

DHS & CEE PURLINS



Dimond Hi-Span (DHS) and CEE Purlin System

Supplier

Dimond Structural, a division of Fletcher Building Limited.

Contacts: Technical Advice structuraltech@dimond.co.nz

Sales and Supply 0800 346 663

Email: structural@dimond.co.nz

Website: <https://www.dimondstructural.co.nz/products/dhs-purlins>

Contacts Website: <https://www.dimondstructural.co.nz/contact#sales-office>

Address: 76A Hunua Road, Papakura, Auckland 2110

Place of Manufacture

DHS Purlins are manufactured in Christchurch and Auckland, except for 3.00mm BMT and CEE Purlins, which are manufactured only in Auckland.

Structural Systems Manual

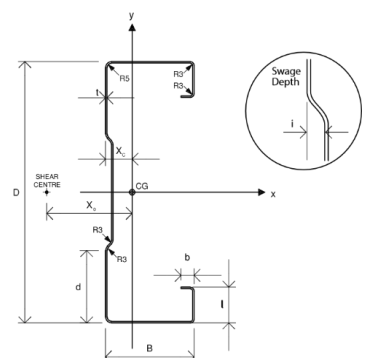
<https://www.dimondstructural.co.nz/structural-design-manual#purlins>

Product Description (DHS)

- 1.1a** The Dimond Hi-Span Purlin System (DHS Purlins) is a galvanised steel sheet that is roll-formed into a modified Cee shape with formed swages used in conjunction with Fastbrace and/or Bolted Brace Channel bracing as structural support to roofing and wall cladding.
- 1.2a** The system includes DHS Purlins, Fastbrace/Bolted Brace Channels and Components (refer Structural Systems Manual Section 1.4.4).
- 1.3a** DHS Purlins are available in 1.15mm, 1.25mm, 1.45mm, 1.75mm, 1.95mm, 2.40mm, and 3.00mm base metal thickness (BMT).
- 1.4a** DHS Purlins are manufactured from Steel Grade G450 and G500 galvanised coil in Z275, i.e. 275g/m² total zinc coating weight. Z450 (450g/m² total zinc coating weight) requires a three-month lead time from date of order, subject to availability. Fastbrace and Bolted Brace Channels are manufactured from Steel Grade G250 (Brace Channel component 1.15mm BMT; End Cleat components 2.0mm BMT), in Z450 zinc coating.

- 1.5a** Refer to table and diagram below for section sizes and shape:

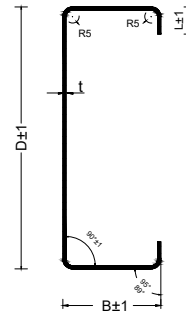
DHS Section	Depth D (mm)	Depth B (mm)	Thickness t (mm)	Mass (kg/m)	Weight (kN/m)	d (mm)	Swage Depth i (mm)	b (mm)	l (mm)	X _c (mm)	X _o (mm)
DHS150/12	150	65	1.15	2.96	0.03	54	4	10	23	22.9	55.4
DHS150/15	150	65	1.45	3.71	0.04	54	4	10	23	22.7	54.8
DHS150/18	150	65	1.75	4.44	0.04	54	4	10	23	22.5	54.3
DHS200/12	200	75	1.15	3.68	0.04	62	4	10	28	25.2	60.9
DHS200/15	200	75	1.45	4.62	0.05	62	4	10	28	25.0	60.3
DHS200/18	200	75	1.75	5.54	0.05	62	4	10	28	24.8	59.8
DHS250/13	250	85	1.25	4.83	0.05	67	6	12	33	28.3	66.0
DHS250/15	250	85	1.45	5.59	0.05	67	6	12	33	28.2	65.6
DHS250/18	250	85	1.75	6.72	0.07	67	6	12	33	28.0	65.1
DHS250/24	250	85	2.40	9.12	0.09	67	6	12	33	27.5	63.9
DHS300/15	300	100	1.45	6.62	0.06	67	7	12	38	32.9	74.9
DHS300/18	300	100	1.75	7.97	0.08	67	7	12	38	32.7	74.4
DHS300/24	300	100	2.40	10.83	0.11	67	7	12	38	32.2	73.2
DHS300/30	300	100	3.00	13.44	0.13	67	7	12	38	31.8	72.1
DHS350/18	350	100	1.75	8.79	0.09	77	7	12	43	31.5	72.3
DHS350/24	350	100	2.40	11.96	0.12	77	7	12	43	31.1	71.1
DHS350/30	350	100	3.00	14.85	0.15	77	7	12	43	30.6	70.1
DHS400/20	400	100	1.95	10.69	0.10	79	7	12	48	30.5	69.8
DHS400/24	400	100	2.40	13.09	0.13	79	7	12	48	30.2	69.1
DHS400/30	400	100	3.00	16.27	0.16	79	7	12	48	29.9	68.1



Product Description (CEE)

- 1.1b** The Dimond Purlin System (CEE Purlins) is a galvanised steel sheet that is roll-formed into a modified Cee shape with formed lip used in conjunction with Fastbrace and/or Bolted Brace Channel bracing as structural support to roofing and wall cladding.
- 1.2b** CEE Purlins are available in 0.95mm, 1.15mm, 1.45mm, 1.55mm, 1.85mm, 2.40mm, and 3.00mm base metal thickness (BMT).
- 1.3b** CEE Purlins are manufactured from Steel Grade G450 and G500 galvanised coil in Z275, i.e. 275g/m² total zinc coating weight. Z450 (450g/m² total zinc coating weight) requires a three-month lead time from date of order, subject to availability. Fastbrace and Bolted Brace Channels are manufactured from Steel Grade G250 (Brace Channel component 1.15mm BMT; End Cleat components 2.0mm BMT), in Z450 zinc coating.
- 1.4b** Refer to table and diagram below for section sizes and shape:

CEE Section	Steel Grade	Depth D (mm)	Width B (mm)	L (mm)	Thickness t (mm)	R (mm)	Mass (kg/m)	Weight (kN/m)
100/10	G550	100	50	14	0.95	5	1.67	0.02
100/12	G500	100	50	14	1.15	5	2.01	0.02
100/15	G450	100	50	14	1.55	5	2.68	0.03
100/19	G450	100	50	14	1.85	5	3.18	0.03
150/12	G500	150	65	16	1.15	5	2.80	0.03
150/15	G450	150	65	16	1.45	5	3.51	0.03
150/19	G500	150	65	16	1.85	5	4.45	0.04
150/24	G450	150	65	16	2.4	5	5.72	0.06
200/15	G500	200	75	23	1.45	5	4.50	0.04
200/19	G500	200	75	23	1.85	5	5.71	0.06
200/24	G450	200	75	23	2.4	5	7.36	0.07
250/15	G500	250	85	23	1.45	5	5.28	0.05
250/19	G450	250	85	21	1.85	5	6.71	0.07
250/24	G450	250	85	21	2.4	5	8.65	0.08
300/24 (90)	G450	300	90	21	2.4	5	9.83	0.10
300/24 (100)	G450	300	100	21	2.4	5	10.22	0.10
300/30 (90)	G450	300	90	21	3.0	5	12.02	0.12
300/30 (100)	G450	300	100	21	3.0	5	12.50	0.12
350/24	G450	350	100	25	2.4	5	11.36	0.11
350/30	G450	350	100	25	3.0	5	13.94	0.14
400/24	G450	400	100	30	2.4	5	12.53	0.12
400/30	G450	400	100	30	3.0	5	15.34	0.15



Scope of Use

- 2.1** Purlins are intended for use as structural support to profile metal roofing and wall cladding. Purlins provide for bolted connections to structural framework, suitable for use on spans and spacings within the limitations of the Structural Systems Manual, and typically used for commercial warehouse building applications where large spans are required.
- 2.2** Use of Purlins must be within the limitations on environment and use given in the Structural Systems Manual Section 1.1.3.

Compliance With The New Zealand Building Code

- 3.1** Past history of use of the Purlin System, product testing and analysis of Purlins by the University of Sydney indicate that provided the system design, installation, use and maintenance is in line with the guidelines of the Structural Systems Manual and the standards referenced therein, and provided the steel components remain dry and free from contamination, Purlin Systems can reasonably be expected to meet or contribute to meeting the following performance criteria outlined in the New Zealand Building Code:
- B1 Structure:** Performance clauses B1.3.1, B1.3.2, B1.3.3 (a) (b) (f) (g) (h), B1.3.4 (b) (d). AS/NZS 4600:1996 used as a basis for design tables in the Structural Systems Manual Section 1.3, refer to Design Instructions 5.1-5.4.
 - B2 Durability:** Performance clause B2.3.1(a). Refer to Durability & Maintenance Requirements 4.1-4.4.
 - F2 Hazardous Building Materials:** Performance clause F2.3.1.
- 3.2** Relevant Standards:
- | | |
|------------------|---|
| AS/NZS 1170 | Structural Design Actions |
| AS/NZS 1365 | Tolerances for Flat-rolled Steel Products |
| AS/NZS 4600:1996 | Cold-formed Steel Structures |
| AS 1397 | Continuous Hot-dip Metallic Coated Steel Sheet and Strip - Coatings of Zinc and Zinc Alloyed with Aluminium and Magnesium |
| SNZ TS 3404:2018 | Durability Requirements for Steel Structures and Components |
- 3.3** Where products used with DHS Purlins are manufactured by other suppliers, compliance to the New Zealand Building Code is required to be sought from that product's manufacturer.

Durability & Maintenance Requirements

- 4.1 Use of Dimond Purlins is limited to dry and non-corrosive environments, unless further suitable protection of the surfaces is provided. It is the responsibility of the structural engineer to assess the durability requirements and specify accordingly.
- 4.2 Dimond Purlins may require additional protection from suitable protective coatings applied in-situ if exposure to moisture, marine deposits, or chemicals is expected.
- 4.3 Dimond Purlins require maintenance to ensure the surfaces remain in sound condition and moisture contamination is prevented. This requires surfaces to be kept clean and free from defects that could give rise to material degradation over time.
- 4.4 Refer to appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
Environments and Limitations on Use	1.1.3
Durability	1.1.5
Maintenance	1.1.6

Design Instructions

- 5.1 Dimond Purlins are intended to be designed by suitably qualified structural engineers experienced in the design of structural building systems, to provide PS1 certification.
- 5.2 It is critical to product performance that the materials selected, the loads applied, spans, spacings, purlin bracing type and layout are designed within the appropriate loads in AS/NZS 1170, load-span performance in AS/NZS 4600 and limitations published in the Structural Systems Manual and the following standards referenced therein.
- 5.3 The information within the Structural Systems Manual is only applicable to Dimond Purlins. It cannot be assumed to apply to similar products from other manufacturers.
- 5.4 Refer to appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
Design Basis	1.3.1
Design Considerations	1.3.2
Section Properties	1.3.3 & 1.3.5
Load Span Tables	1.3.4 & 1.3.6

Installation and Construction Instructions

- 6.1 Installation of Dimond Purlins is generally carried out by experienced steel fabricators and riggers who are familiar with installation of roof Purlins. Dimond Purlins are not intended to be installed by builders, handymen, homeowners etc. without appropriate experience.
- 6.2 Before commencing a project using Dimond Purlins, the installer and builder must refer to the appropriate sections of the Structural Systems Manual, ensuring relevant information (e.g. any limitations on use) is available to the end user. Failure to observe this information may result in a significant reduction in product performance. Dimond accepts no liability whatsoever for products that are used otherwise than in accordance with these recommendations.
- 6.3 Installation including safety considerations, handling and storage, general fixing and workmanship and bracing system installation is to be carried out in accordance with the Structural Systems Manual Section 1.4.
- 6.4 Consideration of the expected loads during construction that are relevant to the specific design project must be given at the design stage to ensure construction can proceed in a safe manner, and contractors are aware of any constraints.
- 6.5 Refer to the appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
Installation	1.4
Components	1.4.4
General Construction Details	1.4.4.8

Dimond Resilient Channel

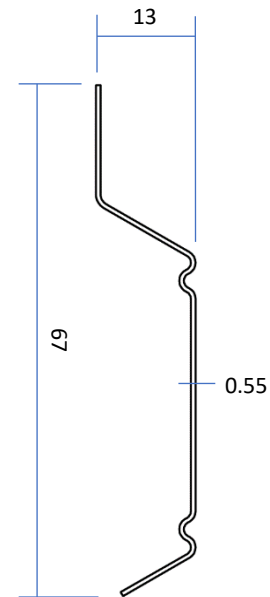
Place of Manufacture

Dimond Resilient Channels are manufactured in Auckland.

Product Description

- 1.1 Resilient Channel is a galvanised steel sheet that is roll-formed into a rail shape profile with formed swages and holes, for use as a batten in internal dry wall systems.
- 1.2 Resilient Channel is available in 0.55mm metal thickness (BMT).
- 1.3 Resilient Channel is manufactured from Steel Grade G250 galvanised coil in Z275, i.e. 275g/m² total zinc coating weight.
- 1.4 Refer to table and diagrams below for section sizes and shape:

Resilient Channel Section	Depth (mm)	Width (mm)	Thickness BMT (mm)	Mass (kg/m)
67 x 13 x 0.55	67	13	0.55	0.37



Scope of Use

- 2.1 Resilient Channel is intended for use as a component in internal dry wall systems, screw fastened to framing to which wall linings are attached.

Compliance With The New Zealand Building Code

- 3.1 Past history of use of Resilient Channel and manufacture to appropriate standards indicate that provided the system design, installation, use and maintenance is in line with the guidelines of this statement, and provided the steel components remain dry and free from contamination, Resilient Channel can contribute to meeting the following performance criteria outlined in the New Zealand Building Code:
 - **B1 Structure:** Performance clauses B1.3.1, B1.3.2, B1.3.3 (a) (b) (h), B1.3.4 (b). Roll-formed from feed coil manufactured to the requirements of AS/NZS 1365 and AS 1397. Refer Design and Installation Requirements 5.1-5.2.
 - **B2 Durability:** Performance clause B2.3.1(a).
 - **F2 Hazardous Building Materials:** Performance clause F2.3.1.
- 3.2 Relevant Standards:
 - AS/NZS 1170 Structural Design Actions
 - AS/NZS 1365 Tolerances for Flat-rolled Steel Products
 - AS 1397 Continuous Hot-dip Metallic Coated Steel Sheet and Strip - Coatings of Zinc and Zinc Alloyed with Aluminium and Magnesium
- 3.3 Where products used with Resilient Channel are manufactured by other suppliers, compliance of those products to the New Zealand Building Code is required to be sought from that product's manufacturer.

Limitations on Use

- 4.1 The use of Resilient Channel is limited to dry and non-corrosive internal environments free from contamination, unless further suitable protection of the surfaces is provided. It is the responsibility of the designer to assess the durability requirements and specify accordingly.

Design and Installation Requirements

- 5.1 Resilient Channel is intended to be designed and specified by suitably qualified designers and acoustics practitioners experienced in the design of internal dry wall building systems to meet the performance criteria set out in the New Zealand Building Code.
- 5.2 Installation of Resilient Channel is generally carried out by commercial builders and dry wall installers who are familiar with installation requirements and practices in New Zealand. Resilient Channel is not intended to be installed by handymen, homeowners etc. without appropriate experience.



TOP NOTCH PURLINS

Dimond Top Hat Purlin System

Place of Manufacture

Top Hats are manufactured in Auckland.

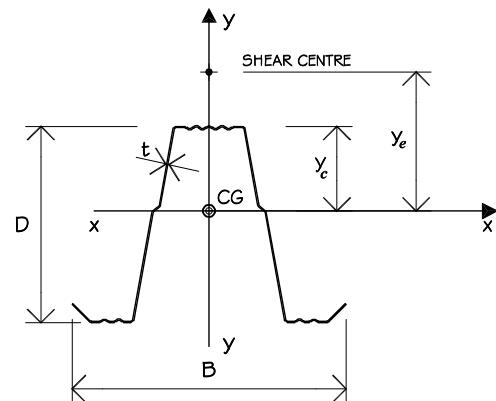
Structural Systems Manual

www.dimondstructural.co.nz/products/top-hat-purlins

Product Description

- 1.1 The Top Hat Purlin System (Top Notch Purlins) is a galvanised steel sheet that is roll-formed into a top hat shape profile with formed swages, for use as structural support to roofing and wall cladding.
- 1.2 The system includes Dimond Top Hat Purlins and Top Hat Support Straps.
- 1.3 Top Hat Purlins are available in 0.75mm, 0.95mm, 1.15mm and 1.55mm base metal thickness (BMT).
- 1.4 Top Hat Purlins are manufactured from Steel Grade G500 and G550 galvanised coil in Z275, i.e. 275g/m² total zinc coating weight. Z450 (450g/m² total zinc coating weight) requires a three-month lead time from date of order, subject to availability. Top Hat Support Straps are manufactured from Steel Grade G300 53mm x 0.90mm BMT galvanised strip, in Z275 zinc coating.
- 1.5 Refer to table and diagram below for section sizes and shape:

Top Hat Section	Depth D (mm)	Width B (mm)	Thickness T (mm)	Area A (mm ²)	Mass per unit length (kg/m)	Centre of Gravity y_c (mm)	Shear Centre y_e (mm)
60x75	60	127	0.75	170.41	1.34	32.5	43.08
60x95	60	127	0.95	215.43	1.69	32.6	42.7
100x75	100	155	0.75	238.31	1.87	53.7	70.3
100x95	100	155	0.95	301.57	2.37	53.8	69.81
120x75	120	162	0.75	268.52	2.11	63.9	85.42
120x95	150	162	0.95	339.59	2.67	94	85.33
150x75	150	173	0.75	314.18	2.47	79.1	108.03
150x95	150	173	0.95	397.73	3.12	79.2	107.68
150x115	150	170	1.15	475.89	3.74	78.4	108.86
150x155	150	170	1.55	641.89	5.04	78.3	108.46



Scope of Use

- 2.1 Top Hat Purlins are intended for use as structural support to roofing and wall cladding. The systems provide for screw fastened connections to structural framework, suitable for use on spans and spacings within the limitations of the Structural Systems Manual, typically used for lightweight commercial building applications (e.g. farm sheds) where small spans are required.
- 2.2 Use of Top Hat Purlins must be within the limitations on environment and use given in the Top Hat Purlin System Manual Section 2.1.

Compliance With The New Zealand Building Code

- 3.1 Past history of use of the Top Hat Purlin system and analysis of Top Hat Purlins indicate that provided the system design, installation, use and maintenance is in line with the guidelines of the Top Hat System Manual and the standards referenced therein, and provided the steel components remain dry and free from contamination, Top Hat Purlins can reasonably be expected to meet or contribute to meeting the following performance criteria outlined in the New Zealand Building Code:
 - **B1 Structure:** Performance clauses B1.3.1, B1.3.2, B1.3.3 (a) (b) (f) (g) (h), B1.3.4 (b) (d). AS/NZS 4600:1996 used as a basis for design tables in the Dimond Top Hat Purlin System Manual Section 2.2, refer to Design Instructions 5.1-5.4.
 - **B2 Durability:** Performance clause B2.3.1(a). Refer to Durability & Maintenance Requirements 4.1-4.4.
 - **F2 Hazardous Building Materials:** Performance clause F2.3.1.

3.2 Relevant Standards:

AS/NZS 1170	Structural Design Actions
AS/NZS 1365	Tolerances for Flat-rolled Steel Products
AS/NZS 4600:1996	Cold-formed Steel Structures
AS 1397	Continuous Hot-dip Metallic Coated Steel Sheet and Strip - Coatings of Zinc and Zinc Alloyed with Aluminium and Magnesium
SNZ TS 3404:2018	Durability Requirements for Steel Structures and Components

3.3 Where products used with Top Hat Purlins are manufactured by other suppliers, compliance to the New Zealand Building Code is required to be sought from that product's manufacturer.

Durability & Maintenance Requirements

- 4.1 The use of Top Hat Purlins is limited to dry and non-corrosive environments, unless further suitable protection of the surfaces is provided. It is the responsibility of the structural engineer to assess the durability requirements and specify accordingly.
- 4.2 Top Hat Purlins may require additional protection from suitable protective coatings applied in-situ if exposure to moisture, marine deposits, or chemicals is expected.
- 4.3 Top Hat Purlins require maintenance to ensure the surfaces remain in sound condition and moisture contamination is prevented. This requires surfaces to be kept clean and free from defects that could give rise to material degradation over time.
- 4.4 Refer to appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
Environments and Limitations on Use	2.1.3
Durability	2.1.5
Maintenance	2.1.6

Design Instructions

- 5.1 Top Hat Purlins are intended to be designed by suitably qualified structural engineers experienced in the design of structural building systems, to provide PS1 certification.
- 5.2 It is critical to product performance that the materials selected, the loads applied, spans and spacings are designed within the appropriate loads in AS/NZS 1170, load-span performance in AS/NZS 4600 and limitations published in the Top Hat Systems Manual and the following standards referenced therein.
- 5.3 The information within the Top Hat System Manual is only applicable to Dimond Top Hat Purlins. It cannot be assumed to apply to similar products from other manufacturers.
- 5.4 Refer to appropriate sections of the Dimond Top Hat System Manual:

Top Hat System Manual	Section Number
Design Basis	2.2.1
Design Considerations	2.2.2
Section Properties	2.2.3
Load Span Tables	2.2.4

Installation and Construction Instructions

- 6.1 Installation of Top Hat Purlins is generally carried out by experienced steel fabricators, riggers and commercial shed builders who are familiar with installation of Top Hat Purlin Systems. Top Hat Purlins are not intended to be installed by builders, handymen, homeowners etc. without appropriate experience.
- 6.2 Before commencing a project using Top Hat Purlins, the installer and builder must refer to the appropriate sections of the Top Hat System Manual, ensuring relevant information (e.g. any limitations on use) is available to the end user. Failure to observe this information may result in a significant reduction in product performance. Dimond accepts no liability whatsoever for products that are used otherwise than in accordance with these recommendations.
- 6.3 Installation including safety considerations, handling and storage, general fixing and workmanship is to be carried out in accordance with the Dimond Top Hat Purlin System Manual Section 2.3.
- 6.4 Consideration of the expected loads during construction that are relevant to the specific design project must be given at the design stage to ensure construction can proceed in a safe manner, and contractors are aware of any constraints.
- 6.5 Refer to the appropriate sections of the Dimond Top Hat System Manual:

Top Hat System Manual	Section Number
Installation	2.3
Components	2.3.3
General Construction Details	2.3.3 & 2.3.4



Dimond Flatdeck Flooring System

Place of Manufacture

Flatdeck steel sheets are manufactured in Auckland .

Structural Systems Manual

<https://www.dimondstructural.co.nz/structural-design-manual#flooring>

Product Description

- 1.1 The Flatdeck Flooring System (Flatdeck Flooring) is a galvanised steel sheet that is roll-formed into a metal decking profile with embossments capable of combining effectively with concrete placed in-situ to form a composite, one-way reinforced concrete floor slab.
- 1.2 Flatdeck Flooring is available in 0.75mm and 0.95mm base metal thickness (BMT). Flatdeck Flooring includes components, refer Structural Systems Manual Section 3.5.11.
- 1.3 Flatdeck Flooring is manufactured from Steel Grade G550 galvanised coil in Z275, i.e. 275g/m² total galvanised zinc coating weight. Components are manufactured from Steel Grade G250 (1.15mm BMT), in Z275 zinc coating.
- 1.4 Refer to table and diagram below for section sizes and shape:

Flatdeck Formwork Properties	0.75mm	0.95mm
Design Strength, f_y (MPa)	550	550
Base Metal Thickness (mm)	0.75	0.95
Self Weight (kN/m ²)	0.094	0.118
Gross Cross Sectional Area (mm ² /m)	1180	1495
Neutral Axis, y_{sh} (mm)	14.1	14.1

All dimensions (mm) are nominal

Scope of Use

- 2.1 Flatdeck Flooring provides both permanent formwork during construction and tensile reinforcement for concrete floor slabs in-service, spanning in the direction of the Flatdeck profile ribs.
- 2.2 Flatdeck Flooring is suitable for used on unpropped spans within the limitations of the Structural Systems Manual, for buildings where minimising slab thickness is preferred over the avoidance of temporary propping. It can also be used on extended spans with the use of structurally suitable props installed during Flatdeck Flooring installation and kept in place for concrete placement and cure during construction.
- 2.3 Flatdeck Flooring is typically installed,
 - a. over steel beams, concrete block walls, poured concrete beams, or timber constructions, subject to the construction limitations and fixing guidelines provided in the Structural Systems Manual.
 - b. with additional reinforcement provided by steel mesh or bars designed and specified by the structural engineer for crack control, transverse reinforcement, negative reinforcement, or where additional reinforcement is required for point or line loads, around penetrations, or to achieve a required fire rating.
 - c. using welded steel studs to provide connectivity to supporting steel beams sufficient to achieve composite beam action.
- 2.4 Use of Flatdeck Flooring must be within the limitations on environment and use given in the Structural Systems Manual Section 3.1.

Compliance With The New Zealand Building Code

3.1 Past history of use of Dimond Flooring systems, structural analysis of the Flatdeck profile and composite floor slab, and acoustic opinions by Marshall Day Acoustics indicate that provided the system design, installation, use and maintenance is in line with the guidelines of the Structural Systems Manual and the standards referenced therein, and provided the steel components remain dry and free from contamination, Flatdeck Flooring can reasonably be expected to meet or contribute to meeting the following performance criteria outlined in the New Zealand Building Code:

- **B1 Structure:** Performance clauses B1.3.1, B1.3.2, B1.3.3 (a) (b) (f) (h) (q), B1.3.4 (b) (d). AS/NZS 4600:1996, AS 3600:2001, BS 5950 Part 4:1994 and BS 5950 Part 6:1995 used as a basis for design tables in the Structural Systems Manual Sections 3.5.4 and 3.5.5, refer to Design Instructions 4.1-4.4.
- **B2 Durability:** Performance clauses B2.3.1(a). Refer to Durability & Maintenance Requirements 5.1-5.4.
- **C3 Fire Affecting Areas Beyond The Fire Source:** Performance clauses C3.4 (a), C3.6. HERA Reports R4-82 and R4-131 (3rd edition) used as a basis for fire design tables in the Structural Systems Manual Section 3.5.6, refer Design Instructions 4.1-4.4.
- **G6 Airborne and Impact Sound:** Performance clause G6.3. Specific design required using guidance in the Structural Systems Manual Section 3.5.7, refer to Design Instructions 4.1-4.4.
- **F2 Hazardous Building Materials:** Performance clause F2.3.1.

3.2 Relevant Standards:

AS/NZS 1170	Structural Design Actions
AS/NZS 1365	Tolerances for Flat-rolled Steel Products
AS/NZS 2327	Composite Structures - Composite Steel-Concrete Construction in Buildings
AS/NZS 4600:1996	Cold-formed Steel Structures
AS 1397	Continuous Hot-dip Metallic Coated Steel Sheet and Strip - Coatings of Zinc and Zinc Alloyed with Aluminium and Magnesium
AS 3600:2001	Concrete Structures
BS 5950 Part 4:1994	Structural Use of Steelwork in Building, Part 4. Code of Practice for Design of Composite Slabs with Profiled Steel Sheeting
BS 5950 Part 6:1995	Structural Use of Steelwork in Building, Part 6. Code of Practice for Design of Light Gauge Profiled Steel Sheeting
SNZ TS 3404:2018	Durability Requirements for Steel Structures and Components

3.3 Where products used with Flatdeck Flooring is manufactured by other suppliers, compliance to the New Zealand Building Code is required to be sought from that product's manufacturer.

Design Instructions

- 4.1** Flatdeck Flooring is intended to be designed by suitably qualified structural engineers and acoustics practitioners experienced in the design of structural building systems, to provide PS1 certification.
- 4.2** It is critical to product performance that the materials selected, the loads applied, spans, additional reinforcement, and overall slab thickness are designed within the appropriate Limit State Loads in AS/NZS 1170, formwork and composite slab load-span performance in AS/NZS 2327 and limitations published in the Structural Systems Manual and the following standards referenced therein.
- 4.3** The information within the Structural Systems Manual is only applicable to Dimond Flatdeck Flooring. It cannot be assumed to apply to similar products from other manufacturers.
- 4.4** Refer to appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
General Design Considerations	3.2.1 - 2
Design Basis	3.5.1
Design Considerations	3.5.2
Section Properties	3.5.3
Load Span Tables	3.5.4 - 5
Fire Design Tables	3.5.6
Acoustic Performance	3.5.7

HIBOND 55



Dimond Hibond 55 Flooring System

Place of Manufacture

Hibond55 steel sheets are manufactured in Christchurch .

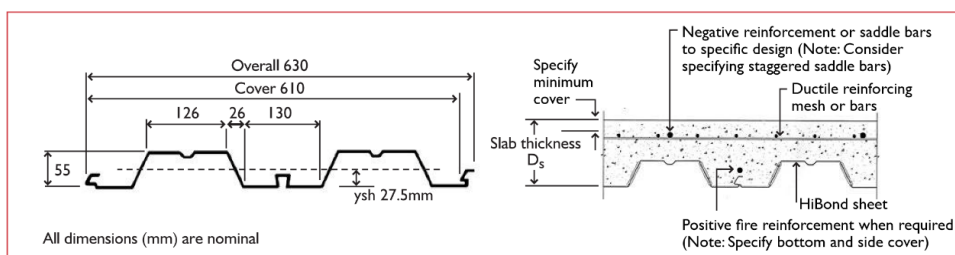
Structural Systems Manual

<https://www.dimondstructural.co.nz/structural-design-manual#flooring>

Product Description

- 1.1 The Hibond 55 Flooring System (Hibond 55 Flooring) is a galvanised steel sheet that is roll-formed into a metal decking profile with embossments capable of combining effectively with concrete placed in-situ to form a composite, one-way reinforced concrete floor slab.
- 1.2 Hibond 55 Flooring is available in 0.75mm and 0.95mm base metal thickness (BMT). Hibond 55 Flooring includes components, refer Structural Systems Manual Section 3.4.11.
- 1.3 Hibond 55 Flooring is manufactured from Steel Grade G550 galvanised coil in Z275, i.e. 275g/m² total galvanised zinc coating weight. Components are manufactured from Steel Grade G250 (0.55mm and 1.15mm BMT), in Z275 zinc coating.
- 1.4 Refer to table and diagram below for section sizes and shape:

Hibond 55 Formwork Properties	0.75mm	0.95mm
Design Strength, f_y (MPa)	550	520
Base Metal Thickness (mm)	0.75	0.95
Self Weight (kN/m ²)	0.085	0.108
Gross Cross Sectional Area (mm ² /m)	1058	1340
Neutral Axis, y_{sh} (mm)	27.5	27.5



Scope of Use

- 2.1 Hibond 55 Flooring provides both permanent formwork during construction and tensile reinforcement for concrete floor slabs in-service, spanning in the direction of the Hibond 55 profile ribs.
- 2.2 Hibond 55 Flooring is suitable for use on unpropped spans within the limitations of the Structural Systems Manual, for buildings where weight saving is preferred over the avoidance of temporary propping. It can also be used on extended spans with the use of structurally suitable props installed during Hibond 55 Flooring installation and kept in place for concrete placement and cure during construction.
- 2.3 Hibond 55 Flooring is typically installed,
 - a. over steel beams, concrete block walls, poured concrete beams, or timber constructions, subject to the construction limitations and fixing guidelines provided in the Structural Systems Manual.
 - b. with additional reinforcement provided by steel mesh or bars designed and specified by the structural engineer for crack control, transverse reinforcement, negative reinforcement, or where additional reinforcement is required for point or line loads, around penetrations, or to achieve a required fire rating.
 - c. using welded steel studs to provide connectivity to supporting steel beams sufficient to achieve composite beam action.
- 2.4 Use of Hibond 55 Flooring must be within the limitations on environment and use given in the Structural Systems Manual Section 3.1.

Compliance With The New Zealand Building Code

3.1 Past history of use of Dimond Flooring systems, product testing and analysis of the Hibond 55 profile and composite floor slab, and acoustic opinions by Marshall Day Acoustics indicate that provided the system design, installation, use and maintenance is in line with the guidelines of the Structural Systems Manual and the standards referenced therein, and provided the steel components remain dry and free from contamination, Hibond 55 Flooring can reasonably be expected to meet or contribute to meeting the following performance criteria outlined in the New Zealand Building Code:

- **B1 Structure:** Performance clauses B1.3.1, B1.3.2, B1.3.3 (a) (b) (f) (h) (q), B1.3.4 (b) (d). BS 5950 Part 4:1994 and BS 5950 Part 6:1995 used as a basis for design tables in the Structural Systems Manual Sections 3.4.4 and 3.4.5, refer to Design Instructions 4.1-4.4.
- **B2 Durability:** Performance clauses B2.3.1(a). Refer to Durability & Maintenance Requirements 4.1-4.4.
- **C3 Fire Affecting Areas Beyond The Fire Source:** Performance clauses C3.4 (a), C3.6. HERA Report R4-82 used as a basis for fire design tables in the Structural Systems Manual Section 3.4.6, refer to Design Instructions 5.1-5.4.
- **G6 Airborne and Impact Sound:** Performance clause G6.3. Specific design required using guidance in the Structural Systems Manual Section 3.4.7, refer to Design Instructions 4.1-4.4.
- **F2 Hazardous Building Materials:** Performance clause F2.3.1.

3.2 Relevant Standards:

AS/NZS 1170	Structural Design Actions
AS/NZS 1365	Tolerances for Flat-rolled Steel Products
AS/NZS 2327	Composite Structures - Composite Steel-Concrete Construction in Buildings
AS 1397	Continuous Hot-dip Metallic Coated Steel Sheet and Strip - Coatings of Zinc and Zinc Alloyed with Aluminium and Magnesium
BS 5950 Part 4:1994	Structural Use of Steelwork in Building, Part 4. Code of Practice for Design of Composite Slabs with Profiled Steel Sheeting
BS 5950 Part 6:1995	Structural Use of Steelwork in Building, Part 6. Code of Practice for Design of Light Gauge Profiled Steel Sheeting
SNZ TS 3404:2018	Durability Requirements for Steel Structures and Components

3.3 Where products used with Hibond 55 Flooring is manufactured by other suppliers, compliance to the New Zealand Building Code is required to be sought from that product's manufacturer.

Design Instructions

- 4.1** Hibond 55 Flooring is intended to be designed by suitably qualified structural engineers and acoustics practitioners experienced in the design of structural building systems, to provide PS1 certification.
- 4.2** It is critical to product performance that the materials selected, the loads applied, spans, additional reinforcement, and overall slab thickness are designed within the appropriate Limit State Loads in AS/NZS 1170, formwork and composite slab load-span performance in AS/NZS 2327 and limitations published in the Structural Systems Manual and the following standards referenced therein.
- 4.3** The information within the Structural Systems Manual is only applicable to Dimond Hibond 55 Flooring. It cannot be assumed to apply to similar products from other manufacturers.
- 4.4** Refer to appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
General Design Considerations	3.2.1 - 2
Design Basis	3.4.1
Design Considerations	3.4.2
Section Properties	3.4.3
Load Span Tables	3.4.4 - 5
Fire Design Tables	3.4.6
Acoustic Performance	3.4.7

HIBOND 80



Dimond Hibond 80 Flooring System

Place of Manufacture

Hibond80 steel sheets are manufactured in Auckland.

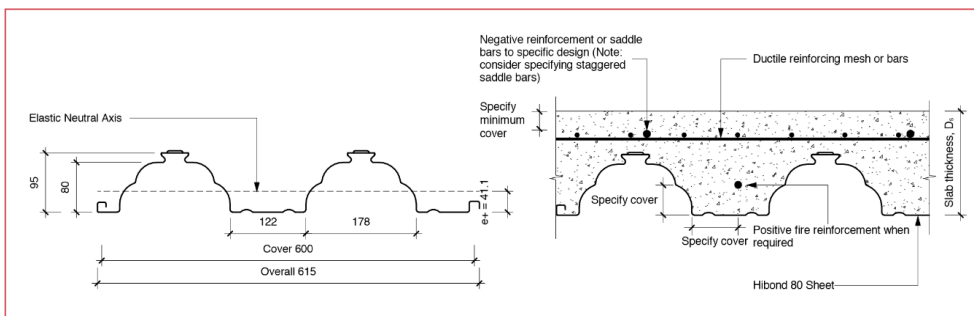
Structural Systems Manual

<https://www.dimondstructural.co.nz/structural-design-manual#flooring>

Product Description

- 1.1 The Hibond 80 Flooring System (Hibond 80 Flooring) is a galvanised steel sheet that is roll-formed into a metal decking profile with embossments capable of combining effectively with concrete placed in-situ to form a composite, one-way reinforced concrete floor slab.
- 1.2 Hibond 80 Flooring is available in 0.75mm, 0.95mm, 1.05mm and 1.15mm base metal thickness (BMT). Hibond 80 Flooring includes components, refer Structural Systems Manual Section 3.3.9.
- 1.3 Hibond 80 Flooring is manufactured from Steel Grade G500 and G550 galvanised coil in Z275, i.e. 275g/m² total galvanised zinc coating weight. Components are manufactured from Steel Grade G250 (0.55mm and 1.15mm BMT), in Z275 zinc coating.
- 1.4 Refer to table and diagram below for section sizes and shape:

Hibond 80 Formwork Properties	0.75mm	0.95mm	1.05mm	1.15mm
Design Strength, f_y (MPa)	550	550	500	500
Base Metal Thickness (mm)	0.75	0.95	1.05	1.15
Self Weight (kN/m ²)	0.093	0.117	0.129	0.141
Gross Cross Sectional Area (mm ² /m)	1155	1463	1617	1771
Elastic Neutral Axis, e_x (mm)	41.1	41.1	41.1	41.1



Scope of Use

- 2.1 Hibond 80 Flooring provides both permanent formwork during construction and tensile reinforcement for concrete floor slabs in-service, spanning in the direction of the Hibond 80 profile ribs.
- 2.2 Hibond 80 Flooring is suitable for use on unpropped spans within the limitations of the Structural Systems Manual, for multi-level buildings when avoidance of temporary propping is preferred. It can also be used on extended spans with the use of structurally suitable props installed during Hibond 80 Flooring installation and kept in place for concrete placement and cure during construction.
- 2.3 Hibond 80 Flooring is typically installed,
 - a. over steel beams, concrete block walls, poured concrete beams, or timber constructions, subject to the construction limitations and fixing guidelines provided in the Structural Systems Manual.
 - b. with additional reinforcement provided by steel mesh or bars designed and specified by the structural engineer for crack control, transverse reinforcement, negative reinforcement, or where additional reinforcement is required for point or line loads, around penetrations, or to achieve a required fire rating.
 - c. using welded steel studs to provide connectivity to supporting steel beams sufficient to achieve composite beam action.
- 2.4 Use of Hibond 80 Flooring must be within the limitations on environment and use given in the Structural Systems Manual Section 3.1.

Compliance With The New Zealand Building Code

- 3.1** Past history of use of Dimond Flooring systems, product testing and analysis of the Hibond 80 profile and composite floor slab by the Heavy Engineering Research Association (HERA) and acoustic opinions by Marshall Day Acoustics indicate that provided the system design, installation, use and maintenance is in line with the guidelines of the Structural Systems Manual and the standards referenced therein, and provided the steel components remain dry and free from contamination, Hibond 80 Flooring can reasonably be expected to meet or contribute to meeting the following performance criteria outlined in the New Zealand Building Code:
- **B1 Structure:** Performance clauses B1.3.1, B1.3.2, B1.3.3 (a) (b) (f) (h) (q), B1.3.4 (b) (d). EN 1993-1-3 and EN 1994-1-1 used as a basis for design tables in the Structural Systems Manual Section 3.3.4, refer to Design Instructions 4.1-4.5.
 - **B2 Durability:** Performance clauses B2.3.1(a). Refer to Durability & Maintenance Requirements 5.1-5.4.
 - **C3 Fire Affecting Areas Beyond The Fire Source:** Performance clauses C3.4 (a), C3.6. Tested to EN 1365-2 as a basis for fire design tables in the Structural Systems Manual Section 3.3.4, refer to Design Instructions 4.1-4.5.
 - **G6 Airborne and Impact Sound:** Performance clause G6.3. Specific design required using guidance in the Structural Systems Manual Section 3.3.5, refer to Design Instructions 4.1-4.5.
 - **F2 Hazardous Building Materials:** Performance clause F2.3.1.
- 3.2** Relevant Standards:
- | | |
|------------------|--|
| AS/NZS 1170 | Structural Design Actions |
| AS/NZS 1365 | Tolerances for Flat-rolled Steel Products |
| AS/NZS 2327 | Composite Structures - Composite Steel-Concrete Construction in Buildings |
| AS 1397 | Continuous Hot-dip Metallic Coated Steel Sheet and Strip - Coatings of Zinc and Zinc Alloyed with Aluminium and Magnesium |
| EN 1365-2 | Fire Resistance Tests for Loadbearing Elements - Part 2: Floors and Roofs |
| EN 1993-1-3 | Eurocode 3 - Design of Steel Structures - Part 1-3: General Rules - Supplementary rules for Cold-formed Members and Sheeting |
| EN 1994-1-1 | Eurocode 4 - Design of Composite Steel and Concrete Structures - Part 1-1: General Rules and Rules for Buildings |
| SNZ TS 3404:2018 | Durability Requirements for Steel Structures and Components |
- 3.3** Where products used with Hibond 80 Flooring is manufactured by other suppliers, compliance to the New Zealand Building Code is required to be sought from that product's manufacturer.

Design Instructions

- 4.1** Hibond 80 Flooring is intended to be designed by suitably qualified structural engineers and acoustics practitioners experienced in the design of structural building systems, to provide PS1 certification.
- 4.2** It is critical to product performance that the materials selected, the loads applied, spans, additional reinforcement, and overall slab thickness are designed within the appropriate Limit State Loads in AS/NZS 1170, formwork and composite slab load-span performance in AS/NZS 2327 and limitations published in the Structural Systems Manual and the following standards referenced therein.
- 4.3** The information within the Structural Systems Manual is only applicable to the Dimond Hibond 80 Flooring. It cannot be assumed to apply to similar products from other manufacturers.
- 4.4** Hibond 80 Composite Floor Design Software is available to structural design engineers for use in Hibond 80 flooring design. This is available for download from the Dimond Structural website: <https://www.dimondstructural.co.nz/software>
- 4.5** Refer to appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
General Design Considerations	3.2.1 - 2
Design Basis	3.3.1
Design Considerations	3.3.2
Section Properties	3.3.3
Load Span Tables	3.3.4
Acoustic Performance	3.3.5

Dimond Flooring System - Durability & Maintenance Requirements

- 5.1 The use of Dimond Flooring is limited to dry and non-corrosive environments, unless further suitable protection of the surfaces is provided. It is the responsibility of the structural engineer to assess the durability requirements and specify accordingly.
- 5.2 Dimond Flooring may require additional protection from suitable protective coatings applied in-situ if exposure to moisture, marine deposits or chemicals is expected,
- the top concrete surface may require additional crack control and/or waterproofing
 - the underside metal surface may require additional protection from suitable protective coatings applied in-situ.
- 5.3 Dimond Flooring requires maintenance to ensure the surfaces remain in sound condition and moisture ingress and contamination is prevented. This requires surfaces to be kept clean and free from defects and contaminants that could give rise to material degradation over time.
- 5.4 Refer to appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
Environments and Limitations on Use	3.1.3
Durability (Surface & Underside Treatment)	3.1.5
Maintenance	3.1.6

Dimond Flooring System - Installation and Construction Instructions

- 6.1 Before commencing a project using Dimond Flooring, the installer and builder must refer to the appropriate sections of the Structural Systems Manual, ensuring relevant information (e.g. any limitations on use) is available to the end user. Failure to observe this information may result in a significant reduction in product performance. Dimond accepts no liability whatsoever for products that are used otherwise than in accordance with these recommendations.
- 6.2 The construction sequence and delivery, installation and placement of Dimond flooring sheets, reinforcement and concrete component should comply with AS/NZS 2327 (Clause 1.3 and Appendix A). Installation is also to be carried out in accordance with the Structural Systems Manual Section 3.6.
- 6.3 Consideration of the expected loads and propping requirements during construction that are relevant to the specific design project must be given at the design stage to ensure construction can proceed in a safe manner, and contractors are aware of any constraints. Further information on construction practice is documented in Steel Construction Institute publication P300.
- 6.4 Refer to the appropriate sections of the Structural Systems Manual:

Structural Systems Manual	Section Number
Installation	3.6
Components	3.3.9
General Construction Details	3.3.10

Warnings & Bans

Not subject to a warning or ban under section 26 of the Building Act 2004.

General Disclaimer

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Contact us

For on-line technical information
visit **www.dimondstructural.co.nz**

Dimond Structural Technical Enquiries:
structuraltech@dimond.co.nz

For Design Advice, Technical Assistance, System Specification Help

Dimond Structural Sales Enquiries:
structuralenquiries@dimond.co.nz
0800 Dimond (0800 346 663)

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