

Petima Pty Ltd
 Factory 52B, 37-39 East Street
 Daylesford VIC 3460

RE: SPA and Tridek SIPs Structural Assessment Report

This office is engaged to provide a Structural Assessment Report for Structural Panels Australia on their SPA and Tridek SIPs for use in building construction.

This office is engaged to carry out the desktop structural specifications assessment on the principal properties of the products based on the desktop computations only. Our assessment is based on the information provided by Petima PTY LTD as below only.

Details of manufacturer:

Petima PTY LTD as trustee for Petima Unit Trust
 trading as Structural Panels Australia and Tridek Roofing ABN 709 4776 8595
 Address: Factory 52B 37-39 East Street (via Mink Street) Daylesford VIC 3460 Australia

Brand and product names:

Structural Insulated Panels (SIPs) under the brand name **Structural Panels Australia**, with two different skin types.

The Oriented Strand Board (OSB) skin products are called **SPA SIPs** and the steel skin products are called **Tridek SIPs**.

SPA SIPs are factory-assembled, engineered-wood faced, structural insulated panels (SIPs) with a foam core of Expanded Polystyrene (EPS) or Polyurethane (PUR) of various thicknesses, acoustic ratings and thermal conductivity grades. The structural integrity of the building is achieved through the Oriented Strand Board (OSB) panel skin. The panels are held together by OSB splines / timber splines / timber studs / box splines / bottom & top timber plates. Panel skins are 11mm thick OSB sheets, Grade OSB 3 or equivalent.

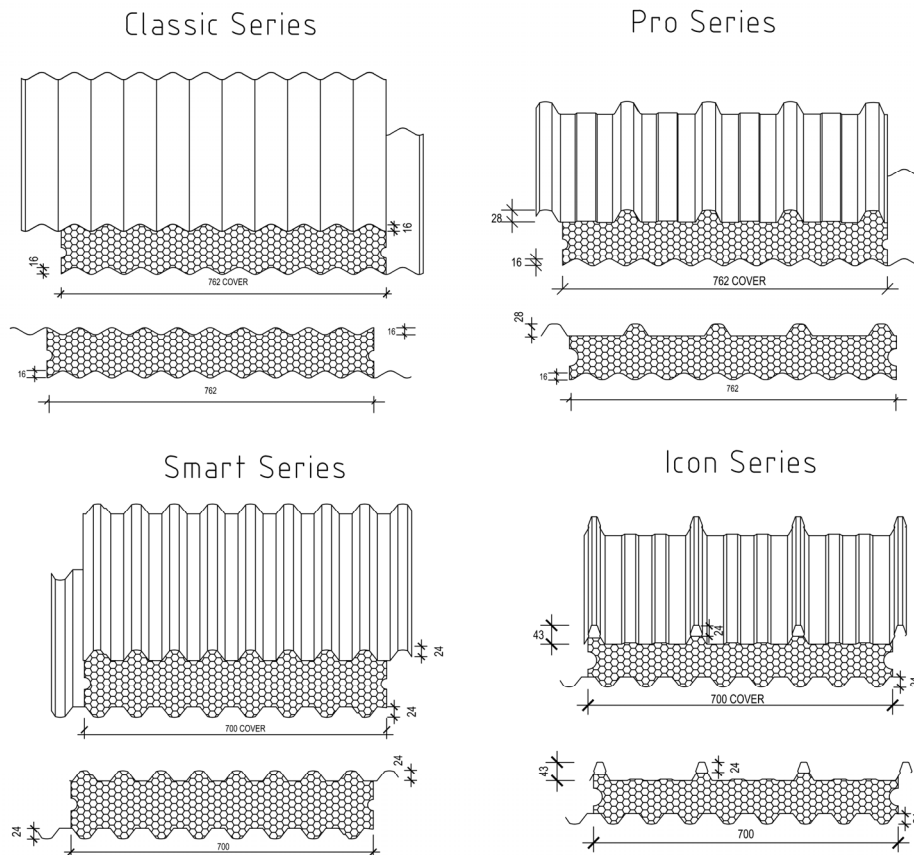
SPA SIPs Properties

Panel Thickness (mm)	EPS Core thickness (mm)	Av mm ²	I	S	Ft	Fc	Fv	E	G	SIP EI
115	93	104	59.7	1038.4	3.4	4.27	0.0448	0.0023	0.0011	0.14
145	123	134	99	1365.2	3.4	4.27	0.0448	0.0023	0.0011	0.23
165	143	154	130.7	1583.8	3.41	4.27	0.0448	0.0023	0.0011	0.3
215	193	204	229.1	2131.3	3.41	4.27	0.0448	0.0023	0.0011	0.53
265	243	254	355.1	2679.7	3.41	4.27	0.0448	0.0023	0.0011	0.82
315	293	304	508.5	3228.6	3.41	4.27	0.0448	0.0023	0.0011	1.17

Tridek SIPs are a simple composite sandwich panel.

Tridek SIPs are a simple composite sandwich panel. Tridek SIPs are factory-assembled structural insulated panels (SIPs), consisting of two steel sheets of minimum 550MPa yield strength, in four sheet profile variations, with a foam core of Expanded Polystyrene (EPS) board or Polyurethane (PUR) board of various thicknesses, acoustic ratings and thermal conductivity grades. Tridek SIPs are NOT held together by any additional structural elements.

Tridek Roof Profiles:



Ix/sheet 0.42BMT					Ix/m 0.6BMT			
thickness	Classic	Pro	Smart	Icon	Classic	Pro	Smart	Icon
100	1.04	0.625	1.04	0.625	1.3684	0.8224	1.3684	0.8224
125	1.85	1.25	1.85	1.25	2.4342	1.6447	2.4342	1.6447
140	2.48	1.81	2.48	1.81	3.2632	2.3816	3.2632	2.3816
165	3.63	2.72	3.63	2.72	4.7763	3.5789	4.7763	3.5789
200	5.69	4.62	5.69	4.62	7.4868	6.0789	7.4868	6.0789
250	9.45	8.27	9.45	8.27	12.434	10.882	12.434	10.882
300	14.2	13	14.2	13	18.684	17.105	18.684	17.105

Assessment Items

The items have been checked are as listed below:

- Roof framing and cladding: Tridek SIPs
- Wall framing: SPA SIPs (EPS/XPS/PUR core)
- Roof framing and cladding: SPA SIPs (EPS/XPS/PUR core)

For CLASS 1 and 10 BUILDING of 1.5 kPa Floor LIVE LOAD:

- Floor framing and flooring: SPA SIPs with SIP/box splines
- Floor framing and flooring: SPA SIPs with MGP10 timber splines
- Floor framing and flooring: SPA SIPs with LVL timber splines
- Wind loads for N1, N2, N3, N4, N5 and N6

For CLASS 2 to 9 BUILDING of 2.0kPa to 3.0kPa Floor LIVE LOAD:

- Floor framing and flooring: SPA SIPs with LVL timber splines of 2.0kPa LIVE LOAD
- Floor framing and flooring: SPA SIPs with LVL timber splines of 3.0kPa LIVE LOAD

Assessment Criteria

The following criteria have been adopted for structural checking:

- A. SPA and Tridek SIPs can be used in single and multi-storey residential buildings as well as light commercial structures. They can be used in the framing, cladding and combined framing/cladding of walls, roofs.
SPA SIPs can also be used in framing, flooring and in/with combined framing/flooring of floors.
- B. The SPA and Tridek SIPs System is capable of:
- Supporting permanent and imposed loads in with AS1170.1,
 - Withstanding wind loads in accordance with AS1170.2 and AS4055 for non-cyclonic areas only
 - NOT Supporting snow and ice actions in accordance with AS1170.3 and:
 - Earthquake loads in Accordance with AS1170.4.
- C. The SPA and Tridek SIPs shall comply with NCC 2019 Building Code of Australia - Volume One
- BP1.1(a)
 - BP1.1(b)(i) to (iV)
 - BP1.2(a) to (d)
 - B1.0(a) to (b)
 - B1.1(a) to (b)
 - B1.2(a) to (b)
 - B1.2(c) (i) to (ii)
 - B1.4(f)
- D. The SPA and Tridek SIPs shall comply with below clauses of part 2.1 Structure and part 3.11 Structural Design Manuals of NCC 2019 Building Code of Australia - Volume Two.
- 2.1.1 P2.1 (a)

- 2.1.1 P2.1 (b) (i) and (ii)
 - 2.1.1 P2.1 (b) (iii)
 - 2.1.1 P2.1 (b) (iv) for non-cyclonic areas only
 - 2.1.1 P2.1 (c) for non-cyclonic areas only
 - 3.0.1 (a)(b)&(c)
 - 3.0.2 (a)&(b)
 - 3.0.3 (a)&(b)
 - 3.0.3 (c)(i)
 - 3.0.3 (c)(ii) for non-cyclonic areas only
 - 3.0.3 (c)(iv)
- E. A table is used to determine the serviceability for the various applications. This table is based on TABLE C1 - Suggested Serviceability Limit State Criteria, of Australian Standard AS/NZS 1170.0:2002 - Structural design actions -General principles
- The SPA and Tridek SIPs have been assessed under loads and load combinations, as nominated below:
 - Dead Loads, self weight of structure
 - Dead Loads of finish
 - Live Loads in accordance with the section C3 of AS/NZS 1170.1-2002
 - Wind Loads in accordance with AS/NZS 1170.2-2011 and Table 3.3 of AS 4055-2012 for non-cyclonic areas only
 - Earthquake Loads in accordance with Appendix A - Domestic Structures (Housing) of AS1170.4-2007
 - Stability Limit State Design has been checked in accordance with the requirements of Load Combinations on AS/NZS 1170.0:2002 Section 4.2.1
 - Strength Limit State Design has been checked in accordance with the requirements of Load Combinations on AS/NZS 1170.0:2002 Section 4.2.2
 - Serviceability Limit State Design has been checked in accordance with the requirements of Load Combinations on AS/NZS 1170.0:2002 Section 4.3
 - Load Combinations have been checked in accordance with the requirements of Load Combinations on AS/NZS 1170.0 Section 4
- F. Relevant Australian Standards:
- AS/NZS 1170.0-2002 Structural design actions Part 0: General principles
 - AS/NZS 1170.1-2002 Structural design actions Part 1: Permanent, imposed and other actions
 - AS/NZS 1170.2-2011 Structural design actions Part 2: Wind
 - AS1170.4-2007 Structural design action Part 4: Earthquake actions in Australia
 - AS4055-:2012 Wind loads for housing
 - AS1720.1-2010 Timber structures Part 1: Design methods
 - AS1684.2-2010 Residential timber-framed construction Part 2: Non-Cyclonic Areas
 - AS1684.4-2010 Residential timber-framed construction Part 4: Simplified Non-Cyclonic Areas
- G. Concentrated Loads
Axial loads shall be applied to additional framing members that shall be designed by a qualified engineer in accordance with NCC and relevant Australian Standards.
- H. Eccentric and Side Loads

In this assessment, an eccentricity of 1/6 of the panel thickness is assumed. Supported members shall have full bearing on the supporting SIP wall panels. Loads shall not be applied eccentrically or through framing attached to one side of the panel (such as face mounting) except where additional engineering documentation is provided. Wind loads applied to the external wall have been converted from transverse loads into eccentricity of the axial loads.

I. Openings

Openings in panels are not part of this assessment. Additional lintels and supporting studs shall be designed by a qualified engineer in accordance with NCC and relevant Australian Standards.

Assessment Results

After computations we found that the above listed Assessment Items are structurally sound in accordance with the following provisions of Building Regulations 2018 (Victoria):

- NCC 2019 Building Code of Australia - Volume One
 - BP1.1(a)
 - BP1.1(b)(i) to (iv)
 - BP1.2(a) to (d)
 - B1.0(a) to (b)
 - B1.1(a) to (b)
 - B1.2(a) to (b)
 - B1.2(c) (i) to (ii)
 - B1.4(f)
- NCC 2019 Building Code of Australia - Volume Two
 - 2.1.1 P2.1 (a)
 - 2.1.1 P2.1 (b) (i) and (ii)
 - 2.1.1 P2.1 (b) (iii)
 - 2.1.1 P2.1 (b) (iv) for non-cyclonic areas only
 - 2.1.1 P2.1 (c) for non-cyclonic areas only
 - 3.0.1 (a)(b)&(c)
 - 3.0.2 (a)&(b)
 - 3.0.3 (a)&(b)
 - 3.0.3 (c)(i)
 - 3.0.3 (c)(ii) for non-cyclonic areas only
 - 3.0.3 (c)(iv)
- Relevant Australian Standards:
 - AS/NZS 1170.0-2002 Structural design actions Part 0: General principles
 - AS/NZS 1170.1-2002 Structural design actions Part 1: Permanent, imposed and other actions
 - AS/NZS 1170.2-2011 Structural design actions Part 2: Wind
 - AS1170.4-2007 Structural design action Part 4: Earthquake actions in Australia
 - AS4055-2012 Wind loads for housing
 - AS1720.1-2010 Timber structures Part 1: Design methods
 - AS1684.2-2010 Residential timber-framed construction Part 2: Non-Cyclonic Areas

- AS1684.4-2010 Residential timber-framed construction Part 4: Simplified Non-Cyclonic Areas

The loading capacity and span tables results are listed in SPA and Tridek SIPs Structural Assessment Report Appendix A to D, all dated 3 May 2021.

Assessment Report Appendix A
 Tridek SIPs Loading Capacity and Span Tables

- Roof framing and cladding: Tridek SIPs

Assessment Report Appendix B
SPA SIPs (EPS/XPS/PUR core) Wall and Roof Framing Loading Capacity and Span Tables

- Wall framing: SPA SIPs (EPS/XPS/PUR core)
- Roof framing and cladding: SPA SIPs (EPS/XPS/PUR core)

Assessment Report Appendix C
SPA SIPs (EPS/XPS/PUR core) Floor Loading Capacity and Span Tables
For CLASS 1 and 10 BUILDING of 1.5 kPa LIVE LOAD:

- Floor framing and flooring: SPA SIPs with SIP/box splines
- Floor framing and flooring: SPA SIPs with MGP10 timber splines
- Floor framing and flooring: SPA SIPs with LVL timber splines
- Wind loads for N1, N2, N3, N4, N5 and N6

Assessment Report Appendix D
SPA SIPs (XPS/PUR core) Floor Loading Capacity and Span Tables
For CLASS 2 to 9 BUILDING of 2.0kPa to 3.0kPa LIVE LOAD:

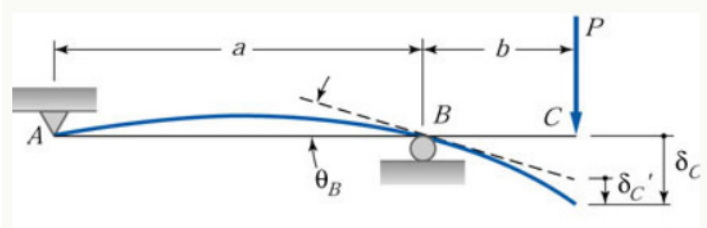
- Floor framing and flooring: SPA SIPs with LVL timber splines of 2.0kPa LIVE LOAD
- Floor framing and flooring: SPA SIPs with LVL timber splines of 3.0kPa LIVE LOAD

Other structural considerations

Cantilevers:

The above values are assessed under the strength capacity of the panels only, assuming deflection criteria is not critical.

Deflections of a cantilevered beam is complicated as illustrated below:



Load resisting width of the panel would need to be checked case by case depending on the layout and location of the load.

Where the deflection criteria is applicable, it should be checked by a competent structural engineer.

For a roof cantilevered eave, canopy, the wind pressure could be much higher than the overall roof area, which could be 3 times higher, depending on the high, chape, location of the cantilever, all cantilevered should be checked by a competent structural engineer.

Maximum Roof Cantilever (strength only) along the Width

SPA SIPs: 25% of the internal bay (back span) under uniformly distributed loads only.

Tridek SIPs: generally as the same thickness of the panel. (e.g. 250mm cantilevered for 250mm thick panel)

Maximum Roof Cantilever (strength only) along the Pitch

SPA SIPs: 25% of the back span under uniformly distributed loads only.

Tridek SIPs: 25% of the back span under uniformly distributed loads only.

Point loads and deflections of the cantilever, must be converted to equivalent UDL effects and checked by a competent structural engineer.

Penetrations

Within span/4 from the support:

Across the width of 300mm maximum penetration on each panel from the connection allowing for maximum 600mm x 600mm Skylight as per the 3rd attachment.

Within span/4 away from the support:

It may be up to the width of a panel sheet, but a load share factor should be applied to the span table.

load share factor = $(1500 + \text{penetration width}) / \text{penetration width}$
(all dimensions in mm)

For example:

For a 600mm wide penetration, $r = (1500 + 600) / 1500 = 1.4$,
with an original design loading of 1kPa.

Therefore, adopt the panel specification with an adjusted loading of $1.4 \times 1 = 1.4$ kPa from the span tables.

I am qualified structural engineer and I certify that the above listed Assessment Items, as detailed and listed above, comply with the above Assessment Criteria.

I believe above will satisfy your enquiries. Please feel free to contact us if you have further queries.

Disclaimer:

Combustible external wall cladding

The following external wall cladding products are prohibited from being used: expanded polystyrene (EPS) products used in an external insulation and finish (rendered) wall system. All EPS products application in the building must be checked and confirmed against the updated local laws.

The application of the product in such areas that are not described in this report, has not been checked by this office, therefore Metroeng Pty Ltd excludes all liability for any damages resulting from such application, including but not limited to the energy rating, insulation, fire resistance. Metroeng Pty Ltd does not provide any warranty in any way regarding the quality and/or non-structural properties of the Petima products.

However, this does not release the user to conduct own examinations and tests due to the number of factors that may affect processing and application of the product. Metroeng Pty Ltd excludes any liability for damages resulting from improper storage and use.

The product information and test reports were submitted and confirmed by Petima Pty Ltd. This office, however, is not obliged to monitor transmitted or stored third-party information. Metroeng Pty Ltd assumes no responsibility to verify the accuracy, adequacy, reliability, timeliness and completeness of the information provided by Petima Pty Ltd. This office has not inspected or monitored the manufacturing, handling, storage, transportation, process control, or the quality of the products.

Yours Faithfully,



Huade He
B.Eng, MIEAust, CPEng, NER, APEC Engineer, IntPE(Aus), EBE, RPEQ, BSP TAS
Endorsed Building Engineer No.: PE0003853
Principal Civil/Structural Engineer
For and on behalf of Metroeng Pty. Ltd.