and 1/3 long term load (i.e. modular ratio = 10) and apply to buildings of normal usage.
   (b) Long term superimposed loads are based on all loads being long term (i.e. modular ratio = 18) and apply to storage loads and loads which are permanent in nature.
4. I_g is the second moment of area of the Hibond 80 composite floor slab for the gross section.
5. I_{cr} is the second moment of area of the Hibond 80 composite floor slab for the cracked section.
6. I_{av} is the average value of gross (I_g) and cracked (I_{cr}) sections to be used for deflection calculations.
7. Y_g is the distance from top of composite floor slab to neutral axis of the Hibond 80 composite floor slab for the gross section.
8. Y_{cr} is the distance from top of composite floor slab to neutral axis of the Hibond 80 composite floor slab for the cracked section.

HIBOND 80 LOAD SPAN TABLES

Maximum formwork and composite floor slab spans are presented for composite floor slab thickness between 150mm and 230mm for a range of live load, superimposed dead load combinations and mesh reinforcing arrangements to achieve a Fire Resistance Rating (FRR) of 60 minutes.

The following notes apply to the load tables in this section.

1) Span: L is the span measured centre to centre between permanent supports.
2) The design superimposed load combination is G_{SDL} + Q must not be greater than the superimposed loads given in the tables.
3) Some values shown in the end/internal span tables are less than corresponding values given in the single span tables. The situation arises as combined effects limit.
4) Linear interpolation is permitted between intermediate composite floor slab thicknesses.
5) Tables for propped spans are based on 1 row of continuous temporary propping at mid-span.

Formwork

a. 150mm support width and a 100mm wide prop width is assumed.
b. For unpropped construction - one layer of mesh in top of the composite floor slab with a concrete cover of 25mm and a minimum cross-sectional area of 252mm^2/m width. For propped construction refer section 3.2.2.2.
c. Imposed construction loads are to AS/NZS 2327:2017.
d. Normal weight concrete: wet density = 2400kg/m^3.
e. Construction stage deflection span/130 or 30mm (ponding has been taken into account).
f. The design span of the formwork relates closely to the site installation. If the Hibond 80 sheet is designed as an end span or internal span, the minimum nominal steel decking sheet length for construction should be noted clearly in the design documentation to ensure that appropriate steel decking sheet lengths are used by the installer to achieve the span type selected. Refer Flooring Installation 3.6.

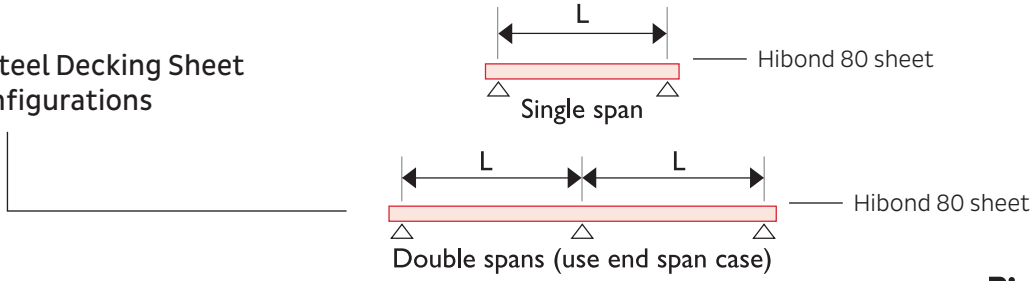
Composite Floor Slab

a. Normal weight concrete: dry density 2350kg/m^3. Modular ratio = 10; Dynamic modular ratio = 38.
b. Composite floor slab moment resistance based on partial connection method with an assumed characteristic shear bond value of $\tau_{u,Rk}$ = 0.107MPa.
c. Composite stage deflection limits: Imposed load, span/350 or 20mm; Total load, span/250 or 30mm:
d. Vibration : Natural frequency limit of 5.0Hz based on the cracked dynamic second moment of area using the dead loads plus 10% of the imposed loads (the proportion of imposed loads that may be considered to be permanent).
e. The composite floor slab is assumed to be acting as simply supported spans in the tables.

Fire

a. Mesh requirements for composite floor slabs enclosed within a building (see minimum concrete cover above) have been provided to achieve a FRR of 60 minutes (in conjunction with bottom reinforcing bars where required).
b. A superimposed dead load (G_{SDL}) of 0.5kPa only has been used for all fire rating combinations.
c. FRR of 90 and 120 minutes can achieved with the additional of extra reinforcement mesh and bottom reinforcing bars by using the Hibond 80 Composite Design Software. Other situations or concrete covers require specific design.
d. Allowance for extra 10mm concrete thickness for unpropped conditions.
e. Live load factor ψ_l = 0.4.
f. Reinforcement is grade 500 to AS/NZS4671, assumed continuous.
g. Moment capacity determined in accordance with NZS3101.
h. Minimum cover to bottom reinforcing bars is 25mm to the bottom of the steel decking sheet and 40mm to the side of the steel decking sheet rib.

Typical Steel Decking Sheet Span Configurations



0.75mm Hibond 80 - Constructed as Unpropped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor Single Span (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.63	3.51	SE82	5.5
160	0.12	2.86	3.43	SE82	5.5
170	0.13	3.09	3.35	SE82	5.5
180	0.14	3.32	3.28	SE92	5.5
190	0.15	3.55	3.22	SE92	5.5
200	0.16	3.78	3.16	SE92	5.5
210	0.17	4.01	3.10	SE92	5.5
220	0.18	4.24	3.05	SE92	5.5
230	0.19	4.47	3.00	SE72 x 2	5.5

0.75mm Hibond 80 - Constructed as Unpropped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor End and Internal Spans (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.63	3.45	SE82	5.5
160	0.12	2.86	3.34	SE82	5.5
170	0.13	3.09	3.23	SE82	5.5
180	0.14	3.32	3.14	SE92	5.5
190	0.15	3.55	3.04	SE92	5.5
200	0.16	3.78	2.96	SE92	5.5
210	0.17	4.01	2.88	SE92	5.5
220	0.18	4.24	2.80	SE92	5.5
230	0.19	4.47	2.73	SE72 x 2	5.5

0.75mm Hibond 80 - Constructed as Propped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)		Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load[1], G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
150	0.11	2.63	**Maximum Span[3] (m)**	**5.16**	**5.11**	**4.86**	**4.51**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 HD12, 2nd Pan	SE92 HD12, 2nd Pan	SE92 HD12, 2nd Pan	SE92 HD12, 2nd Pan
160	0.12	2.86	**Maximum Span[3] (m)**	**5.16**	**5.11**	**4.88**	**4.54**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan
170	0.13	3.09	**Maximum Span[3] (m)**	**5.16**	**5.11**	**4.89**	**4.57**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan
180	0.14	3.32	**Maximum Span[3] (m)**	**5.00**	**5.03**	**4.90**	**4.59**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD10, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 3rd Pan
190	0.15	3.55	**Maximum Span[3] (m)**	**4.98**	**5.03**	**4.91**	**4.60**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD10, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 3rd Pan
200	0.16	3.78	**Maximum Span[3] (m)**	**4.93**	**4.79**	**4.70**	**4.65**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 x 2 HD10, 3rd Pan	SE82 x 2 HD10, 3rd Pan	SE82 x 2 HD10, 3rd Pan	SE82 x 2 HD12, 2nd Pan
210	0.17	4.01	**Maximum Span[3] (m)**	**4.80**	**4.78**	**4.70**	**4.63**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD12, 3rd Pan
220	0.18	4.24	**Maximum Span[3] (m)**	**4.66**	**4.66**	**4.66**	**4.42**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD10, 3rd Pan
230	0.19	4.47	**Maximum Span[3] (m)**	**4.54**	**4.54**	**4.54**	**4.54**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 x 2 HD10, 3rd Pan	SE92 x 2 HD10, 3rd Pan	SE92 x 2 HD10, 3rd Pan	SE92 x 2 HD10, 3rd Pan

0.75mm Hibond 80 - Constructed as Propped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Minimum Crack Control D500 Mesh[2]	Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load,[1] G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
				Maximum Composite Floor End and Internal Spans[3] (m)			
150	0.11	2.63	SE92	5.16	5.11	4.86	4.51
160	0.12	2.86	SE72 x 2	5.16	5.11	4.88	4.54
170	0.13	3.09	SE72 x 2	5.16	5.11	4.89	4.57
180	0.14	3.32	SE62 + SE92	5.16	5.11	4.90	4.60
190	0.15	3.55	SE62 + SE92	5.09	5.09	4.91	4.62
200	0.16	3.78	SE82 x 2	4.93	4.93	4.92	4.65
210	0.17	4.01	SE82 + SE92	4.80	4.80	4.80	4.67
220	0.18	4.24	SE82 + SE92	4.66	4.66	4.66	4.66
230	0.19	4.47	SE92 x 2	4.54	4.54	4.54	4.54

Notes:
1. Superimposed Dead Load for Fire Rating assumes only 0.5 KPa for all load combinations.
2. Crack control steel is the minimum D500 Mesh required for a composite floor slab enclosed within a building.
3. One row of continuous propping is required at mid-span.
4. Fire reinforcement is comprised of bottom ductile reinforcing bars in the steel decking sheet pans.

0.95mm Hibond 80 - Constructed as Unpropped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor Single Span (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.65	3.58	SE82	5.5
160	0.12	2.88	3.50	SE82	5.5
170	0.13	3.11	3.42	SE82	5.5
180	0.14	3.34	3.35	SE92	5.5
190	0.15	3.57	3.29	SE92	5.5
200	0.16	3.81	3.23	SE92	5.5
210	0.17	4.04	3.17	SE92	5.5
220	0.18	4.27	3.12	SE92	5.5
230	0.19	4.50	3.07	SE72 x 2	5.5

0.95mm Hibond 80 - Constructed as Unpropped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor End and Internal Spans (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.65	4.13	SE82	5.5
160	0.12	2.88	4.01	SE82	5.5
170	0.13	3.11	3.90	SE82	5.5
180	0.14	3.34	3.79	SE92	5.5
190	0.15	3.57	3.69	SE92	5.5
200	0.16	3.81	3.59	SE92	5.5
210	0.17	4.04	3.51	SE92	5.5
220	0.18	4.27	3.43	SE92	5.5
230	0.19	4.50	3.35	SE72 x 2	5.5

0.95mm Hibond 80 - Constructed as Propped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)		Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load[1], G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
150	0.11	2.65	**Maximum Span[3] (m)**	**5.42**	**5.37**	**5.15**	**4.72**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 HD12, 2nd Pan	SE92 HD16, 3rd Pan	SE92 HD12, 2nd Pan	SE92 HD12, 2nd Pan
160	0.12	2.88	**Maximum Span[3] (m)**	**5.41**	**5.36**	**5.15**	**4.85**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD16, 3rd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD16, 3rd Pan
170	0.13	3.11	**Maximum Span[3] (m)**	**5.40**	**5.35**	**5.16**	**4.86**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD16, 3rd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan
180	0.14	3.34	**Maximum Span[3] (m)**	**5.39**	**5.34**	**5.16**	**4.88**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan
190	0.15	3.57	**Maximum Span[3] (m)**	**5.38**	**5.34**	**5.16**	**4.89**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan
200	0.16	3.81	**Maximum Span[3] (m)**	**5.37**	**5.33**	**5.16**	**4.91**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 x 2 HD12, 3rd Pan	SE82 x 2 HD12, 2nd Pan	SE82 x 2 HD12, 2nd Pan	SE82 x 2 HD12, 2nd Pan
210	0.17	4.04	**Maximum Span[3] (m)**	**5.36**	**5.33**	**5.16**	**4.92**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 2nd Pan	SE82 + SE92 HD12, 2nd Pan	SE82 + SE92 HD12, 2nd Pan
220	0.18	4.27	**Maximum Span[3] (m)**	**5.36**	**5.32**	**5.16**	**4.93**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 2nd Pan	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 2nd Pan
230	0.19	4.50	**Maximum Span[3] (m)**	**5.35**	**5.32**	**5.17**	**4.94**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 x 2 HD10, 3rd Pan	SE92 x 2 HD12, 3rd Pan	SE92 x 2 HD12, 3rd Pan	SE92 x 2 HD12, 3rd Pan

0.95mm Hibond 80 - Constructed as Propped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Minimum Crack Control D500 Mesh[2]	Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load[1], G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
				Maximum Composite Floor End and Internal Spans[3] (m)			
150	0.11	2.65	SE92	5.42	5.37	5.15	4.72
160	0.12	2.88	SE72 x 2	5.41	5.36	5.15	4.85
170	0.13	3.11	SE72 x 2	5.40	5.35	5.16	4.86
180	0.14	3.34	SE62 + SE92	5.39	5.34	5.16	4.88
190	0.15	3.57	SE62 + SE92	5.38	5.34	5.16	4.89
200	0.16	3.81	SE82 x 2	5.37	5.33	5.16	4.91
210	0.17	4.04	SE82 + SE92	5.36	5.33	5.16	4.92
220	0.18	4.27	SE82 + SE92	5.36	5.32	5.16	4.93
230	0.19	4.50	SE92 x 2	5.35	5.32	5.17	4.94

Notes:
1. Superimposed Dead Load for Fire Rating assumes only 0.5 KPa for all load combinations.
2. Crack control steel is the minimum D500 Mesh required for a composite floor slab enclosed within a building.
3. One row of continuous propping is required at mid-span.
4. Fire reinforcement is comprised of bottom ductile reinforcing bars in the steel decking sheet pans.

1.05mm Hibond 80 - Constructed as Unpropped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor Single Span (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.66	3.59	SE82	5.5
160	0.12	2.90	3.51	SE82	5.5
170	0.13	3.13	3.43	SE82	5.5
180	0.14	3.36	3.36	SE92	5.5
190	0.15	3.59	3.30	SE92	5.5
200	0.16	3.82	3.24	SE92	5.5
210	0.17	4.05	3.18	SE92	5.5
220	0.18	4.28	3.13	SE92	5.5
230	0.19	4.51	3.08	SE72 x 2	5.5

1.05mm Hibond 80 - Constructed as Unpropped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor End and Internal Spans (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.66	4.48	SE82	5.5
160	0.12	2.90	4.38	SE82	5.5
170	0.13	3.13	4.26	SE82	5.5
180	0.14	3.36	4.16	SE92	5.5
190	0.15	3.59	4.06	SE92	5.5
200	0.16	3.82	3.97	SE92	5.5
210	0.17	4.05	3.89	SE92	5.5
220	0.18	4.28	3.79	SE92	5.5
230	0.19	4.51	3.72	SE72 x 2	5.5

1.05mm Hibond 80 - Constructed as Propped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)		Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load[1], G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
150	0.11	2.66	**Maximum Span[3] (m)**	**5.32**	**5.32**	**5.15**	**4.72**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 HD12, 3rd Pan	SE92 HD12, 2nd Pan	SE92 HD12, 2nd Pan	SE92 HD16, 2nd Pan
160	0.12	2.90	**Maximum Span[3] (m)**	**5.42**	**5.37**	**5.16**	**4.85**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 3rd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD16, 2nd Pan
170	0.13	3.13	**Maximum Span[3] (m)**	**5.41**	**5.36**	**5.16**	**4.87**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 3rd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD10 Every Pan
180	0.14	3.36	**Maximum Span[3] (m)**	**5.40**	**5.35**	**5.17**	**4.89**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD10, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD16, 3rd Pan
190	0.15	3.59	**Maximum Span[3] (m)**	**5.39**	**5.35**	**5.17**	**4.90**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD10, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD16, 3rd Pan
200	0.16	3.82	**Maximum Span[3] (m)**	**5.38**	**5.34**	**5.17**	**4.91**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 x 2 HD10, 3rd Pan	SE82 x 2 HD12, 3rd Pan	SE82 x 2 HD12, 3rd Pan	SE82 x 2 HD16, 3rd Pan
210	0.17	4.05	**Maximum Span[3] (m)**	**5.37**	**5.33**	**5.17**	**4.92**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 2nd Pan
220	0.18	4.28	**Maximum Span[3] (m)**	**5.37**	**5.33**	**5.17**	**4.94**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD10, 3rd Pan	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 2nd Pan
230	0.19	4.51	**Maximum Span[3] (m)**	**5.36**	**5.32**	**5.17**	**4.95**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 x 2 HD10, 3rd Pan	SE92 x 2 HD10, 3rd Pan	SE92 x 2 HD12, 3rd Pan	SE92 x 2 HD12, 2nd Pan

1.05mm Hibond 80 - Constructed as Propped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Minimum Crack Control D500 Mesh[2]	Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load[1], G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
				Maximum Composite Floor End and Internal Spans[3] (m)			
150	0.11	2.66	SE92	5.43	5.38	5.15	4.72
160	0.12	2.90	SE72 x 2	5.42	5.37	5.16	4.85
170	0.13	3.13	SE72 x 2	5.41	5.36	5.16	4.87
180	0.14	3.36	SE62 + SE92	5.40	5.35	5.17	4.89
190	0.15	3.59	SE62 + SE92	5.39	5.35	5.17	4.90
200	0.16	3.82	SE82 x 2	5.38	5.34	5.17	4.91
210	0.17	4.05	SE82 + SE92	5.37	5.33	5.17	4.93
220	0.18	4.28	SE82 + SE92	5.37	5.33	5.17	4.94
230	0.19	4.51	SE92 x 2	5.36	5.32	5.17	4.95

Notes:
1. Superimposed Dead Load for Fire Rating assumes only 0.5 KPa for all load combinations.
2. Crack control steel is the minimum D500 Mesh required for a composite floor slab enclosed within a building.
3. One row of continuous propping is required at mid-span.
4. Fire reinforcement is comprised of bottom ductile reinforcing bars in the steel decking sheet pans.

1.15mm Hibond 80 - Constructed as Unpropped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor Single Span (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.68	3.80	SE82	5.5
160	0.12	2.91	3.71	SE82	5.5
170	0.13	3.14	3.63	SE82	5.5
180	0.14	3.37	3.56	SE92	5.5
190	0.15	3.60	3.49	SE92	5.5
200	0.16	3.83	3.43	SE92	5.5
210	0.17	4.06	3.37	SE92	5.5
220	0.18	4.29	3.32	SE92	5.5
230	0.19	4.52	3.26	SE72 x 2	5.5

1.15mm Hibond 80 - Constructed as Unpropped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Maximum Composite Floor End and Internal Spans (limited by formwork capacity) (m)	Minimum Crack Control D500 Mesh (for slab enclosed within a building)	Maximum Superimposed Load (G_{SDL} + Q) (kPa)
150	0.11	2.68	4.75	SE82	5.5
160	0.12	2.91	4.67	SE82	5.5
170	0.13	3.14	4.59	SE82	5.5
180	0.14	3.37	4.52	SE92	5.5
190	0.15	3.60	4.45	SE92	5.5
200	0.16	3.83	4.39	SE92	5.5
210	0.17	4.06	4.32	SE92	5.5
220	0.18	4.29	4.23	SE92	5.5
230	0.19	4.52	4.15	SE72 x 2	5.5

1.15mm Hibond 80 - Constructed as Propped Single Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)		Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load[1], G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
150	0.11	2.68	**Maximum Span[3] (m)**	**5.65**	**5.58**	**5.29**	**4.81**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 HD12, 2nd Pan	SE92 HD16, 3rd Pan	SE92 HD12, 2nd Pan	SE92 HD12, 2nd Pan
160	0.12	2.91	**Maximum Span[3] (m)**	**5.64**	**5.59**	**5.37**	**5.05**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD16, 3rd Pan	SE72 x 2 HD16, 3rd Pan	SE72 x 2 HD16, 3rd Pan
170	0.13	3.14	**Maximum Span[3] (m)**	**5.63**	**5.58**	**5.37**	**5.06**
			Crack Control Steel[2] Fire Reinforcement[4]	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD16, 3rd Pan	SE72 x 2 HD12, 2nd Pan	SE72 x 2 HD16, 3rd Pan
180	0.14	3.37	**Maximum Span[3] (m)**	**5.62**	**5.57**	**5.37**	**5.08**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan
190	0.15	3.60	**Maximum Span[3] (m)**	**5.58**	**5.56**	**5.37**	**5.09**
			Crack Control Steel[2] Fire Reinforcement[4]	SE62 + SE92 HD12, 3rd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan	SE62 + SE92 HD12, 2nd Pan
200	0.16	3.83	**Maximum Span[3] (m)**	**5.58**	**5.55**	**5.37**	**5.10**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 x 2 HD12, 3rd Pan	SE82 x 2 HD12, 2nd Pan	SE82 x 2 HD12, 2nd Pan	SE82 x 2 HD12, 2nd Pan
210	0.17	4.06	**Maximum Span[3] (m)**	**5.59**	**5.55**	**5.37**	**5.11**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 2nd Pan	SE82 + SE92 HD12, 2nd Pan	SE82 + SE92 HD12, 2nd Pan
220	0.18	4.29	**Maximum Span[3] (m)**	**5.58**	**5.54**	**5.37**	**5.12**
			Crack Control Steel[2] Fire Reinforcement[4]	SE82 + SE92 HD12, 3rd Pan	SE82 + SE92 HD12, 2nd Pan	SE82 + SE92 HD12, 2nd Pan	SE82 + SE92 HD12, 2nd Pan
230	0.19	4.52	**Maximum Span[3] (m)**	**5.57**	**5.53**	**5.37**	**5.13**
			Crack Control Steel[2] Fire Reinforcement[4]	SE92 x 2 HD12, 3rd Pan	SE92 x 2 HD12, 3rd Pan	SE92 x 2 HD12, 3rd Pan	SE92 x 2 HD12, 2nd Pan

1.15mm Hibond 80 - Constructed as Propped Double Span Formwork, FRR 60

Slab Depth (mm)	Concrete Volume (m^3/m^2)	Dry Slab Weight (kPa)	Minimum Crack Control D500 Mesh[2]	Superimposed Live Load, Q (kPa)			
				1.5	2.5	3	5
				Superimposed Dead Load[1], G_{SDL} (kPa)			
				0.8	0.1	0.8	0.5
				Maximum Composite Floor End and Internal Spans[3] (m)			
150	0.11	2.68	SE92	5.65	5.58	5.29	4.81
160	0.12	2.91	SE72 x 2	5.64	5.59	5.37	5.05
170	0.13	3.14	SE72 x 2	5.63	5.58	5.37	5.06
180	0.14	3.37	SE62 + SE92	5.62	5.57	5.37	5.08
190	0.15	3.60	SE62 + SE92	5.61	5.56	5.37	5.09
200	0.16	3.83	SE82 x 2	5.60	5.55	5.37	5.10
210	0.17	4.06	SE82 + SE92	5.59	5.55	5.37	5.11
220	0.18	4.29	SE82 + SE92	5.58	5.54	5.37	5.12
230	0.19	4.52	SE92 x 2	5.57	5.53	5.37	5.13

Notes:
1. Superimposed Dead Load for Fire Rating assumes only 0.5 KPa for all load combinations.
2. Crack control steel is the minimum D500 Mesh required for a composite floor slab enclosed within a building.
3. One row of continuous propping is required at mid-span.
4. Fire reinforcement is comprised of bottom ductile reinforcing bars in the steel decking sheet pans.

HIBOND 80 ACOUSTIC PERFORMANCE

SCOPE

This section provides guidelines for specifiers and constructors who require noise control systems for residential applications such as separate multi-unit dwellings or single dwellings, commercial applications such as retail spaces, offices and institutional buildings. It is not intended that these guidelines replace the need for specialist acoustic design to meet the specified sound insulation performance for the building.

A Dimond Structural Noise Control System consists of a Hibond 80 composite floor slab with a selected USG ceiling system, GIB® standard plasterboard ceiling linings, selected floor coverings and the specific inclusion of a cavity absorber. It must be noted that the floor covering is an essential aspect of the performance of the system.

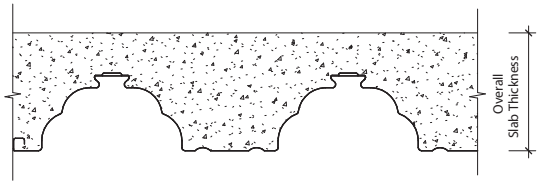
The information in this section is based on laboratory testing of a 120mm Hibond 55 composite floor slab carried out by the University of Auckland, Acoustics Testing Service and opinions on expected acoustic performance by Marshall Day Acoustics Limited Report Rp 001 2016284A. More information is available on request.

The systems set out in this section provide the expected sound transmission performance under laboratory conditions. However in practical applications on site there is a significant element of subjectivity to interpreting noise levels within rooms. No matter how low a sound level might be, if it is intrusive upon a person's privacy, then it is likely to cause annoyance. No practical system can guarantee complete sound insulation and completely satisfy everyone.

Introduction of light fittings, vents or other floor or ceiling penetrations will reduce the acoustic performance of the system, requiring specific assessment in each case.

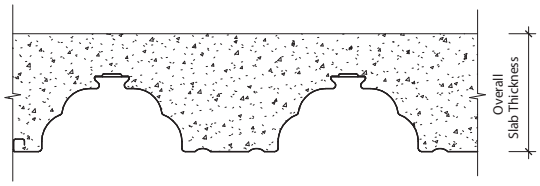
Hibond 80 Composite Floor Slab - Bare Composite Floor Slab

System Description:
Steel Decking: 0.75, 0.95, 1.05, 1.15mm Hibond 80
Composite Floor Slab: Overall thickness (mm)



Overall Composite Floor Slab Thickness (mm)	STC
150	47
175	49
200	51

System Description:
Steel Decking: 0.75, 0.95, 1.05, 1.15mm Hibond 80
Composite Floor Slab: 150mm overall thickness

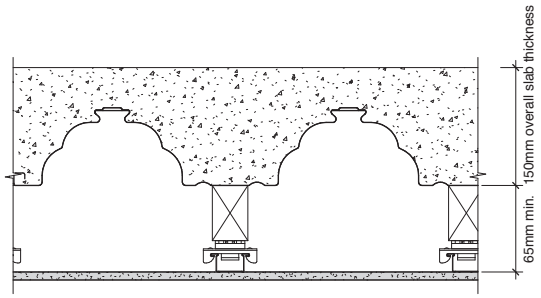


Floor Surface Treatment	STC	IIC
No Covering	47	27
14mm timber on Bostic Ultraset adhesive	47	45
14mm timber on 3mm Acoustimat foam	47	48
6mm Cork flooring	47	45
Gerfloor Taralay Comfort Imprimes 43	47	49
Carpet, Hirst 22oz Stratron Collection	47	57
Carpet, Hirst 28oz Stratron Collection	47	58
Carpet, 40oz with 7lb rebond pad	47	62

Notes:
1. The acoustic opinion has a margin of error of +/- 3 STC/IIC points
2. IIC result depends on the quality of the floor covering material and installation
3. All adhesives must be applied to manufacturers instructions, and Bostic Ultraset adhesive dry film thickness must not be less than 1.9mm
4. It is prudent to allow a 5 point reduction for expected field STC and IIC when compared to the above performance expected in laboratory conditions. This is considered a reasonable compensation to allow for flanking paths at junctions and construction variations.

Hibond 80 Composite Floor Slab with Direct Fix Ceiling System - Non-Insulated

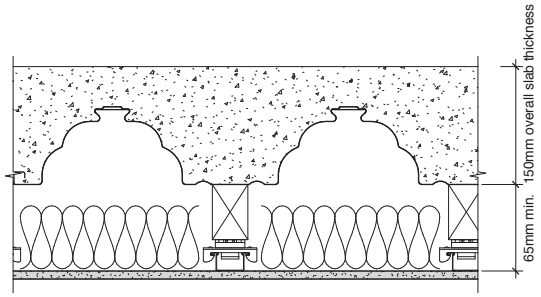
System Description:
Steel Decking: 0.75, 0.95, 1.05, 1.15mm Hibond 80
Composite Floor Slab: 150mm overall thickness
Ceiling System: Potters Direct Fix with sound isolation clips
USG furring channel at maximum 600mm centres
Ceiling Lining: 13mm GIB standard plasterboard in one or two layers



Floor Surface Treatment	Ceiling Lining			
	One Layer 13mm GIB		Two Layers 13mm GIB	
	STC	IIC	STC	IIC
No Covering	59	42	62	44
14mm strip timber on Bostic Ultraset adhesive	59	47	62	49
14mm timber on 3mm Acoustimat foam	59	48	62	50
6mm Cork flooring	59	48	62	50
Gerfloor Taralay Comfort Imprimes 43	59	50	62	52
Carpet, Hirst 22oz Stratron Collection	59	51	62	53
Carpet, Hirst 28oz Stratron Collection	59	52	62	54
Carpet, 40oz with 7lb Rebond pad	59	67	62	69

Hibond 80 Composite Floor Slab with Direct Fix Ceiling System - Insulated

System Description:
Steel Decking: 0.75, 0.95, 1.05, 1.15mm Hibond 80
Composite Floor Slab: 150mm overall thickness
Insulation Blanket: 75mm thick R1.8 Pink Batts
Ceiling System: Potters Direct Fix with sound isolation clips
USG furring channel at maximum 600mm centres
Ceiling Lining: 13mm GIB standard plasterboard in one or two layers

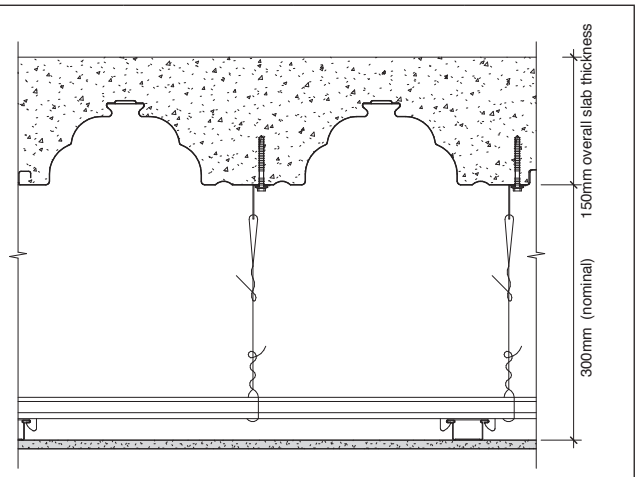


Floor Surface Treatment	Ceiling Lining			
	One Layer 13mm GIB		Two Layers 13mm GIB	
	STC	IIC	STC	IIC
No Covering	68	52	71	54
14mm strip timber on Bostic Ultraset adhesive	68	57	71	59
14mm timber on 3mm Acoustimat foam	68	58	71	60
6mm Cork flooring	68	58	71	60
Gerfloor Taralay Comfort Imprimes 43	68	60	71	62
Carpet, Hirst 22oz Stratron Collection	68	61	71	63
Carpet, Hirst 28oz Stratron Collection	68	62	71	64
Carpet, 40oz with 7lb Rebond pad	68	77	71	79

Notes:
1. The acoustic opinion has a margin of error of +/- 3 STC/IIC points
2. IIC result depends on the quality of the floor covering material and installation
3. All adhesives must be applied to manufacturers instructions, and Bostic Ultraset adhesive dry film thickness must not be less than 1.9mm
4. It is prudent to allow a 5 point reduction for expected field STC and IIC when compared to the above performance expected in laboratory conditions. This is considered a reasonable compensation to allow for flanking paths at junctions and construction variations.

Hibond 80 Composite Floor Slab with Suspended Ceiling System - Non-Insulated

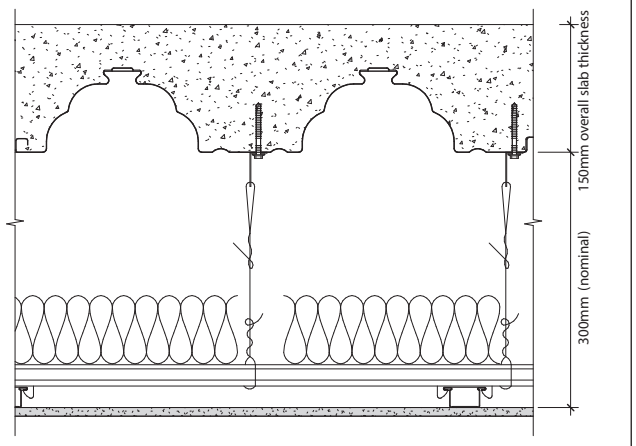
System Description:
Steel Decking: 0.75, 0.95, 1.05, 1.15mm Hibond 80
Composite Floor Slab: 150mm overall thickness
Ceiling System: Don suspended ceiling system
USG furring channel at maximum 600mm centres
Ceiling Lining: 13mm GIB standard plasterboard in one or two layers



Floor Surface Treatment	Ceiling Lining			
	One Layer 13mm GIB		Two Layers 13mm GIB	
	STC	IIC	STC	IIC
No Covering	54	46	57	48
14mm strip timber on Bostic Ultraset adhesive	54	52	57	54
14mm timber on 3mm Acoustimat foam	54	54	57	56
6mm Cork flooring	54	53	57	55
Gerfloor Taralay Comfort Imprimes 43	54	55	57	57
Carpet, Hirst 22oz Stratron Collection	54	56	57	58
Carpet, Hirst 28oz Stratron Collection	54	57	57	59
Carpet, 40oz with 7lb Rebond pad	54	72	57	74

Hibond 80 Composite Floor Slab with Suspended Ceiling System - Insulated

System Description:
Steel Decking: 0.75, 0.95, 1.05, 1.15mm Hibond 80
Composite Floor Slab: 150mm overall thickness
Insulation Blanket: 75mm thick R1.8 Pink Batts
Ceiling System: Don suspended ceiling system
USG furring channel at maximum 600mm centres
Ceiling Lining: 13mm GIB standard plasterboard in one or two layers



Floor Surface Treatment	Ceiling Lining			
	One Layer 13mm GIB		Two Layers 13mm GIB	
	STC	IIC	STC	IIC
No Covering	67	46	70	48
14mm strip timber on Bostic Ultraset adhesive	67	65	70	67
14mm timber on 3mm Acoustimat foam	67	67	70	69
6mm Cork flooring	67	64	70	66
Gerfloor Taralay Comfort Imprimes 43	67	67	70	69
Carpet, Hirst 22oz Stratron Collection	67	70	70	72
Carpet, Hirst 28oz Stratron Collection	67	72	70	74
Carpet, 40oz with 7lb Rebond pad	67	82	70	84

Notes:
1. The acoustic opinion has a margin of error of +/- 3 STC/IIC points
2. IIC result depends on the quality of the floor covering material and installation
3. All adhesives must be applied to manufacturers instructions, and Bostic Ultraset adhesive dry film thickness must not be less than 1.9mm
4. It is prudent to allow a 5 point reduction for expected field STC and IIC when compared to the above performance expected in laboratory conditions. This is considered a reasonable compensation to allow for flanking paths at junctions and construction variations.

HIBOND 80 DESIGN EXAMPLES

EXAMPLE: FORMWORK

A 200 mm overall thickness composite floor slab is required to span 4200mm c/c between permanent supports using the Hibond 80 sheet as permanent formwork only. Two alternatives are available in design.

a) Using Hibond 80 x 0.75mm from Section 3.3.4 select the maximum formwork span capabilities for a 200mm overall thickness composite floor slab, i.e.

   Single Span 3160mm

   Double Span 2960mm

   Span with 1 row of propping at midspan 4930mm

   To meet the required span using Hibond 80 x 0.75mm,

   1 row of continuous propping in required at midspan,

   Span with 1 row of propping at midspan = 4930mm > 4200mm ∴ ok

   Therefore Hibond 80 x 0.75 mm with 1 row of continuous propping at mid-span may be considered.

b) Using Hibond 80 x 1.15mm from Section 3.3.4 select the formwork span capabilities for a 200mm overall thickness composite floor slab, i.e.

   Single 3430mm

   Double Span 4390mm

   1 row of props 5600mm (total span)

   To meet the required span using Hibond 80 x 1.15mm, an unpropped double span can be used.

   Double Span = 4390mm > 4200mm ∴ ok

   Therefore Hibond 80 x 1.15mm in an unpropped configuration may also be considered.

EXAMPLE: COMMERCIAL

A suspended composite floor slab in a commercial building is required to achieve spans of 4000mm using unpropped construction, while utilising a minimum composite floor slab thickness of 160mm. A Fire Resistance Rating (FRR) of 60 minutes is also required.

Commercial loading,

live load, Q	3.0kPa
superimposed dead load, G_{SDL}	0.8kPa
design superimposed load, G_{SDL} + Q	3.8kPa

From section 3.3.4 select the corresponding steel decking thickness for a 160mm composite floor slab thickness to achieve an unpropped span of 4000mm.

This gives Hibond 80 x 0.95mm,
Maximum unpropped double span = 4010mm > 4000mm ∴ ok
Maximum design superimposed Load = 5.5kPa > 3.8kPa ∴ ok
FRR 60 minutes (using unpropped double span formwork) - use continuous SE82 mesh (this is the same as the minimum mesh for crack control in an unpropped configuraton)

Note: Hibond 80 x 0.75mm could also be considered, however it would require 1 row of props at midspan as the maximum unpropped single span available for a composite floor slab of 160mm overall thickness is 3510mm. To meet FRR 60 minutes, the use of propped double span formwork requires 2 layers of SE72 Mesh.

Therefore, use a Hibond 80 x 0.95mm composite floor slab of 160mm overall thickness in an unpropped double span configuration with continuous SE82 mesh throughout the composite floor slab at minimum cover.

HIBOND 80 MATERIAL SPECIFICATION

Dimond Hibond 80 and accessories are manufactured from galvanised steel coil produced to AS 1397.

	Thickness BMT (mm)	Steel Grade (MPa)	Min. Zinc Weight (g/m^2)
Hibond 80 sheet	0.75 & 0.95	G550	Z 275
Hibond 80 sheet	1.05 & 1.15	G500	Z 275
End cap	0.55	G250	Z 275
Closure strip	0.55	G250	Z 275
Edge form	1.15	G250	Z 275

BMT - Base Metal Thickness

Tolerances

Length: -0mm +10mm
Cover width: -1mm +5mm
Maximum manufactured length of Hibond 80 sheet: 15m.

HIBOND 80 SHORT FORM SPECIFICATION

The flooring system will be Dimond Structural **(1)** mm Hibond 80 manufactured from G550/G500 grade steel, with a $275g/m^2$ galvanised zinc weight. The minimum nominal steel decking sheet length to be used in construction shall be ..... m, in accordance with the design formwork spans.

Edge form and end caps to be used in accordance with Dimond Structural recommendations.

Specify concrete thickness, and number of rows of propping during construction.

Mesh and any additional reinforcement bar size and spacing should be referred to the design engineer's drawings.

(1) Choose from: 0.75, 0.95, 1.05, 1.15

HIBOND 80 COMPONENTS

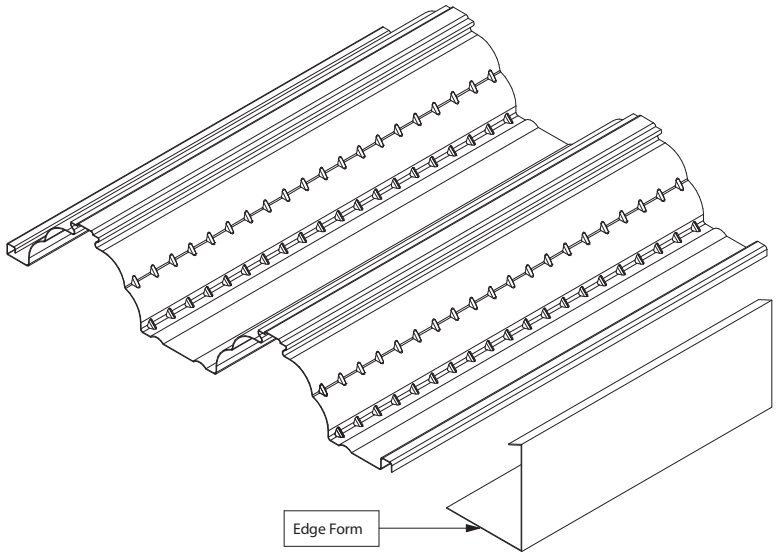
EDGE FORM

Manufactured from 1.15mm Base Metal Thickness (BMT) galvanised steel in 6m lengths, providing an edge to screed the concrete to the correct composite floor slab thickness.

Standard sizes are from 150mm to 230mm in 10mm height increments.

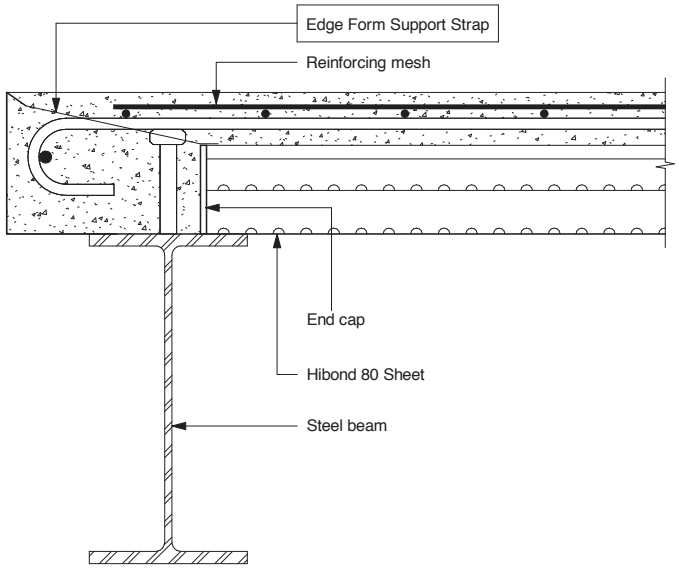
The foot of the Edge Form is typically fixed to structure using powder actuated fasteners (self-drilling screws can also be used, type dependent on support material and thickness).

Where necessary, for example cantilevered steel decking sheets, the foot of the Edge Form may be attached to the Hibond 80 sheets with 10g - 16 x 16mm self-drilling screws. Fasteners are required every pan to steel decking sheet ends and at 750mm centres along steel decking sheets.



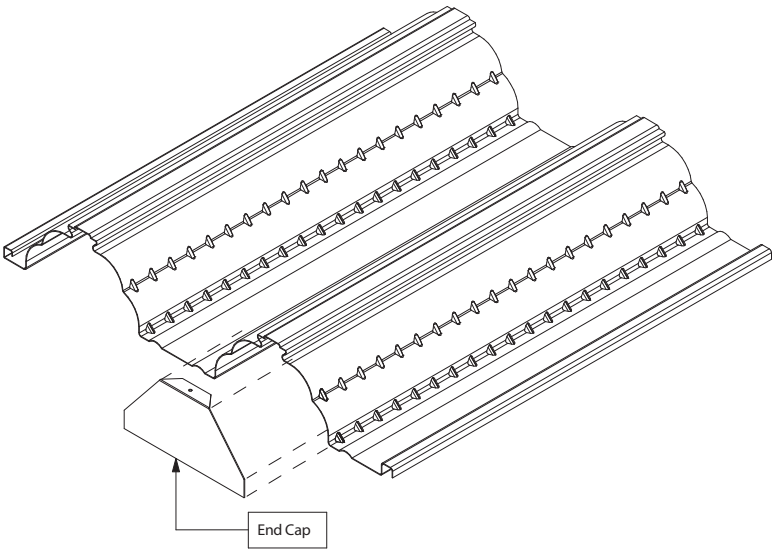
EDGE FORM SUPPORT STRAP

Edge Form is restrained from outward movement during concrete placement by 0.75mm BMT x 25mm galvanised steel Edge Form Support Straps. Fastened with 10g - 16 x 16mm self-drilling screws (2 per strap), Edge Form Support Straps are required every second rib to steel decking sheet ends and at 750mm centres along steel decking sheets.



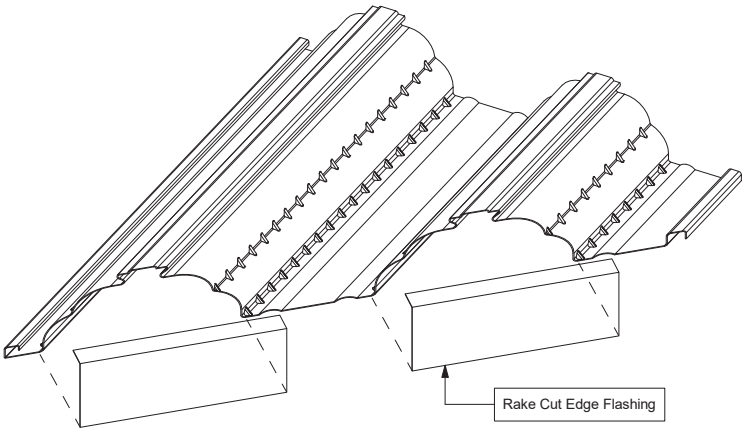
END CAPS

Manufactured from 0.55mm BMT galvanised steel, end caps are used to blank off the ribs (to prevent concrete leakage) at the end of each Hibond 80 sheet, or where openings are created in the deck. Each End Cap is fixed to the Hibond 80 sheet with 1 fastener atop each rib (10g - 16 x 16mm self-drilling screw).



RAKE CUT EDGE FLASHINGS

Manufactured from 0.55mm BMT galvanised steel in 95mm x 30mm x 3m lengths which are cut to suit on site (as shown). Rake cut edge flashings are used in place of end caps to close off the end of Hibond 80 sheets when they are cut on an angle or curve. These are cut to length and fixed to the Hibond 80 sheet with 1 fastener atop each rib (10g - 16 x 16mm self-drilling screw).



HIBOND 80 CAD DETAILS

For the latest Hibond 80 CAD details, please download from the Dimond Structural website **www.dimondstructural.co.nz/products/hibond-80**

Please note, the Hibond 80 CAD details are to be used as a guide only and are not intended for construction. Specific design details are required to be provided by the design engineer.