



DeltaFireX™ Car Port System

Fire Engineering Report

Revision 1-4

Report Issue Authorisation

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SOTERA

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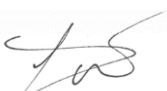





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1-0	21/10/2021	FER	Dirk van der Walt 	Dr Paul Clancy 

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1 Summary

1.1 General

SOTERA has been engaged to carry out fire engineering assessment of the proposed performance solution for the project:

Client:	Delta Panels Pty Ltd
Project Title:	DeltaFireX™ Panel Car Port System

This summary gives the proposed performance solution and BCA issues. The main body of the report provides the detailed documentary evidence justifying the performance solutions. To avoid errors in duplication material may not be repeated. The main body of the report must be read in conjunction with this summary.

1.2 Brief Description of Application

This fire engineering report is intended to assess the generic application of the DeltaFireX™ Panel Car Port System when used as a Class 10a structure (car port) attached or adjacent to a Class 1a building positioned within 900 mm of a site boundary pursuant to NCC 2022 Housing Provisions Standard & Volume 2.

1.3 Fire Safety Systems

(A) Performance solution systems:

1. This performance solution is solely applicable to the DeltaFireX™ car port system which may comprise either DeltaTrim-MW or DeltaOrb-MW sandwich panels with a core consisting of mineral wool (with a density of 100 kg/m³) - (refer to Section 3 describing the permitted system), non-combustible supporting structure and non-combustible plumbing fixtures (gutters and downpipes).
2. All components used in the awning construction shall be compliant with Section 3. The components shall not be modified except with the written authorisation of the manufacturer and SOTERA.
3. The following restrictions apply for the Class 10a awning installation:
 - (a) Two or more sides (making up at least one third of the awning perimeter) shall be “open” in accordance with NCC 9.2.8(b); that is the roof covering shall be more than 500 mm from another building or allotment boundary on at least two sides without enclosing these sides with a wall, privacy screen, vehicle access door or the like within 500mm of the edge of the roof covering. A boundary along a road or public space such as parklands, lakes, rivers and the like (where the construction of buildings is unlikely) may be considered open regardless of proximity to the boundary subject to no vertical obstruction (wall, privacy screen, vehicle access door or the like) within 500 mm of the edge of the roof covering.
 - (b) All components used in the awning construction shall be compliant with Section 3. The components shall not be modified except with the written authorisation of the manufacturer and SOTERA.
 - (c) The awning structure shall not provide direct vertical support to any part of the adjacent Class 1 building.
 - (d) The DeltaFireX™ car port shall consist solely of the following:
 - (i) DeltaTrim-MW or DeltaOrb-MW panels
 - (ii) Steel fixtures, gutters and the like
 - (iii) Steel columns, beams, purlins and the like

- (iv) Metallic flashing
- (e) As the DeltaTrim-MW and DeltaOrb-MW sandwich panels used in the DeltaFireX™ car port system constitutes bonded laminates, the following restrictions shall apply to the DeltaTrim-MW and DeltaOrb-MW sandwich panels:
 - (i) Each lamina shall be non-combustible. For clarity this includes low carbon steel (see AS1530.1 test in Section A.2) or mineral wool (see AS1530.1 test in Section A.1). As permitted under Section 3.3.2, low carbon steel from any manufacturer may be used and the steel may include a surface finish not exceeding 1 mm thickness with a spread of flame index no greater than 0.
 - (ii) Each adhesive layer may not exceed 1 mm in thickness and the total combined thickness of adhesive layers may not exceed 2 mm.
 - (iii) The spread of flame index and the smoke developed index of the bonded laminated material as a whole shall not exceed 0 and 3 respectively (refer to AS1530.3 test certificates given in Section Appendix B).

Unless detailed otherwise above, all other systems shall be in accordance with the DtS provisions.

1.4 Variations to DtS Provisions and Performance Requirements

Table 1-1 lists the variations to the DtS requirements and the performance requirements as agreed by stakeholders.

Table 1-1 Variations from BCA-DtS provisions and performance requirements.

DtS reference	Issue	Performance Requirements	IFEG Subsystems
9.2.8(c)&(d)	Use of an open carport with a sandwich panel roof system consisting solely of non-combustible lamina but using combustible adhesive between laminae.	H3P1(1)	A – Fire initiation and development and control B – Smoke development and spread and control

1.5 Details of Standards Referenced in Report

The details of any acts, regulations, codes or standards which this report may reference are given in Table 1-2.

Table 1-2. Details of Standards - informative.

Reference in this Report	Year Version	Title
NCC	NCC 2022	ABCB National Construction Code 2022 , Building Code of Australia – Housing Provisions Standard.
NCC	NCC 2022	ABCB National Construction Code 2022 Building Code of Australia – Volume 2.

2 Scope and Limitations

2.1 General

SOTERA has been engaged to carry out fire engineering assessment of the proposed performance solution for the project:

Client:	Delta Panels Pty Ltd
Project Title:	DeltaFireX™ Panel Car Port System

The following Fire Engineering Assessment has been conducted in order to address issues of variation from the Deemed-to-Satisfy (DtS) provisions of the National Construction Code 2022 Housing Provisions Standard & Volume 2 (ABCB 2022); hereafter referred to simply as the NCC. The fire engineering evaluation has been carried out in accordance with the methodologies defined in the International Fire Engineering Guidelines (IFEG 2005). This assessment considers the performance solution to show compliance with the performance requirements of the NCC. The evaluation methodology was based on direct compliance with performance requirements and/or equivalence to the deemed-to-satisfy provisions of the NCC as allowed under Part A2G1. This is supported by qualitative and quantitative evaluation analyses as allowed under Part A2G2 of the NCC.

2.2 Summary of Developments in Fire Engineering Report

Rev 1-4: This report has been updated to reflect the new version of the NCC, NCC 2022 which supersedes the outgoing NCC 2019 Amendment 1. The report is updated with regards to the applicable NCC 2022 clauses and performance requirements throughout.

Rev 1-3: Following further comments received from CertMark, the report has been updated to incorporate minor wording changes and to remove reference to the concession provided under NCC 3.7.1.1(e).

Rev 1-2: This report has been updated following comment received from CertMark on 23/03/2022.

Main updates include:

- Reference to the AS1530.1 test for low carbon steel has been added to Section 2.4.
- Section 3.3.2 has been updated to reference the AS1530.1 test for low carbon steel given in Section A.2 and extrapolate these results to any low carbon steel.
- Section 4.4 has been updated to clarify that low carbon steel is permissible for use as a lamina in the DeltaFireX™ car port system with reference to the AS1530.1 test for low carbon steel given in Section A.2.
- Section 1.3 has been updated accordingly.
- Section 4.7 has been updated to clarify that the top and bottom skins are not deemed combustible.

Rev 1-1: Following review by the client, the following changes have been made:

- Bottom skin thickness has been changed from 0.60 mm to 0.55 mm throughout, consistent with fire test data given in Section B.5. Specifications given in Appendix C have been updated.
- Top skin thickness has been changed from 0.5 mm to 0.42 mm throughout consistent with fire test data given in Section B.3.
- The “DeltaFireX” brochure has been retitled “DeltaFireXRoof” throughout.

Rev 1-0: This report aims to inform stakeholders to facilitate agreement on performance solutions. Information and agreement is sought on matters including: critical building and occupant characteristics, proposed details of performance solutions, DtS variations, issues, hazards, design fires and scenarios, methodologies and acceptability criteria.

2.3 Scope of Project.

The assessment relates to the final state of the building. This assessment and report does not address any issues of variation from deemed-to-satisfy requirements and occupant safety that may arise as a result of partial completion and partial occupation of the building. Analysis of intentional fire incidents such as arson is not contemplated as part of this assessment.

This assessment will address the issues of variation from deemed-to-satisfy provisions of the BCA, which are identified in the summary of this report (Section 1). The assessment is concerned primarily with the life safety of occupants. The fire safety systems to achieve this are outlined in the report in principle. The assessment does not consider property protection, business continuity issues, environmental protection and insurance requirements unless specifically identified within this report.

This assessment only addresses the specific issues identified in the context that the remainder of the building is fully compliant with the deemed-to-satisfy provisions of the NCC.

2.4 Supporting Information

The fire engineering assessment described in this report is based on the following information:

- i) Branz Fire Assessment Report FC10893-001: Assessment of Delta Panels Pty Ltd DeltaCool wall and DeltaTrim and DeltaOrb roofing systems for compliance with BAL-29 and BAL-40 Ratings of AS3959-2009.
- ii) CSIRO Certificate of Test: AS1530.1-1994 fire test certificate for Mineral Wool / Rockwool, Report No. FNC12604.
- iii) CSIRO Certificate of Test: AS1530.1-1994 combustibility test for low carbon steel manufactured by Bluescope Australia No. FNC12440.
- iv) AWTA Product Testing: AS1530.3-1999 Test Report for DeltaOrb-MW, Test Number 21-003529.
- v) AWTA Product Testing: AS1530.3-1999 Test Report for DeltaTrim-MW, Test Number 21-003527.
- vi) CSIRO Certificate of Test: AS1530.3-1999 fire test certificate for Bluescope ZINCALUME Steel, Report No. FNE11602.
- vii) CSIRO Certificate of Test: AS1530.3-1999 fire test certificate for UniCote pre-painted steel sheeting, Report No. FNE11809A.
- viii) AWTA Product Testing: AS1530.3-1999 Test Report for Uni Zinc Rigid Panel, Test Number 20-000776.
- ix) AWTA Product Testing: AS1530.3-1999 Test Report for MagnaFlow Coated Steel Panel, Test Number 19-002186.
- x) DeltaFireXRoof car port system brochure V15.10.21.
- xi) DeltaTrim-MW Specifications (from <https://www.deltapanel.com.au/downloads-delta-panels> accessed 19/10/2021).
- xii) DeltaOrb-MW Specifications (from <https://www.deltapanel.com.au/downloads-delta-panels> accessed 19/10/2021).
- xiii) Architectural drawings referenced in Table 2-1.

Table 2-1. List of drawings relied upon.

Drawn by:	Delta Panels Pty Ltd	
Drawing No	Title	Revision
PATIO ON BOUNDARY MW_1	-	A

2.5 Stakeholders

This report may be relied on by the following stakeholders:

Client:	Delta Panels Pty Ltd 731 Boundary Rd, Richlands QLD 4076 John Guy Phone: 07 3271 2170 Email: johnguy@deltapanel.com
Certifying Authority:	CertMark International PO Box 7144, Sippy Downs QLD 4556 Tallisa Ireland Phone: 07 5445 2199 Email: talissa@CertMark.org
Fire Engineer:	SOTERA Pty Ltd 225 Wickham Terrace, Spring Hill, QLD 4000 Dirk van der Walt Phone: 07 5562 0022 Email: dirk.vanderwalt@sotera.com.au

This report should not be relied on by other parties without the consent of the Client and SOTERA.

2.6 Limitations

The scope of this report is limited to the performance solutions described in the summary of this report; Section 1. The general scope of the report is based on the agreed fee proposals dated 9th February 2021 and subsequent acceptance of the scope from the client.

This report has been developed generally in accordance with standards, guidelines, practices and review procedures generally accepted in the building design and construction, and fire engineering communities.

The fire engineering assessment and the subsequent recommendations reflect the reasonable and practical efforts of SOTERA. The extent to which the fire safety requirements are implemented will affect the probability of achieving adequate fire safety margins. It is important to note, however, that SOTERA cannot guarantee that fire ignition and fire damage will not occur.

This report is an assessment specifically of the performance issues highlighted in Table 1-1 in the summary of this report.

3 DeltaFireX™ Car Port System

3.1 Description of Application

This fire engineering report documents the assessment of the DeltaFireX™ car port system when used as a Class 10a structure (car port) attached or adjacent to a Class 1a building positioned directly adjacent to the site boundary pursuant to NCC 2022 Housing Provisions Standard & Volume 2 and installed to the requirements of Section 4.4.

3.2 Description of System

The DeltaFireX™ car port system comprises:

- a) A sandwich panel roof system (shown in Figure 3-1 to Figure 3-5) consisting of steel top and bottom skin with a non-combustible mineral wool (MW) core. Perimeter encapsulation consists of steel flashing.
- b) Non-combustible support structure.
- c) Non-combustible plumbing fixtures (gutters and downpipes).

The DeltaFireX™ car port system incorporates a sandwich panel roof system with a non-combustible MW core and steel outer facings with a top skin consisting of 0.42 mm G550 AZ150 steel, and a bottom skin consisting of 0.55 mm G300 Z275 steel – see Figure 3-1.

Delta Panels produce the DeltaFireX™ sandwich panel in two variations (see Figure 3-2), one with a trapezoidal upper facing (referred to as the DeltaTrim-MW system) and one with a corrugated upper facing (referred to as the DeltaOrb-MW system). The composition of the facing material for both the DeltaTrim-MW and DeltaOrb-MW systems are identical, it is only the profile of the upper facing that is varied. Based on the assessment provided in Section 3.3.2, the profile of the upper facing does not have any significant effect on the achieved fire performance of the DeltaOrb-MW and DeltaTrim-MW panels. As such, the DeltaOrb-MW and DeltaTrim-MW panels may be used interchangeably and the outcomes of this assessment remain applicable to both panel types.

Material specifications as given by Delta Panels is quoted in Table 3-1.

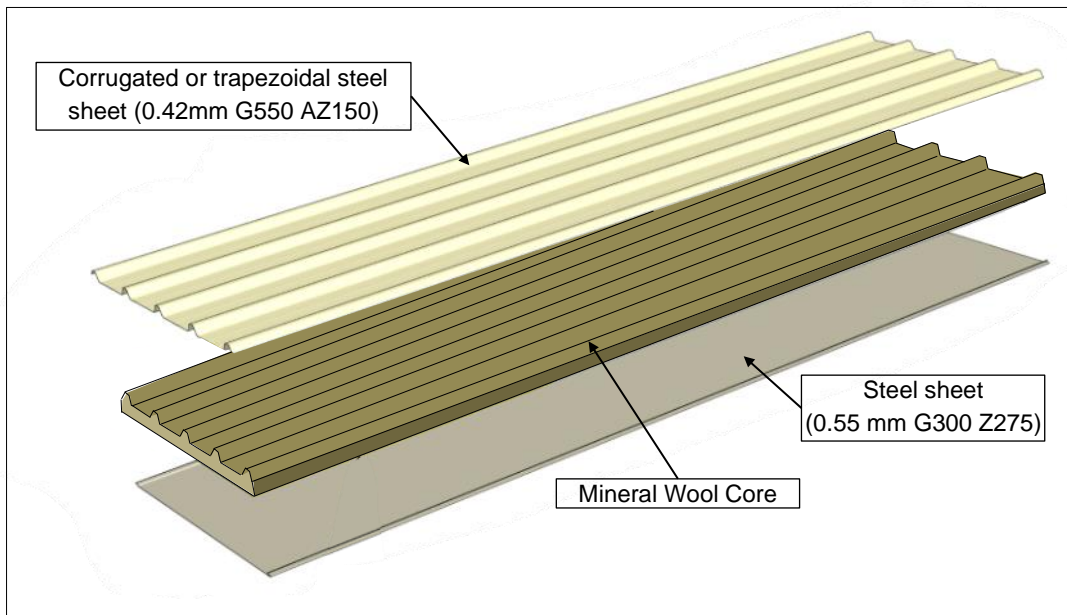


Figure 3-1. Blowout of a DeltaTrim-MW sandwich panel – similar for DeltaOrb-MW (from DeltaFireXRoof car port system brochure V15.10.21).

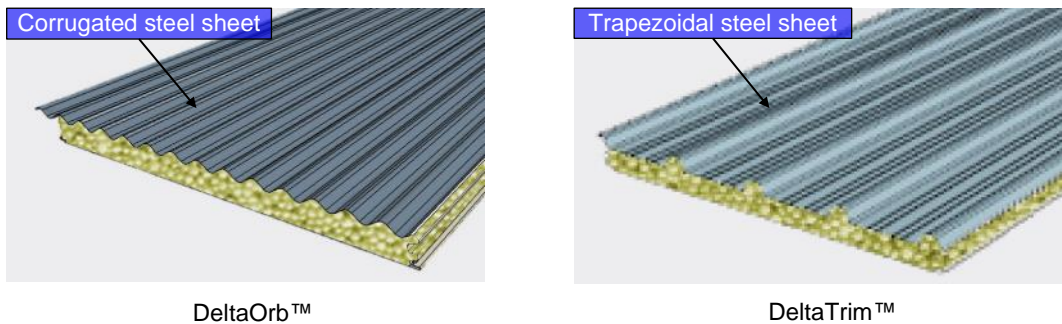


Figure 3-2. Illustration of DeltaOrb™ and DeltaTrim™ systems showing the difference in top skin (from DeltaFireXRoof car port system brochure V15.10.21).

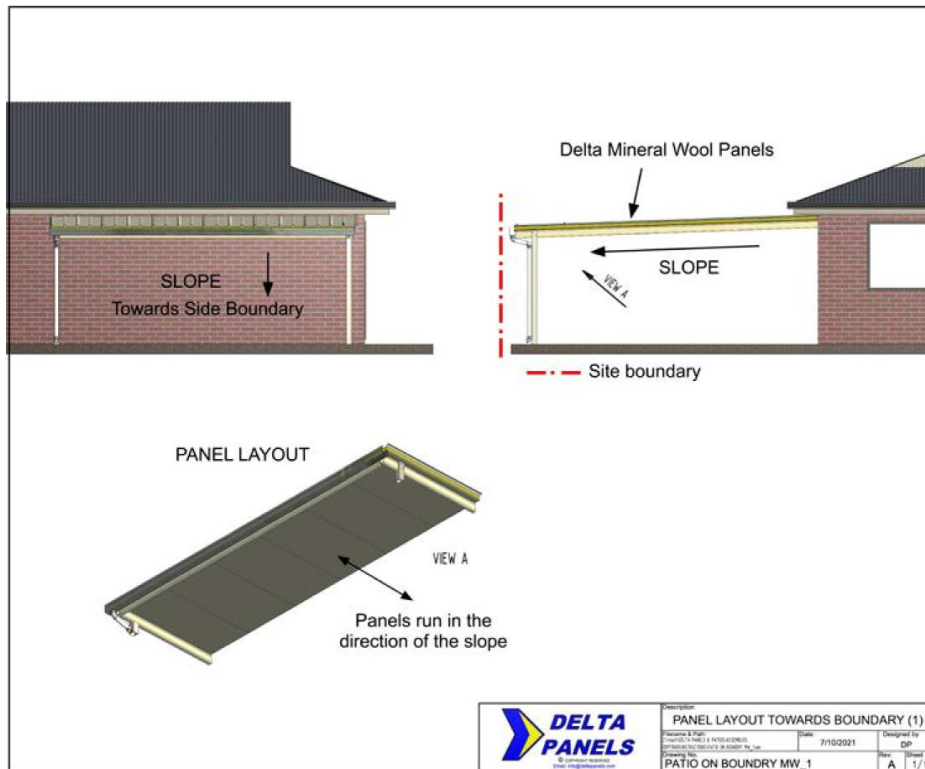


Figure 3-3. DeltaFireX™ system sloping towards the site boundary (from DeltaFireXRoof car port system brochure V15.10.21).

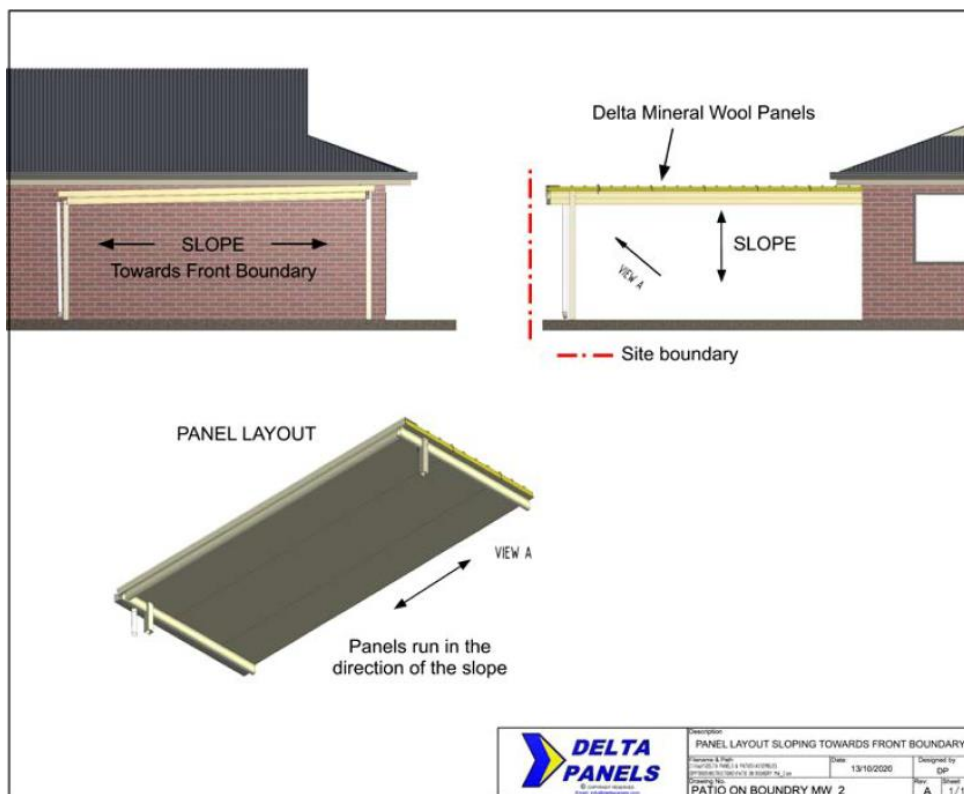


Figure 3-4. DeltaFireX™ system sloping parallel to the site boundary (from DeltaFireXRoof car port system brochure V15.10.21).

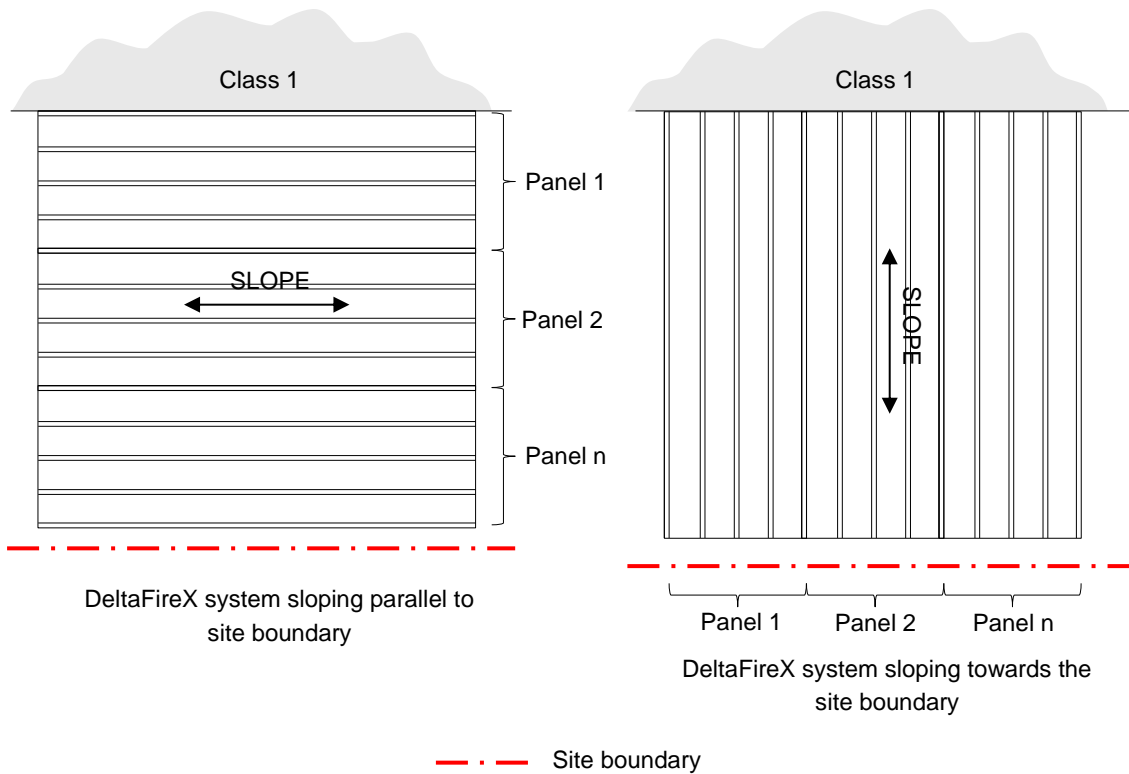


Figure 3-5. Sketch illustrating DeltaFireX™ slope and orientation to the site boundary.

Table 3-1. Manufacturers material specification (DeltaFireXRoof car port system brochure V15.10.21).

Steel skin detail	Top skin	0.42 mm / G550 AZ150
	Bottom skin	0.55 mm / G300 Z275
Core material	- Mineral wool (deemed non-combustible when tested in accordance with AS1530.1)	
Core density	100 kg/m ³	
Thermal conductivity	Min. 0.042 W/mK @ 23.0°C	
Panel weight (kg/m ²)	75 mm Panel	18.50
	100 mm Panel	21.00
	125 mm Panel	23.50
	150 mm Panel	26.00
R Value @ 22.5°C	75 mm Panel	2.50
	100 mm Panel	3.30
	125 mm Panel	4.20
	150 mm Panel	5.00
Sheet coverage	1000 mm	
Length (9mm)	Cut to Length – Min. 1800 mm	

Density	Average density for a 6 m panel is 30.8 kg/m ³
Length (mm)	Min. of 1800 mm (cut to length)
Thickness (mm)	75, 100, 125, 150

Table 3-2. DeltaOrb™ fixing details (crest fixing only, one fixing every second crest).

Panel Thickness	Fixing into steel
75	Tek 14 x 135 Hex Head Screw
100	Tek 14 x 150 Hex Head Screw
125	Tek 14 x 175 Hex Head Screw
150	Tek 14 x 200 Hex Head Screw

*Use cyclone plate and neo washer on each fixing. Upon installation the overlap needs to be stitch screwed or riveted every 300mm

Table 3-3. DeltaTrim™ fixing details (crest fixing only, one fixing every second crest).

Panel Thickness	Fixing into steel
75	Tek 14 x 150 Hex Head Screw
100	Tek 14 x 175 Hex Head Screw
125	Tek 14 x 200 Hex Head Screw
150	Tek 14 x 230 Hex Head Screw

*Use cyclone plate and neo washer on each fixing. Upon installation the overlap needs to be stitch screwed or riveted every 300mm

3.3 Fire Test Certificates

3.3.1 Summary of Relevant Fire Test Certificates

Relevant fire test certificates referenced within this assessment are given in Table 3-4.

Three test methods are referenced, AS1530.1, AS1530.3 and AS3959.

AS1530.1 specifies a test method for the determination of combustibility of a building material (this test method is material specific, each component of a system is tested separately). This test identifies whether a material is deemed combustible or not.

AS1530.3 sets out a test method for the assessment of building materials and components according to their tendency to ignite, propagate flame, release smoke and release heat following ignition. (This test is not material specific, components may be tested as a system). This test assesses each of these characteristics during the incipient stage of fire, providing an index rating to indicate the severity of each of these characteristics.

AS3959 specifies requirements for the construction of buildings in bushfire-prone areas in order to improve their resistance to bushfire attack from burning embers, radiant heat, flame contact and combination of the three attack forms.

Table 3-4. Applicable fire test certificates.

Mineral Wool (MW)			
Test	Report	Test Specimen	Relevant Performance
1. AS1530.1:1994	CSIRO Report No. FNC12604 (refer to Section A.1)	Mineral Wool, 50 mm thickness, 100 kg/m ³	Not deemed combustible
2. AS1530.3:1999	AWTA Test No. 21-003527 (refer to Section B.2)	Pre-painted steel skins (DeltaTrim™) bonded to an MW core.	Indices: Ignitability: 0 Spread of Flame: 0 Heat Evolved: 0 Smoke Developed: 3
3. AS1530.3:1999	AWTA Test No. 21-003529 (refer to Section B.1)	Pre-painted steel skins (DeltaOrb™)	Indices: Ignitability: 0

			bonded to an MW core.	Spread of Flame: 0 Heat Evolved: 0 Smoke Developed: 3
Coated Steel Facings				
Test	Report	Test Specimen	Relevant Performance	
4.	AS1530.3:1999	CSIRO Report No. FNE11602 (refer to Section B.3)	BlueScope ZINCALUME Steel (0.42 mm nominal thickness)	Indices: Ignitability: 0 Spread of Flame: 0 Heat Evolved: 0 Smoke Developed: 2
5.	AS1530.3:1999	AWTA Test No. 19-002186 (refer to Section B.4)	MagnaFlow Coated Steel Panel (nominal mass per unit density 7850 kg/m ³)	Indices: Ignitability: 0 Spread of Flame: 0 Heat Evolved: 0 Smoke Developed: 3
6.	AS1530.3:1999	CSIRO Report No. FNE11809A (refer to Section B.5)	UniCote steel (0.55 mm nominal thickness)	Indices: Ignitability: 0 Spread of Flame: 0 Heat Evolved: 0 Smoke Developed: 2
7.	AS1530.3:1999	AWTA Test No. 20-000776 (refer to Section B.6)	UniZinc (low carbon steel) Rigid Panel (< 1 mm nominal thickness)	Indices: Ignitability: 0 Spread of Flame: 0 Heat Evolved: 0 Smoke Developed: 0-1

3.3.2 Extrapolation of Fire Test Results

All relevant fire testing referenced within this report are given in Table 3-4 with a summary of the fire performance achieved in each case.

A number of coated steel and steel-alloy sheet metals have been tested to AS1530.3:1999 both independently and as part of a sandwich panel. When tested independently (tests 4 to 7 in Table 3-4), the test results obtained for each AS1530.3 index (Ignitability, Spread of Flame, Heat Evolved and Smoke Developed) are almost identical with only a small variance in the Smoke Developed Index. In all cases, the AS1530.3 results are within the following value range:

- Ignitability Index: 0 (Range 0-20)
- Spread of Flame Index: 0 (Range 0-10)
- Heat Evolved Index: 0 (Range 0-10)
- Smoke Developed Index: 0-3 (Range 0-10)

When the AS1530.3 test is repeated with the steel facings bonded either side of a material deemed not combustible under AS1530.1, in this case mineral wool (tests 2 & 3 in Table 3-4), the results give a near identical outcome to tests 4 to 7 in Table 3-4, that is:

- Ignitability Index: 0 (Range 0-20)
- Spread of Flame Index: 0 (Range 0-10)
- Heat Evolved Index: 0 (Range 0-10)
- Smoke Developed Index: 2 (Range 0-10)

Based on these results and with reference to the tested facings and substrates, the tested indices are independent of the substrate to which the coated metallic facings are bonded. The results are indicative only of the fire performance of the coated metallic facings during the early stages of fire development, before involvement of the substrate. As such, the test results are independent of the thickness of the core material used (substrate) to which the coated metallic facings are bonded.

Furthermore, the AS1530.3 results in tests 2 and 3 (Table 3-4) indicate that the DeltaOrb™ system and the DeltaTrim™ system achieves identical early fire hazard performance. Based on these results, the differing profiles of the DeltaOrb™ and DeltaTrim™ systems do not appear to have any significant effect on the achieved fire performance of the panels. As such, the DeltaOrb™ and DeltaTrim™ panels may be used interchangeably and the outcomes of this assessment remain applicable to both panel types.

The AS1530.1 test provides determination of combustibility for each material independently. The mineral wool has been tested to AS1530.1 (test 1 in Table 3-4) and is deemed not combustible.

Low carbon steel is widely accepted as a non-combustible construction material. This is also confirmed by an AS1530.1 test for low carbon steel manufactured by Bluescope Australia (test 11 in Table 3-4) in which the test outcome demonstrates that the material (low carbon steel) is not deemed combustible. The NCC Volume 1 (although not applicable to NCC Housing Provisions Standard & Volume 2) further states “The following materials ... are non combustible and may be used wherever a non-combustible material is required: (b) Steel, including metallic coated steel”, which illudes to steel being considered a non-combustible construction material under the NCC (as is concrete and masonry). On this basis, low carbon steel is assumed to be non-combustible, regardless of who the manufacturer is or whether the manufacturer has tested the material to AS1530.1.

4 DeltaFireX™ Car Port System within 900 mm of a Site Boundary

4.1 Assessment Task Defined

4.1.1 Background

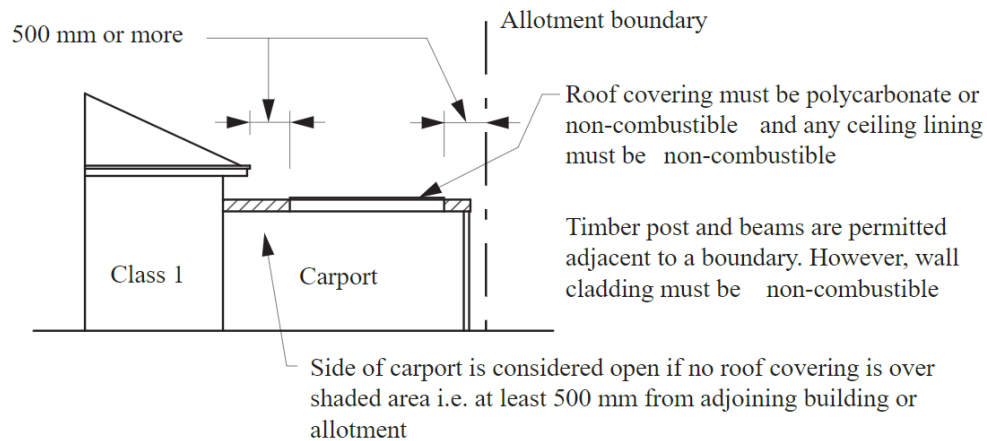
This performance solution assesses the use of the DeltaFireX™ roofing system when used as a car port attached to a Class 1 building and positioned less than 900 mm from the allotment boundary.

4.1.2 Issue

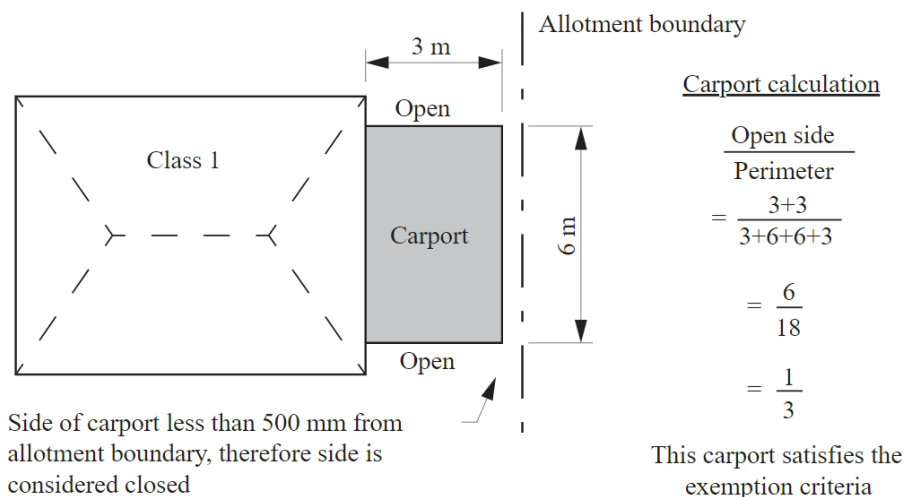
NCC 9.2.8 permits a Class 10a car port to be located within 900mm of the site boundary subject to compliance with the following:

- (a) The carport shall have two or more sides open and not less than one third of its perimeter open; and
- (b) For the purposes of (i), a side is considered to be open if the roof covering adjacent to that side is not less than 500 mm from another building or allotment boundary; and
- (c) The carport shall have a polycarbonate or non-combustible roof covering; and
- (d) Any ceiling lining and wall cladding, including gables, is non-combustible; and
- (e) The carport shall not provide direct support to any part of the Class 1 building; and
- (f) In the case where it has a common roof structure with the Class 1 building and the carport does not have a ceiling, the opening between the top of the wall of the Class 1 building and the underside of the roof covering is infilled with –
 - (i) A non-combustible material; or
 - (ii) Construction clad with non-combustible material on the car port side.

This assessment will identify whether the DeltaFireX™ roofing system constitutes a non-combustible roof covering (or provides equivalent performance) in accordance with NCC 9.2.8(c) & (d).



(a) Example A



(b) Example B

Figure 4-1. Identifying an open car port (NCC Figure 9.2.8a).

4.2 Hazards

4.2.1 Specific Hazards

The NCC Schedule 1 defines fire hazard as the danger in terms of potential harm and degree of exposure arising from the start and spread of fire and the smoke and gases that are thereby generated. As such, the BCA definition of a hazard relates to the potential for occupants to be exposed to heat and/or smoke.

The intent of NCC 9.2.8 is to reduce the risk of fire spread between Class 1 buildings on neighbouring allotments as per performance requirement H3P1(1). The hazard associated with the variations to NCC 9.2.8 is the potential for fire spread between buildings to expose occupants to heat and/or smoke.

Whether the DeltaFireX™ car port system when used within 900 mm of a site boundary presents an unacceptable risk of fire spread between buildings (which could significantly increase the hazard of building occupants becoming exposed to heat and/or smoke) must be assessed.

4.2.2 General Hazard

The following statistics indicating type and severity of domestic fires was obtained from Dowling and Ramsay (1997), Australian Bureau of Statistics: Home Fire Safety (2000), Fire Statistics UK (2002):

- 70% of fires are caused by the misuse of equipment including cooking appliances, candles, heaters, electrical appliances
- 20% of fires are due to arson
- 10% of fires are due to electrical faults
- 3% of fires start outside
- 2.2% of fires, which start inside, spread beyond the building of origin
- 76% of reported fires do not spread beyond the room of origin whether by good fortune or by occupant intervention
- 80% of fires are not reported to the fire brigade. They are extinguished by occupants while the fires are small
- 30% of fires start in kitchens, 10% in bedrooms i.e. approximately 3% per bedroom.

From the above statistics it is evident that only a small fraction of reported residential home fires start outside the building and an even smaller fraction of fires that start inside the building, spread beyond the building of fire origin. Unreported fires (which make up approximately 80% of all fires) are typically those that are extinguished, further reducing the number of fires that spread beyond the building of fire origin. Based on the statistics, as the building contains fire load of a relatively small scale, it is unlikely that a fire within the building will spread to the neighbouring building and as a result, the hazard of occupants being exposed to heat and/or smoke is low.

4.3 Performance to be Assessed

The performance solution must be assessed for whether it mitigates the identified hazards to performance requirement:

H3P1 – Spread of Fire:

- (1) A Class 1 building must be protected from the spread of fire such that the probability of a building not being able to withstand the design heat flux of 92.6 kW/m² for a period of 60 minutes shall not exceed 0.01, when located within 900 mm from the allotment boundary or within 1.8 m from another building on the same allotment from –
 - (i) Another building other than an associated Class 10 building; and
 - (ii) The allotment boundary, other than a boundary adjoining a road or public space.

4.4 Systems

The systems proposed are:

- This performance solution is solely applicable to the DeltaFireX™ car port system which may comprise either DeltaTrim-MW or DeltaOrb-MW sandwich panels with a core consisting of mineral wool (with a density of 100 kg/m³) - (refer to Section 3 describing the permitted system), non-combustible supporting structure and non-combustible plumbing fixtures (gutters and downpipes).
- All components used in the awning construction shall be compliant with Section 3. The components shall not be modified except with the written authorisation of the manufacturer and SOTERA.
- The following restrictions apply for the Class 10a awning installation:

- (a) Two or more sides (making up at least one third of the awning perimeter) shall be “open” in accordance with NCC 9.2.8 (b); that is the roof covering shall be more than 500 mm from another building or allotment boundary on at least two sides without enclosing these sides with a wall, privacy screen, vehicle access door or the like within 500mm of the edge of the roof covering. A boundary along a road or public space such as parklands, lakes, rivers and the like (where the construction of buildings is unlikely) may be considered open regardless of proximity to the boundary subject to no vertical obstruction (wall, privacy screen, vehicle access door or the like) within 500 mm of the edge of the roof covering.
- (b) All components used in the awning construction shall be compliant with Section 3. The components shall not be modified except with the written authorisation of the manufacturer and SOTERA.
- (c) The awning structure shall not provide direct vertical support to any part of the adjacent Class 1 building.
- (d) The DeltaFireX™ car port shall consist solely of the following:
 - (i) DeltaTrim-MW and DeltaOrb-MW panels
 - (ii) Steel fixtures, gutters and the like
 - (iii) Steel columns, beams, purlins and the like
 - (iv) Metallic flashing
- (e) As the DeltaTrim-MW and DeltaOrb-MW sandwich panels used in the DeltaFireX™ car port system constitutes bonded laminates, the following restrictions shall apply to the DeltaTrim-MW and DeltaOrb-MW sandwich panels:
 - (i) Each lamina shall be non-combustible. For clarity this includes low carbon steel (see AS1530.1 test in Section A.2) or mineral wool (see AS1530.1 test in Section A.1). As permitted under Section 3.3.2, low carbon steel from any manufacturer may be used and the steel may include a surface finish not exceeding 1 mm thickness with a spread of flame index no greater than 0.
 - (ii) Each adhesive layer may not exceed 1 mm in thickness and the total combined thickness of adhesive layers may not exceed 2 mm.
 - (iii) The spread of flame index and the smoke developed index of the bonded laminated material as a whole shall not exceed 0 and 3 respectively (refer to AS1530.3 test certificates given in Section Appendix B).

4.5 Methodology

The method of assessment is qualitative to justify the risk and mitigate the hazard as identified in Sections 4.2.1 and 4.2.2.

Performance requirements are addressed comparatively in accordance with BCA A2G2(1)(b) and A2G2(2)(d).

4.6 Acceptability Criteria

It shall be demonstrated that the DeltaFireX™ car port system is equivalent to a DtS open car port in accordance with NCC Clause 9.2.8.

4.7 Assessment

NCC H3D2 (1) permits that a bonded laminate, although combustible, may be used wherever a non-combustible materials is required subject to:

- i) Each lamina, including any core, is non-combustible; and
- ii) Each adhesive layer does not exceed 1 mm thickness and the total thickness of the adhesive layer does not exceed 2 mm; and
- iii) The Spread-of-Flame Index and Smoke-Developed Index of the bonded laminated material as a whole does not exceed 0 and 3 respectively.

Equivalence with NCC H3D2(1) is demonstrated in Table 4-1.

Table 4-1. Assessment of equivalence to DtS.

DtS requirements for a bonded laminate to be used as a non-combustible material:	DeltaFireX Car Port System Roof Panel Bonded Laminates (i.e. DeltaTrim-MW and DeltaOrb-MW):
1 Each lamina, including any core, is non-combustible	<p>The specifications of the DeltaTrim-MW and DeltaOrb-MW sandwich panel systems are given in Appendix C. The laminae comprise:</p> <ul style="list-style-type: none"> • steel top skin (0.42 mm G550 AZ150); • steel bottom skin (0.55 mm G300 Z275); • Mineral wool core (100 kg/m³) <p>The steel top and bottom skins consist of low carbon steel which has been tested to AS1530.1 and is not deemed combustible (fire test certificate given in Section A.2). The surface finish of the top and bottom skin is less than 1 mm thick with a Spread-of-Flame Index of 0 (refer to applicable AS1530.3 fire test certificates given in Sections B.3, B.4, B.5, B.6 and B.7 and DeltaTrim-MW and DeltaOrb-MW specifications given in Sections C.1 and C.2).</p> <p>The mineral wool core material has been tested to AS1530.1 and is deemed non-combustible (refer to the AS1530.1 fire test certificate given in Section A.1).</p> <p>On this basis, all laminae are considered non-combustible in accordance with the DtS provisions.</p>
2 Each adhesive layer does not exceed 1 mm thickness and the total thickness of the adhesive layer does not exceed 2 mm	<p>The DeltaTrim-MW and DeltaOrb-MW bonded laminate panels incorporate combustible adhesive layers to bind the laminae. Each adhesive layer shall be less than 1 mm thick. The combined thickness of the two adhesive layers shall therefore be less than 2 mm in total.</p>
3 The Spread-of-Flame Index and Smoke-Developed Index of the bonded laminated material as a whole does not exceed 0 and 3 respectively	<p>The DeltaTrim-MW and DeltaOrb-MW bonded laminate panels have each been tested as a system to AS1530.3 with fire test certificates given in Sections B.1 and B.2.</p> <p>The fire test certificates indicate that the Spread-of-Flame Index and Smoke-Developed Index for both DeltaTrim-MW and DeltaOrb-MW bonded laminate panels are:</p> <p>Spread-of-Flame Index: $0 \leq 0$... ACCEPTABLE</p>

	Smoke-Developed Index: $3 \leq 3$... ACCEPTABLE
4 Use of the DeltaFireX Car Port System as a non-combustible roof covering.	Based on the justification given in items 1 to 3 above, the DeltaTrim-MW and DeltaOrb-MW bonded laminate panels which make up the roof covering for the DeltaFireX Car Port System are suitable to be used as a non-combustible roof covering.

4.8 Conclusion and Compliance

This fire engineering report confirms that the DeltaFireX car port system which may comprise of;

- A roof system comprising either DeltaOrb-MW or DeltaTrim-MW panels complying with the specifications given in Sections C.1 and C.2 respectively,
- A non-combustible support structure,
- Non-combustible plumbing fixtures (gutters and downpipes),
- Panel thickness ranging between 75 mm -150 mm,
- Minimum cut length of 1800 mm,
- Panel width of 1000 mm,
- Top skin consisting of 0.42mm G550 AZ150 steel and bottom skin consisting of 0.55mm G300 Z275 steel,

Meets the performance requirements of H3P1(1) Volume 2, NCC 2022 when installed in accordance with the DeltaFireXRoof brochure version V15.10.21 and Section 4.4 of this report as a Class 10a structure (car port) attached or adjacent to a Class 1a building positioned directly adjacent to the site boundary (i.e. less than 900 mm from the site boundary).

The comparative assessment has demonstrated qualitatively that the DeltaFireX car port system (when installed to the requirements of Section 4.4) is equivalent to a non-combustible roof covering in accordance with the DtS provisions outlined within NCC H3D2 and does not increase the risk of fire spread between a Class 1 building and a neighbouring building over and above that permitted under the DtS provisions.

Performance requirement H3P1(1) is satisfied. The assessment is compliant in accordance with A2G2(1)(b) and A2G2(2)(d).

5 References

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Appendix A AS1530.1 Test Certificates

A.1 Mineral Wool AS1530.1 Test Certificate

Certificate of Test

QUOTE No.: NC8391 REPORT No.: FNC12604

COMBUSTIBILITY TEST FOR MATERIALS IN ACCORDANCE WITH AS 1530.1-1994

TRADE NAME: Mineral Wool / Rock Wool

SPONSOR: Delta Panels Pty Ltd
731 Boundary Road
RICHLANDS QLD 4077
AUSTRALIA

DESCRIPTION OF TEST SAMPLE: The sponsor described the tested specimen as a mineral wool insulation slab comprised of a silicate fibres, alkaline oxide, alkali earth oxide, Bakelite synthetic thermosetting resin binder and mineral oil.

Nominal thickness: 50 mm
Nominal density: 100 kg/m³
Colour: brown

TEST PROCEDURE: Five (5) samples were tested in accordance with Australian Standard 1530 Methods for fire tests on building materials, components and structures, Part 1- 1994: Combustibility Test for Materials.

An alternative suitable insulating material was used to fill the annular space between the furnace tubes, as specified in Clause 4.2 of ISO 1182:2010.

RESULTS: The following calculated results were obtained, refer also to Summary of measurements:


Arithmetic mean	$= \frac{\Sigma \text{results}}{5}$
Mean furnace thermocouple temperature rise (°C)	26.37
Mean specimen centre thermocouple temperature rise (°C)	253.80
Mean specimen surface thermocouple temperature rise (°C)	36.60
Mean duration of sustained flaming (s)	0
Mean mass loss (%)	6.04


DESIGNATION: The material is NOT deemed combustible according to the test criteria specified in Clause 3.4 of AS 1530.1-1994.

These test results relate only to the behaviour of the test specimens of the material under the particular conditions of the test and they are not intended to be the sole criterion for assessing the potential fire hazard of the material in use.

DATE OF TEST: 8 July 2020


Issued on the 24th day of July 2020 without alterations or additions.


 Faustin Molina
 Testing Officer


 Stephen Smith
 Team Leader, Reaction to Fire & Façade Fire Laboratory

End of Report


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SUMMARY OF MEASUREMENTS AND OBSERVATIONS OF SAMPLES UNDER TEST C12604

Parameters	Symbol or expression	Unit symbol	Sample Number				
			1	2	3	4	5
Initial specimen mass	m_{si}	g	7.52	8.15	7.09	7.82	8.87
Final specimen mass	m_{sf}	g	7.03	7.58	6.49	7.81	8.15
Mass loss	$\Delta m = \frac{M_{si} - M_{sf}}{M_{si}} \times 100$	%	6.52	6.99	8.46	0.13	8.12
Total duration of sustained flaming	Cumulative total of duration of flaming*	s	0	0	0	0	0
Initial furnace thermocouple temperature	T_{fi}	°C	748	747	746	754	748
Maximum furnace thermocouple temperature	T_{fm}	°C	816	802	818	803	798
Final furnace thermocouple temperature	T_{ff}	°C	782	781	785	782	775
Furnace thermocouple temperature rise	$\Delta T_f = T_{fm} - T_{ff}$	°C	34	21	33	21	23
Maximum specimen centre thermocouple temperature	T_{cm}	°C	1017	994	1039	1015	1049
Final specimen centre thermocouple temperature	T_{cf}	°C	762	762	776	773	772
Specimen centre thermocouple temperature rise	$\Delta T_c = T_{cm} - T_{cf}$	°C	255	232	263	242	277
Maximum specimen surface thermocouple temperature	T_{sm}	°C	816	818	829	835	834
Final specimen surface thermocouple temperature	T_{sf}	°C	780	785	790	801	793
Specimen surface thermocouple temperature rise	$\Delta T_s = T_{sm} - T_{sf}$	°C	36	33	39	34	41
Test duration	-	min	40	30	55	30	30

- Any individual duration flaming less than 5 seconds was discarded

End of Test Certificate

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A.2 Coated Sheet Steel (Low Carbon Steel) AS1530.1 Test Certificates

Certificate of Test

QUOTE No.: NC8205

REPORT No.: FNC12440

COMBUSTIBILITY TEST FOR MATERIALS IN ACCORDANCE WITH AS 1530.1-1994

TRADE NAME: Low Carbon Steel Manufactured by Bluescope Australia

SPONSOR: Bluescope Steel Limited
Five Islands Road
Sirius Building (#51)
PORT KEMBLA NSW 2505
AUSTRALIA

DESCRIPTION OF TEST SAMPLE: The sponsor described the tested specimen as low carbon steel.

Nominal thickness: 4.38 mm (loose laid to form 50 mm)
Nominal density: 7850 kg/m³
Colour: grey

TEST PROCEDURE: Five (5) samples were tested in accordance with Australian Standard 1530 Methods for fire tests on building materials, components and structures, Part 1- 1994: Combustibility Test for Materials.

An alternative suitable insulating material was used to fill the annular space between the furnace tubes, as specified in Clause 4.2 of ISO 1182:2010.

RESULTS: The following calculated results were obtained, refer also to Summary of measurements:

Arithmetic mean	$= \frac{\Sigma \text{results}}{5}$
Mean furnace thermocouple temperature rise (°C)	0.10
Mean specimen centre thermocouple temperature rise (°C)	0.06
Mean specimen surface thermocouple temperature rise (°C)	0.32
Mean duration of sustained flaming (s)	0
Mean mass loss (%)	0.06

DESIGNATION: The material is **NOT** deemed combustible according to the test criteria specified in Clause 3.4 of AS 1530.1-1994.

These test results relate only to the behaviour of the test specimens of the material under the particular conditions of the test and they are not intended to be the sole criterion for assessing the potential fire hazard of the material in use.

DATE OF TEST: 27 August 2019

Issued on the 9th day of September 2019 without alterations or additions.


Faustin Molina
Testing Officer



Brett Roddy
Group Leader, Fire Testing and Assessments

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SUMMARY OF MEASUREMENTS AND OBSERVATIONS OF SAMPLES UNDER TEST C12440

Parameters	Symbol or expression	Unit symbol	Sample Number				
			1	2	3	4	5
Initial specimen mass	m_{si}	g	540.98	543.87	544.14	541.96	543.60
Final specimen mass	m_{sf}	g	540.82	543.84	544.00	541.15	543.21
Mass loss	$\Delta m = \frac{M_{si} - M_{sf}}{M_{si}} \times 100$	%	0.03	0.01	0.03	0.15	0.07
Total duration of sustained flaming	Cumulative total of duration of flaming*	s	0	0	0	0	0
Initial furnace thermocouple temperature	T_{fi}	°C	747	753	751	751	751
Maximum furnace thermocouple temperature	T_{fm}	°C	782	775	781	779	780
Final furnace thermocouple temperature	T_{ff}	°C	782	775	781	779	780
Furnace thermocouple temperature rise	$\Delta T_f = T_{fm} - T_{ff}$	°C	0	0	1	0	0
Maximum specimen centre thermocouple temperature	T_{cm}	°C	766	763	763	769	771
Final specimen centre thermocouple temperature	T_{cf}	°C	766	763	763	769	771
Specimen centre thermocouple temperature rise	$\Delta T_c = T_{cm} - T_{cf}$	°C	0	0	0	0	0
Maximum specimen surface thermocouple temperature	T_{cm}	°C	770	764	766	771	768
Final specimen surface thermocouple temperature	T_{sf}	°C	769	764	765	771	768
Specimen surface thermocouple temperature rise	$\Delta T_s = T_{cm} - T_{sf}$	°C	1	0	1	0	0
Test duration	-	min	105	85	75	85	85

* Any individual duration flaming less than 5 seconds was discarded

End of Test Certificate

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Appendix B AS1530.3 Test Certificates

B.1 DeltaOrb™ Facings Bonded to MW Core AS1530.3 Test Certificate

AWTA PRODUCT TESTING

Australian Wool Testing Authority Ltd - trading as AWTA Product Testing
A.B.N 43 006 014 106

1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
P.O Box 240, North Melbourne, Victoria 3051
Phone (03) 9371 2400

TEST REPORT

Client : Delta Panels Pty Ltd
2828 Ipswich Road
Darra QLD 4076

Test Number : 21-003529
Issue Date : 19/07/2021
Print Date : 19/07/2021

Sample Description Clients Ref : "DeltaOrb - MW"
Insulated building panel
End Use : Insulated building panel
Nominal Composition : Prepainted steel skins bonded to a non-combustible mineral wool core
Nominal Mass per Unit Area/Density : 100kg/m³
Nominal Thickness : 100mm

AS/NZS 1530.3-1999

**Methods for Fire Tests on Building Materials, Components and Structures
Part 3: Simultaneous Determination of Ignitability,
Flame Propagation, Heat Release and Smoke Release**

Face tested:	Flat Face	
Date tested:	19-07-2021	
	Standard Error	Mean
Ignition time	Nil	Nil min
Flame propagation time	Nil	Nil sec
Heat release integral	Nil	Nil kJ/m ²
Smoke release, log d	0.0199	-1.4863
Optical density, d		0.0328 / metre
Number of specimens ignited:		0
Number of specimens tested:		6
Regulatory Indices:		
Ignitability Index		0 Range 0-20
Spread of Flame Index		0 Range 0-10
Heat Evolved Index		0 Range 0-10
Smoke Developed Index		3 Range 0-10

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MICHAEL A. JACKSON B.Sc (Hons)
MANAGING DIRECTOR

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Australian Wool Testing Authority Ltd - trading as AWTA Product Testing
A.B.N 43 006 014 106

1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
P.O Box 240, North Melbourne, Victoria 3051
Phone (03) 9371 2400

TEST REPORT

Client : Delta Panels Pty Ltd
2828 Ipswich Road
Darra QLD 4076

Test Number : 21-003529
Issue Date : 19/07/2021
Print Date : 19/07/2021

These results only apply to the specimen mounted, as described in this report. The result of this fire test may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

Ignition is initiated by a pilot flame that is held near, but does not touch the specimen. A material that does not ignite during the standard test may ignite if contacted with a pilot flame during the test.

Each test specimen had an unattached backing of 4.5mm thick fibre reinforced cement board.

Each test specimen was clamped in four places.

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MANAGING DIRECTOR

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B.2 DeltaTrim™ Facings Bonded to MW Core AS1530.3 Test Certificate

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1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
P.O Box 240, North Melbourne, Victoria 3051
Phone (03) 9371 2400

TEST REPORT

Client : Delta Panels Pty Ltd
2828 Ipswich Road
Darra QLD 4076

Test Number : 21-003527
Issue Date : 19/07/2021
Print Date : 19/07/2021

Sample Description Clients Ref : "DeltaTrim - MW"
Insulated building panel
End Use : Insulated building panel
Nominal Composition : Prepainted steel skins bonded to a non-combustible mineral wool core
Nominal Mass per Unit Area/Density : 100kg/m3
Nominal Thickness : 100mm

AS/NZS 1530.3-1999

**Methods for Fire Tests on Building Materials, Components and Structures
Part 3: Simultaneous Determination of Ignitability,
Flame Propagation, Heat Release and Smoke Release**

Face tested:	Flat Face	
Date tested:	19-07-2021	
	Standard Error	Mean
Ignition time	Nil	Nil min
Flame propagation time	Nil	Nil sec
Heat release integral	Nil	Nil kJ/m ²
Smoke release, log d	0.0138	-1.3967
Optical density, d		0.0402 / metre
Number of specimens ignited:		0
Number of specimens tested:		6
Regulatory Indices:		
Ignitability Index		0 Range 0-20
Spread of Flame Index		0 Range 0-10
Heat Evolved Index		0 Range 0-10
Smoke Developed Index		3 Range 0-10

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1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
P.O Box 240, North Melbourne, Victoria 3051
Phone (03) 9371 2400

TEST REPORT

Client : Delta Panels Pty Ltd
2828 Ipswich Road
Darra QLD 4076

Test Number : 21-003527
Issue Date : 19/07/2021
Print Date : 19/07/2021

These results only apply to the specimen mounted, as described in this report. The result of this fire test may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

Ignition is initiated by a pilot flame that is held near, but does not touch the specimen. A material that does not ignite during the standard test may ignite if contacted with a pilot flame during the test.

Each test specimen had an unattached backing of 4.5mm thick fibre reinforced cement board.

Each test specimen was clamped in four places.

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MANAGING DIRECTOR

B.3 Coated Sheet Steel (Zincalume 0.42mm) AS1530.3 Test Certificate

Certificate of Test

Quote No.: NE7500

REPORT No.: FNE11602

AS/NZS 1530.3:1999 SIMULTANEOUS DETERMINATION OF IGNITABILITY, FLAME PROPAGATION, HEAT RELEASE AND SMOKE RELEASE

TRADE NAME: BlueScope ZINCALUME Steel

SPONSOR: Bluescope Steel Limited
Innovations Lab
Old Port Road
PORT KEMBLA NSW 2505
AUSTRALIA

DESCRIPTION OF SAMPLE:

The sponsor described the tested specimen as a metal-coated steel sheet with aluminium-zinc-magnesium alloy coating, resin coating and passivation layer on both sides.

Nominal thickness of steel sheet:	0.42 mm
Nominal thickness of aluminium-zinc-magnesium coating:	45 µm
Nominal thickness of passivation layer:	0.2 µm
Nominal thickness of resin layer:	3 µm
Nominal total thickness:	0.5 mm
Nominal total mass:	3.3 kg/m ²
Nominal total density:	7800 kg/m ³
Colour:	silver

TEST PROCEDURE: Six samples were tested in accordance with Australian Standard 1530, Method for fire tests on building components and structures, Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release, 1999. For the test, each sample was clamped to the specimen holder in four places.

RESULTS: The following means and standard errors were obtained:

Parameter	Mean	Standard Error
Ignition Time (min)	N/A	N/A
Flame Spread Time (s)	N/A	N/A
Heat Release Integral (kJ/m ²)	N/A	N/A
Smoke Release (log ₁₀ D)	-1.882	0.159

For regulatory purposes these figures correspond to the following indices:

Ignitability Index (0-20)	Spread of Flame Index (0-10)	Heat Evolved Index (0-10)	Smoke Developed Index (0-10)
0	0	0	2

The results of this fire test may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

DATE OF TEST: 20 January 2016

Issued on the 3rd day of March 2016 without alterations or additions.

Heherson Alarde
Testing Officer

Brett Roddy
Team Leader, Fire Testing and Assessments

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CSIRO INFRASTRUCTURE TECHNOLOGIES

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Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 www.csiro.au

B.4 Coated Sheet Steel (MagnaFlow) AS1530.3 Test Certificate

AWTA PRODUCT TESTING

Australian Wool Testing Authority Ltd - trading as AWTA Product Testing
A.B.N 43 006 014 106
1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
P.O Box 240, North Melbourne, Victoria 3051
Phone (03) 9371 2400 Fax (03) 9371 2499

TEST REPORT

Client : Selection Steel Trading
64-66 Ventura Place
Dandenong South VIC 3175

Test Number : 19-002186
Issue Date : 9/05/2019
Print Date : 9/05/2019

Sample Description Clients Ref : "MagnaFlow"
Coated steel panel
Colour : Light Grey
End Use : Roofing & Cladding
Nominal Composition : Low carbon steel with metallic alloy coated substrate and organic top coating
Nominal Mass per Unit Area/Density : 7850kg/m3

AS/NZS 1530.3-1999

Methods for Fire Tests on Building Materials, Components and Structures
Part 3: Simultaneous Determination of Ignitability,
Flame Propagation, Heat Release and Smoke Release

Face tested:	Light Grey Face		
Date tested:	09/05/2019		
	Standard Error	Mean	
Ignition time	Nil	Nil	min
Flame propagation time	Nil	Nil	sec
Heat release integral	Nil	Nil	kJ/m ²
Smoke release, log d	0.0902	-1.3899	
Optical density, d		0.0445	/ metre
Number of specimens ignited:		0	
Number of specimens tested:		6	
Regulatory Indices:			
Ignitability Index		0	Range 0-20
Spread of Flame Index		0	Range 0-10
Heat Evolved Index		0	Range 0-10
Smoke Developed Index		3	Range 0-10

165141

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0204/11/06

APPROVED SIGNATORY

MICHAEL A. JACKSON B.Sc (Hons)
MANAGING DIRECTOR

AWTA PRODUCT TESTING

Australian Wool Testing Authority Ltd - trading as AWTA Product Testing
 A.B.N 43 006 014 106
 1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
 P.O Box 240, North Melbourne, Victoria 3051
 Phone (03) 9371 2400 Fax (03) 9371 2499

TEST REPORT

Client : Selection Steel Trading
 64-66 Ventura Place
 Dandenong South VIC 3175

Test Number : 19-002186
Issue Date : 9/05/2019
Print Date : 9/05/2019

Ignition is initiated by a pilot flame that is held near, but does not touch the specimen. A material that does not ignite during the standard test may ignite if contacted with a pilot flame during the test.

Each test specimen had an unattached backing of 4.5mm thick fibre reinforced cement board.

Each test specimen was clamped in four places.

These results only apply to the specimen mounted, as described in this report. The result of this fire test may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

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[Signature]
 APPROVED SIGNATORY

[Signature]
 MICHAEL A. JACKSON B.Sc. (Hons)
 MANAGING DIRECTOR

B.5 Coated Sheet Steel (UniCote 0.55mm) AS1530.3 Test Certificate

Certificate of Test

Quote No.: NE7651

REPORT No.: FNE11809A

AS/NZS 1530.3:1999 SIMULTANEOUS DETERMINATION OF IGNITABILITY, FLAME PROPAGATION, HEAT RELEASE AND SMOKE RELEASE

TRADE NAME: UniCote

SPONSOR: Selection Steel Trading Pty Ltd
64-66 Ventura Place
DANDENONG SOUTH VIC 3175
AUSTRALIA

DESCRIPTION OF SAMPLE:

The sponsor described the tested specimen as a pre painted steel product comprising of the following layers:
 Layer 1: 18- μ \pm 2- μ paint finish coat
 Layer 2: 7- μ \pm 1- μ chromate primer
 Layer 3: 75-g/m² aluminium/zinc alloy coating
 Layer 4: 0.55-mm steel core
 Layer 5: 75-g/m² aluminium/zinc alloy coating
 Layer 6: 5- μ \pm 1- μ primer
 Layer 7: 5 μ \pm 1 μ Shadow Grey (standard colour) wash coat
 Nominal total mass: 150-g/m²
 Nominal thickness: 0.55-mm
 Colour: Monolith (dark grey)

TEST PROCEDURE: Six samples were tested in accordance with Australian Standard 1530, Method for fire tests on building components and structures, Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release, 1999. For the test, each sample was clamped to the specimen holder in four places.

RESULTS: The following means and standard errors were obtained:

Parameter	Mean	Standard Error
Ignition Time (min)	N/A	N/A
Flame Spread Time (s)	N/A	N/A
Heat Release Integral	N/A	N/A
Smoke Release (log ₁₀ D)	-1.498	0.042

For regulatory purposes these figures correspond to the following indices:


Ignitability Index (0-20)	Spread of Flame Index (0-10)	Heat Evolved Index (0-10)	Smoke Developed Index (0-10)
0	0	0	2

The results of this fire test may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

DATE OF TEST: 12 October 2016

Issued on the 25th day of October 2016 without alterations or additions. Supersedes Report No. FNE11809 issued on 17th day of October 2016.


Heherson Alarde
Testing Officer


Brett Roddy
Team Leader, Fire Testing and Assessments

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B.6 Coated Sheet Steel (UniZinc) AS1530.3 Test Certificate

AWTA PRODUCT TESTING

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A.B.N 43 006 014 106
1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
P.O Box 240, North Melbourne, Victoria 3051
Phone (03) 9371 2400

TEST REPORT

Client : Selection Steel Trading
64-66 Ventura Place
Dandenong South VIC 3175

Test Number : 20-000776
Issue Date : 6/03/2020
Print Date : 10/03/2020

Sample Description Clients Ref : "Uni Zinc"
Rigid Panel
Colour : Silver
End Use : Roofing and Cladding
Nominal Composition : Low carbon steel with metallic alloy coated substrate (nominal 50 micron total on both sides)
Nominal Mass per Unit Area/Density : 7850 kg/m³
Nominal Thickness : <1mm

AS/NZS 1530.3-1999

Methods for Fire Tests on Building Materials, Components and Structures
Part 3: Simultaneous Determination of Ignitability,
Flame Propagation, Heat Release and Smoke Release

Face tested:	Face		
Date tested:	06/03/2020		
	Standard Error	Mean	
Ignition time	Nil	Nil	min
Flame propagation time	Nil	Nil	sec
Heat release integral	Nil	Nil	kJ/m ²
Smoke release, log d	0.0929	-2.2106	
Optical density, d		0.0068	/ metre
Number of specimens ignited:		0	
Number of specimens tested:		6	
Regulatory Indices:			
Ignitability Index		0	Range 0-20
Spread of Flame Index		0	Range 0-10
Heat Evolved Index		0	Range 0-10
Smoke Developed Index		0-1	Range 0-10

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MANAGING DIRECTOR

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 1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
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TEST REPORT

Client : Selection Steel Trading
 64-66 Ventura Place
 Dandenong South VIC 3175

Test Number : 20-000776
Issue Date : 6/03/2020
Print Date : 10/03/2020

These results only apply to the specimen mounted, as described in this report. The result of this fire test may be used to directly assess fire hazard, but it should be recognised that a single test method will not provide a full assessment of fire hazard under all fire conditions.

The reaction of thin unsupported flexible materials to flame impingement can be assessed in accordance with AS 1530.2. Where materials of thickness less than 2mm that are sufficiently flexible to be bent by hand around a mandrel of 2mm diameter or less are subjected to the test described herein, they should also be subjected to the test in AS 1530.2.

Ignition is initiated by a pilot flame that is held near, but does not touch the specimen. A material that does not ignite during the standard test may ignite if contacted with a pilot flame during the test.

Each test specimen had an unattached backing of 4.5mm thick fibre reinforced cement board.

Each test specimen was clamped along all sides.

Smoke Developed Index is reported as 0-1 due to the inability of the smoke measurement equipment to resolve an index of zero.

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 MANAGING DIRECTOR

B.7 Coated Steel Facings Bonded to Mineral Wool Core AS1530.3 Test Certificate

AWTA PRODUCT TESTING

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 1st Floor, 191 Racecourse Road, Flemington, Victoria 3031
 P.O Box 240, North Melbourne, Victoria 3051
 Phone (03) 9371 2400 Fax (03) 9371 2499

TEST REPORT

Client : Delta Panels Pty Ltd
 2828 Ipswich Road
 Darra QLD 4076

Test Number : 18-006075
 Issue Date : 14/11/2018
 Print Date : 14/11/2018

Sample Description Clients Ref : "DeltaCool - MW"
 Insulated Building Panels
 Nominal Composition : Pre-painted steel skins bonded to a mineral wool core
 Nominal Mass per Unit Area/Density : 100kg/m³
 Nominal Thickness : 125mm

AS/NZS 1530.3-1999

Methods for Fire Tests on Building Materials, Components and Structures Part 3: Simultaneous Determination of Ignitability, Flame Propagation, Heat Release and Smoke Release

Face tested:	Face	
Date tested:	13/11/2018	
	Standard Error	Mean
Ignition time	Nil	Nil min
Flame propagation time	Nil	Nil sec
Heat release integral	Nil	Nil kJ/m ²
Smoke release, log d	0.0142	-1.5719
Optical density, d		0.0269 / metre

Number of specimens tested: 6

Regulatory Indices:

Ignitability Index	0	Range 0-20
Spread of Flame Index	0	Range 0-10
Heat Evolved Index	0	Range 0-10
Smoke Developed Index	2	Range 0-10

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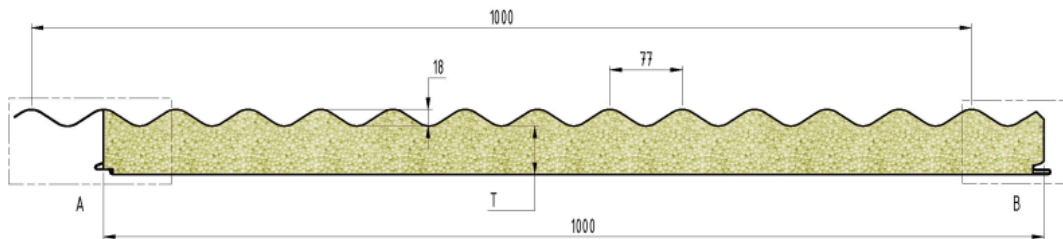
APPROVED SIGNATORY

MICHAEL A. JACKSON B.Sc (Hons)
 MANAGING DIRECTOR

Appendix C Specifications

C.1 DeltaOrb-MW

DeltaOrb-MW SPECIFICATIONS



DeltaOrb-MW is an Insulated Roof Panel System, comprising of two pre-painted, roll-formed steel skins, with a roll-formed steel skins bonded to a non-combustible mineral wool core.

The top profile offers striking looks with all of the benefits of modern Insulated Panel technologies.

The bottom skin has a roll-formed tongue and groove edge.

Early Fire Hazard Properties AS 1530.3:1999		
AWTA Test Report 21-003529 19/07/21		
Index	Test Range	External Top Skin
Ignitability	0-20	0
Spread of Flame	0-10	0
Heat Evolved	0-10	0
Smoke Developed	0-10	3

Combustibility Test AS 1530.1-1994

CSIRO Report no. FNC12604 dated 8/7/2020 tested five (5) samples of the Delta Panels supplied mineral wool sample and certified that the material is NOT deemed combustible according to the criteria specified in clause 3.4 of AS 1530.1-1994.

Non-Combustible Building Material - Report

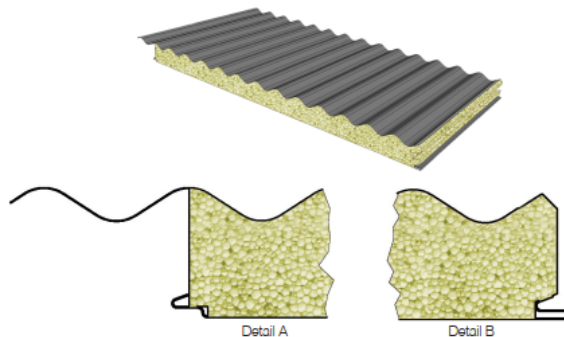
The Delta Panels laminated mineral wool products are certified, by Milanovic Neale Consulting Engineers 28/8/2020, to meet the three performance criteria in the NCC (2019) 3.7.1.1(e)

Sotera - FireX™ Car Port System

The Sotera report A21007 J005 - DeltaFireX Car Port System FER dw rev 1-3 confirms that the FireX™ Car Port System meets the performance requirements of P2.3.1(a) Volume 2, NCC 2019 Amendment 1 when installed in accordance with the DeltaFireXRoof Brochure version v15.10.21 and section 4.4 of their report as a Class 10a structure (car port) attached or adjacent to a Class 1a building positioned directly adjacent to the site boundary (i.e.) less than 900 mm from the site boundary)

Sotera - Delta MW and EPS-FR Awning & Patio Roof System

The Sotera report A21007 J004 - Delta MW and EPS-FR Awning and Patio Roof System FER dw rev 1-3, confirms that the Mineral Wool & EPS-FR Awning & Patio Roof System meets the performance requirements of P2.3.1(a) Volume 2, NCC 2019 Amendment 1 when installed in accordance with the Delta Mineral Wool Panels Brochure version V20.10.21 and section 4.4 of their report as a Class 10a structure (car port) attached or adjacent to a Class 1a building positioned directly adjacent to the site boundary (i.e.) less than 900 mm from the site boundary)



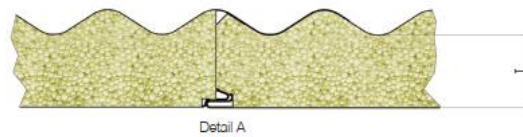
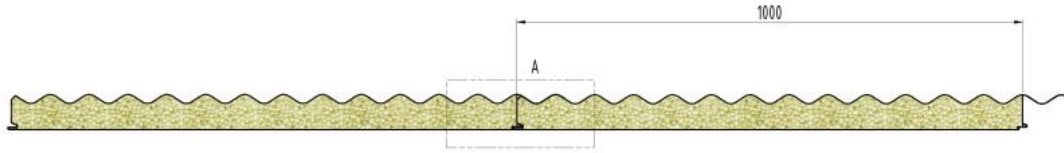
Steel Skin Details	Top Skin	0.42mm / G550 AZ150
	Bottom Skin	0.55mm / G300 Z275
Max. Skin Temperature	78°C Dry Heat	
Core Material Details	Mineral Wool	
Thermal Conductivity AS 1386.2/ASTM C 518	0.0363 W/mK @23.0°C	
Core Density	100kg/m ³	
0.6mm Skin Weight (kg/m²)	75mm Panel	18.50
	100mm Panel	21.00
	125mm Panel	23.50
	150mm Panel	26.00
R Value	75mm Panel	2.08
	100mm Panel	2.78
	125mm Panel	3.48
	150mm Panel	4.17
Sheet Coverage	1000mm	
Length (mm)	Cut to Length Min of 1800mm	
Length Tolerance (mm)	5mm+/-	
Thickness (mm)	75, 100, 125, 150	
Minimum Roof Pitch	Building Classes 1-9	- 5°
	Building Class 10	- 3°
Flatness Standards	0.40mm	Surface deformations can be apparent to the naked eye when observed in certain lighting conditions
	0.60mm	

Version Date: 27.04.2022

Delta Panels Pty Ltd

P: +61 07 3271 2170 E: info@deltapanel.com W: www.deltapanel.com A: 731 Boundary Road, Richlands, Qld 4077 ABN: 11 147 861 292

DeltaOrb-MW SPECIFICATIONS



DeltaOrb-MW Single & Multi Span Non-Cyclonic Tabs				
Span	Pressure (kPa)			
	75mm	100mm	125mm	150mm
1800	2.29	3.27	4.24	5.49
2400	1.44	2.09	2.74	3.63
3000	0.94	1.34	1.73	2.33
3600	0.63	0.93	1.22	1.61
4200	0.46	0.67	0.91	1.16
4800	0.36	0.53	0.70	0.91
5400	0.28	0.43	0.56	0.74
6000		0.33	0.43	0.59

DeltaOrb-MW Acoustic Testing has been performed in compliance with the requirements of AS 1191-2002 "Acoustics - Method for Laboratory Measurement of Airborne Sound Insulation of Building Elements".

The procedures specified by AS 1276-1979 and AS/NZS ISO 717.1:2004 were used to calculate the Sound Transmission Class (STC) and the Weighted Sound Reduction Index (Rw) of DeltaOrb-MW.

DeltaOrb-MW is classed as trafficable when used in a roof application.

DeltaOrb-MW Acoustic Values			
Frequency		50mm	125mm
		100	15.41
	160	16.40	15.09
	200	18.81	17.70
	250	19.70	18.51
	315	21.39	19.40
	400	22.31	19.69
	630	23.40	19.10
	800	23.69	17.31
	1000	25.61	18.29
	1250	21.01	30.10
	1600	20.00	36.19
	2000	34.79	37.30
	2500	41.70	37.09
	3150	44.10	35.69
	5000	44.61	39.90
	STC	24.00	23.00
	RW	25.00	24.00

DeltaOrb-MW Fixing Details		
Crest fixing only. One fixing every second crest		
Panel Thickness (mm)	Fixing into Steel	Fixing into Timber
75	Tek 14 x 135 Hex Head Screw	T17 14 x 150 Hex Head Screw
100	Tek 14 x 150 Hex Head Screw	T17 14 x 175 Hex Head Screw
125	Tek 14 x 175 Hex Head Screw	T17 14 x 200 Hex Head Screw
150	Tek 14 x 200 Hex Head Screw	T17 14 x 230 Hex Head Screw

Use Cyclone Plate and Neo Washer on each fixing. Upon Installation the overlap needs to be stitch cored or riveted every 300mm.



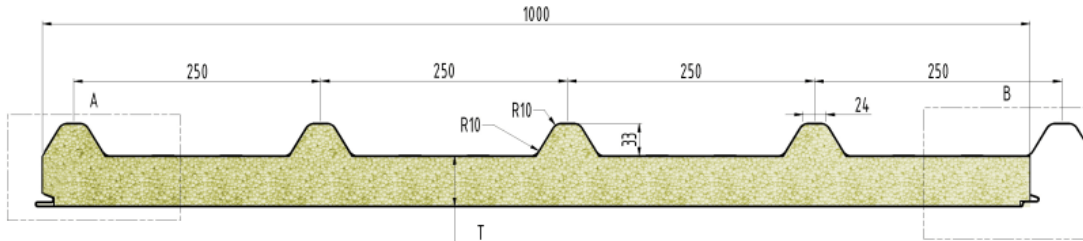
Please refer to the web page for the available colour range, paint finishes and relevant warranty conditions.

Version Date: 27.04.2022

Delta Panels Pty Ltd
 P: +61 07 3271 2170 E: info@deltapanel.com W: www.deltapanel.com A: 731 Boundary Road, Richlands, Qld 4077 ABN: 11 147 861 292

C.2 DeltaTrim-MW

DeltaTrim-MW SPECIFICATIONS



DeltaTrim-MW is an Insulated Roof Panel System, comprising of two pre-painted, roll-formed steel skins, with a roll-formed steel skins bonded to a non-combustible mineral wool core.

The top profile offers striking looks with all of the benefits of modern Insulated Panel technologies.

The bottom skin has a roll-formed tongue and groove edge.

Early Fire Hazard Properties AS 1530.3:1999		
AWTA Test Report 21-003527 19/07/21		
Index	Test Range	External Top Skin
Ignitability	0-20	0
Spread of Flame	0-10	0
Heat Evolved	0-10	0
Smoke Developed	0-10	3

Combustibility Test AS 1530.1-1994

CSIRO Report no. FNC12604 dated 8/7/2020 tested five (5) samples of the Delta Panels supplied mineral wool sample and certified that the material is NOT deemed combustible according to the criteria specified in clause 3.4 of AS 1530.1-1994.

Non-Combustible Building Material - Report

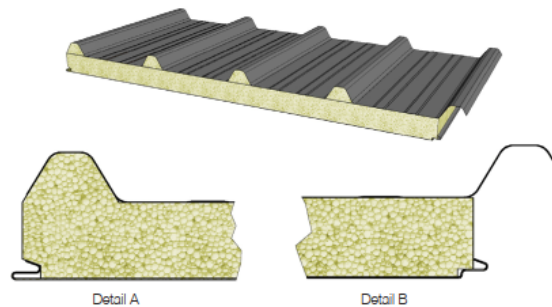
The Delta Panels laminated mineral wool products are certified, by Milanovic Neale Consulting Engineers 28/8/2020, to meet the three performance criteria in the NCC (2019) 3.7.1.1(e)

Sotera - FireX™ Car Port System

The Sotera report A21007 J005 - DeltaFireX Car Port System FER dw rev 1-3 confirms that the FireX™ Car Port System meets the performance requirements of P2.3.1(a) Volume 2, NCC 2019 Amendment 1 when installed in accordance with the DeltaFireXRoof Brochure version v15.10.21 and section 4.4 of their report as a Class 10a structure (car port) attached or adjacent to a Class 1a building positioned directly adjacent to the site boundary (i.e.) less than 900 mm from the site boundary)

Sotera - Delta MW and EPS-FR Awning & Patio Roof System

The Sotera report A21007 J004 - Delta MW and EPS-FR Awning and Patio Roof System FER dw rev 1-3, confirms that the Mineral Wool & EPS-FR Awning & Patio Roof System meets the performance requirements of P2.3.1(a) Volume 2, NCC 2019 Amendment 1 when installed in accordance with the Delta Mineral Wool Panels Brochure version V20.10.21 and section 4.4 of their report as a Class 10a structure (car port) attached or adjacent to a Class 1a building positioned directly adjacent to the site boundary (i.e.) less than 900 mm from the site boundary)



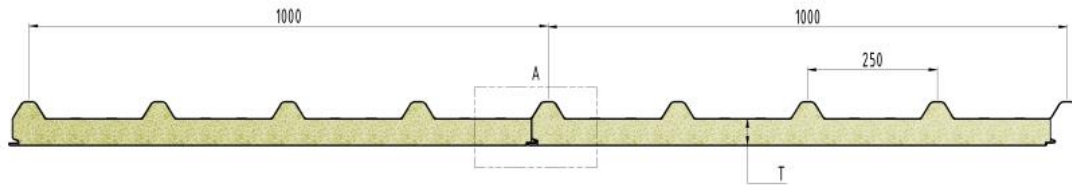
Steel Skin Details	Top Skin	0.42mm / G550 AZ150
	Bottom Skin	0.55mm / G300 Z275
Max. Skin Temperature	78°C Dry Heat	
Core Material Details	Mineral Wool	
Thermal Conductivity AS 1386.2/ASTM C 518	0.0363 W/mK @23.0°C	
Core Density	100kg/m ³	
0.6mm Skin Weight (kg/m²)	75mm Panel	18.50
	100mm Panel	21.00
	125mm Panel	23.50
	150mm Panel	26.00
R Value	75mm Panel	2.08
	100mm Panel	2.78
	125mm Panel	3.48
	150mm Panel	4.17
Sheet Coverage	1000mm	
Length (mm)	Cut to Length Min of 1800mm	
Length Tolerance (mm)	5mm+/-	
Thickness (mm)	75, 100, 125, 150	
Minimum Roof Pitch	2°	
Flatness Standards	0.40mm	Surface deformations can be apparent to the naked eye when observed in certain lighting conditions
	0.60mm	

Version Date: 27.04.2022

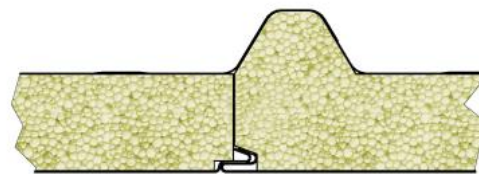
Delta Panels Pty Ltd

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DeltaTrim-MW SPECIFICATIONS



DeltaTrim-MW Single & Multi Span Non-Cyclonic Tabs				
Span	Pressure (kPa)			
	75mm	100mm	125mm	150mm
1800	2.29	3.27	4.24	5.49
2400	1.44	2.09	2.74	3.63
3000	0.94	1.34	1.73	2.33
3600	0.63	0.93	1.22	1.61
4200	0.46	0.67	0.91	1.16
4800	0.36	0.53	0.70	0.91
5400	0.28	0.43	0.56	0.74
6000		0.33	0.43	0.59



Detail A

DeltaTrim-MW Acoustic Testing has been performed in compliance with the requirements of AS 1191-2002 "Acoustics - Method for Laboratory Measurement of Airborne Sound Insulation of Building Elements".

The procedures specified by AS 1276-1979 and AS/NZS ISO 717.1:2004 were used to calculate the Sound Transmission Class (STC) and the Weighted Sound Reduction Index (Rw) of **DeltaTrim-MW**.

DeltaTrim-MW is classed as trafficable when used in a roof application.

DeltaTrim-MW Acoustic Values			
Frequency		50mm	125mm
		100	15.41
	160	16.40	15.09
	200	18.81	17.70
	250	19.70	18.51
	315	21.39	19.40
	400	22.31	19.69
	630	23.40	19.10
	800	23.69	17.31
	1000	25.61	18.29
	1250	21.01	30.10
	1600	20.00	36.19
	2000	34.79	37.30
	2500	41.70	37.09
	3150	44.10	35.69
	5000	44.61	39.90
	STC	24.00	23.00
	RW	25.00	24.00

Please refer to the web page for the available colour range, paint finishes and relevant warranty conditions.

DeltaTrim-MW Fixing Details

Crest fixing only. One fixing every second crest

Panel Thickness (mm)	Fixing into Steel	Fixing into Timber
75	Tek 14 x 150 Hex Head Screw	T17 14 x 150 Hex Head Screw
100	Tek 14 x 175 Hex Head Screw	T17 14 x 175 Hex Head Screw
125	Tek 14 x 200 Hex Head Screw	T17 14 x 200 Hex Head Screw
150	Tek 14 x 230 Hex Head Screw	T17 14 x 230 Hex Head Screw

Use Cyclone Plate and Neo Washer on each fixing.

Upon Installation the overlap needs to be stitch cored or riveted every 300mm.



SCI QUAL
INTERNATIONAL

SCI QUAL
INTERNATIONAL

Version Date: 27.04.2022

Delta Panels Pty Ltd

P: +61 07 3271 2170 E: info@deltapanel.com W: www.deltapanel.com A: 731 Boundary Road, Richlands, Qld 4077 ABN: 11 147 861 292

Appendix D Accreditation

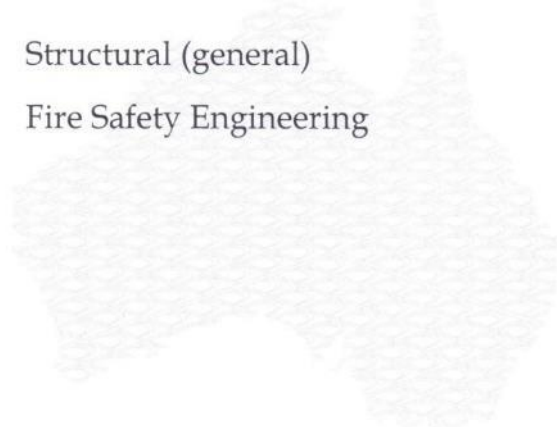
NATIONAL PROFESSIONAL ENGINEERS REGISTER

Registered Professional Engineer

This is to certify that:
Paul Clancy
MIEAust CPEng

has been registered in the following areas of practice from the dates shown

Table with 2 columns: Area of Practice, Date. Rows: Structural (general) 27/02/2007, Fire Safety Engineering 27/02/2007



Handwritten signature of Michael J. Barron

Chair, National Engineering Registration Board

Handwritten signature of Michael J. Barron

Registrar, National Engineering Registration Board

Government, community and profession cooperating to maintain national registers in the community interest

For details see - http://www.nerb.org.au



The Association of Consulting Engineers Australia



THE ASSOCIATION OF PROFESSIONAL ENGINEERS, SCIENTISTS AND MANAGERS, AUSTRALIA



Certificate NOT valid without current membership card that states "National Professional Engineers Register (NPER)" against "REGISTRATION" in the left-hand column. This certificate is evidence that at the time of assessment the person named on the certificate demonstrated the qualifications and experience to practice competently in the stated area(s) of practice. When taken in conjunction with a current practice card the certificate also provides evidence of continued practice in the stated area(s) and a commitment to ethical standards and continuing professional development that is satisfactory to the profession.



NPER

NATIONAL PROFESSIONAL ENGINEERS REGISTER

136936

The National Professional Engineers Register is administered by

The Institution of Engineers, Australia

(This certificate does not imply membership of any of the sponsoring professional bodies)

Appendix E Company Profile

1. Contact Details

Address	24 Watts Drive Varsity Lakes Qld 4227
Phone	07 5562 0022
Mobile	0439 632 886
Fax	07 5562 1466
Email	sotera@sotera.com.au
Web	www.sotera.com.au



2.0 Overview of Company

Sotera specialises in fire risk engineering. The consultancy does not design building services and thus does not have its interests comprised in recommending a cost-effective safe combination of fire services. The director of the company has been practising in Queensland and New South Wales for the past five years and since 1990 generally including research and consulting for overseas interests. It has successfully undertaken over 300 projects of all types with a near perfect approval record. The company is highly respected by QFRS and other building professionals. It is often invited onto challenging projects and to give seminars to professional institutes.

3.0 Staff

Dr Paul Clancy – Director, fire and structural engineering (PhD-fire, MEngSc – Struc Mgt)
Mr Neelesh Chandiran – Fire and electrical engineering, BEng (Elec). MEng (Elec) MEng (Mgt)

4.0 Accreditations:

NPER Fire, Structures, CPEng, MIEAust – one of six in Queensland.
RPEQ Fire Structural registration number 10045
NSW Registration with Building Professionals Board C-10 Accredited Certifier – Fire Safety Engineering No BPB0747
Victoria Fire Safety Engineer EF 30459

5.0 Projects

Featured High Rise Buildings Classes 2, 3, 5, 6, 7a

Soul: 75 storeys, Surfers Paradise
Hilton Hotel Surfers Paradise, two towers 35 and 55 storeys on 5 level car park basement.
The Oracle, Broadbeach: two towers 40 and 50 storeys on common podium
Southport Central 2 and 3: two 40 storey towers on a 6 level basement car park

Featured Medium Rise Buildings Classes 2, 3, 5, 6, 7a, 9b

Riverpoint, West End, Brisbane: several apartment buildings to 6 and 7 storeys on a common basement car park.
16-18 Eden Avenue, Rainbow Bay: 9 storey apartment building
Emerald Lakes: several buildings to 9 storeys, offices, apartments, shops

Community Housing Projects

Brisbane Housing Company, Masters Street Newstead, 6 storey housing commission – smoke doors deleted from long corridors

Brisbane Housing Company, Danby Lane, Nundah, 6 storeys open balconies and stairs
 Elliot Avenue, Caboolture – travel distance extended from 6 to 20 m.
 Tree Tops, Burleigh Waters – apartments, 8 storeys, travel distance to exit extended from 6 to 20 m by means of ventilation
 Bond University Student Accommodation six storeys

Featured Aged care

Tall Trees Rochedale
 Grande Pacific, 25 storeys
 Stage 15 Gardens on Lindfield, Helensvale

Shopping Centres

Sandgate Shopping Centre, Bowser Road
 Harvey Norman, Village Square Browns Plains

 Novo Northlakes

 Bargara Shopping Centre

 South Gympie

 Nerang Fair

Hospitals

Royal Brisbane Womens Hospital
 Bundaberg Hospital – Emergency and Maternity
 North West Hospital Redevelopment, Stage 4

Warehouses

Repcos Brisbane Airport
 Toll Express, Brisbane Airport
 Rivergate Boat Storage Facility
 Billabong, Burleigh Heads
 Lot 130 Days Rd, Upper Coomera

Other Featured Projects

Mackay Convention Centre
 HMAS Penguin diving bases in Sydney
 University of Southern Queensland, Springfield Campus
 Quad Park sports stadium – rationalization of FRL's, EVACNET study
 Southport Marina

6.0 Issues

Separation of united buildings, rationalization of sprinklers, stairs and lifts in same shaft safe zones, travel distances, non-fire-isolated stairs through 3 or 4 levels, combined hydrant sprinkler flows, proximity to boundary, rationalisation of FRL's, discharge past windows, discharge of fire isolated exit not direct to open space, stair widths and overall building evacuation, deletion of sprinklers in car parks with non-compliant ventilation, deletion of stair pressurization, single exits

7.0 Research – Paul Clancy

1986-2006 Research and consulting senior lecturer Victoria University – projects for Forintek Canada, National Research Council Canada, Canadian Defense, National Assoc Forest Ind Australia, American Forest & Paper, Swedish Timber Research, National Building Fire Safety Systems Code, Australia, project coordinator. 35 papers (most reviewed) in major reports, international conferences, international journals in fire safety engineering including Fire Safety Journal, Fire and Materials, Fire Technology, and Fire Protection Engineering Journal.

Supervision of Masters and PhD students. \$700,000 in research grants (2/3 as an individual effort, 1/3 with a group)