STEPHEN GRUBITS & ASSOCIATES

Stephen Grubits & Associates Pty Ltd
Suite 5A, Level 4, 189 Kent Street, Sydney
PO Box N522, Grosvenor Place NSW 1220
Tel: +61 2 9247 1444
Email: sydney@grubits.com.au
ABN: 24 075 049 688

TECHNICAL NOTE – Mitsubishi Alpolic NC

Project:	MITSUBISHI ALPOLIC NC	**File:**	2019/391
Recipient:	Clint Gavin	**Note No.:**	TN1.1
		Date:	18/10/2019
Revision 1:	Editorial and Stylistic Changes.		

1. INTRODUCTION

Stephen Grubits & Associates Pty Ltd have been requested to examine documentation referenced below and comment on the likely impact of Alpolic NC cladding when it is installed as the part of the external wall on compliance with Performance Requirement CP2 and Clause C1.9(a) of the Deemed-to-Satisfy Provisions **(DTS)** of the NCC 2019 Volume Once **(BCA)**.

The review contained herein is the subject to the validity of the following:

- National Construction Code Series, Volume 1, Building Code of Australia 2019, Australian Building Codes Board;
- Test Report in accordance with AS 1530.1-1994 (R2016), ref. RTF190153 R3.0, prepared by Warringtonfire Prt Ltd, dated 24 July 2019 **(Warringtonfire Test)**;
- Test Report in accordance with AS 1530.3-1999, ref. FNR12292, prepared by CSIRO, dated 12 December 2018 **(CSIRO Test)**.

2. DESCRIPTION:

2.1. GENERAL

Mitsubishi has developed a new product under the commercial name Alpolic NC and is looking to distribute it in the Australian market. Alpolic NC is the Aluminium Composite Panel **(ACP)** with entirely mineral core (0% Polyethylene).

Alpolic NC application that falls within the scope of this Technical Note is its installation as the part of external walls. As such this Technical Note considers the following to be relevant:

- DTS Clause C1.9(a) of the BCA; and
- Performance Requirement CP2.

2.2. REVIEW

Alpolic NC ACPs consist of the following base layers:

- Skin material (0.5 mm thick): 0.5mm Thick Aluminium Alloy (3105-H14);
- Core material (3 mm thick): Aluminium Tri-Hydroxide, Calcium Carbonate and a polymer binder;

- Surface finish (no more than 100 μm thick): Fluoropolymer based coating.

Alpolic NC core material was tested in accordance with AS 1530.1-1994 (Warringtonfire Test) and it was determined that the material is not deemed combustible according to the test criteria for combustibility specified in Clause 3.4 of AS 1530.1:1994 (R2016).

Alpolic NC ACP was also tested in accordance with AS 1530.3-1999 (CSIRO Test) and achieved the following indices:

- Ignitability Index, 0;
- Spread of Flame Index, 0;
- Heat Evolved Index, 0; and
- Smoke Developed Index, 0-1.

Based on the above results it is evident that the tested specimen did not ignite during the test (Ignitability Index (0)). The Smoke Developed Index was 0-1, which corresponds to very little smoke being given off. The Spread of Flame Index was found to be 0, indicating flame spread is unlikely.

Clause C1.9(a) of the BCA specifies requirements for certain building elements in Type A and B construction to be non-combustible (Figure 1).

C1.9 Non-combustible building elements

(a) In a building *required* to be of Type A or B construction, the following building elements and their components must be *non-combustible*:

(i) *External walls* and *common walls*, including all components incorporated in them including the facade covering, framing and insulation.

(ii) The flooring and floor framing of lift pits.

(iii) Non-*loadbearing internal walls* where they are *required* to be *fire-resisting*.

Figure 1 – Clause C1.9(a), extract from the NCC 2019 Volume One

Performance Requirement CP2 deals with fire spread to exits, to sole-occupancy units, to public corridors, between buildings and in a building (Figure 2).

CP2 Spread of fire

(a) A building must have elements which will, to the degree necessary, avoid the spread of fire—

(i) to *exits*; and

(ii) to *sole-occupancy units* and *public corridors*; and

Application:
CP2(a)(ii) only applies to a Class 2 or 3 building or Class 4 part of a building.

(iii) between buildings; and

(iv) in a building.

(b) Avoidance of the spread of fire referred to in (a) must be appropriate to—

(i) the function or use of the building; and

(ii) the *fire load*; and

(iii) the potential *fire intensity*; and

(iv) the *fire hazard*; and

(v) the number of *storeys* in the building; and

(vi) its proximity to *other property*; and

(vii) any active *fire safety systems* installed in the building; and

(viii) the size of any *fire compartment*; and

(ix) *fire brigade* intervention; and

(x) other elements they support; and

(xi) the *evacuation time*.

Figure 2 – Performance Requirement CP2, extracted from NCC 2019 Volume One

From AS 1530.1 test it is evident that Alpolic NC can be considered to be non-combustible as defined in NCC 2019 Volume One. Moreover, Alpolic NC has not indicated a propensity for fire spread in the medium-scale (AS 1530.3) test.

Therefore, in our opinion installation of Alpolic NC as part of an non-combustible external wall would not compromise Performance requirements CP2 and Clause C1.9(a) of the DTS Provisions.

Having said that, to determine whether the whole of the external wall assembly would comply with all the relevant Performance Requirements and / or DTS Provisions it would be necessary to conduct a holistic and comprehensive assessment of the wall on a case-by-case basis.

REFERENCES:

A reaction-to-fire test in accordance with AS 1530.1:1994 (R2016), Mitsubishi Alpolic NC, Warringtonfire Pty Ltd, RTF190153 R3.0, dated 24 July 2019.

AS/NZS 1530.3:1999 Simulteneious Determination of Ignitability, Flame Propagation, Heat Release and Smoke Release, 4-mm Alpolic NC, CSIRO, FNR12292, dated 12 December 2018.

Summary of Technical Data Sheet – Alpolic NC, Mitsubishi Chemical, ref 11-2018.

National Construction Code Series, Volume 1, Building Code of Australia 2019, Australian Building Codes Board.

Prepared By

Viktor Yarchuk
Graduate Fire Safety Engineer
for Stephen Grubits & Associates Pty Ltd

Approved By

Carlos Quaglia
Managing Director
C10 – BPB0334

APPENDIX A. AS 1530.3 TEST CERTIFICATE

Certificate of Test

Quote No.: NE8089 **REPORT No.: FNE12292**

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

TRADE NAME: 4-mm ALPOLIC NC

SPONSOR: Mitsubishi Chemical Corporation
1-1, Maruouchi 1-chome
CHIYODA-KU 100-8251
JAPAN

DESCRIPTION OF SAMPLE: The sponsor describe the tested specimen as an aluminium composite panel comprised of the following layers:

Layer 1:	28-µm thick fluoropolymer coating;
Layer 2:	0.5-mm thick aluminium alloy skin;
Layer 3:	35-µm thick adhesive film;
Layer 4:	3-mm thick core comprised of polymers, aluminium hydroxide ($Al(OH)_3$), calcium carbonate ($CaCO_3$) and additives.
Layer 5:	35-µm thick adhesive film;
Layer 6:	0.5-mm thick aluminium alloy skin;
Layer 7:	5-µm thick polyester coating.

The aluminium alloy skin was adhered onto the core with an adhesive film applied at an application rate of 0.057-m^2/l.

Nominal total thickness:	4 mm
Nominal total mass:	8.6 kg/m^2
Colour:	silver (face)/ off-white (back)

TEST PROCEDURE: Six samples were tested in accordance with AS/NZS 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 ($log_{10}D$)	-2.22	0.119

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	0 - 1

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: 6 December 2018

Issued on the 12th day of December 2018 without alterations or additions.

Shaw Tran
Testing Officer

Brett Roddy
Team Leader, Fire Testing and Assessments

NATA Accredited Laboratory
Number: 165
Corporate Site No 3625
Accredited for compliance with ISO/IEC 17025 – Testing.

CSIRO INFRASTRUCTURE TECHNOLOGIES
14 Julius Avenue, Riverside Corporate Park, North Ryde NSW 2113 AUSTRALIA
Telephone: 61 2 9490 5444 Facsimile: 61 2 9490 5555 www.csiro.au

APPENDIX B. EXTRACT FROM AS 1530.1 TEST REPORT

warringtonfire
Proud to be part of element

Reaction-to-fire test report

A reaction-to-fire test in accordance with AS 1530.1:1994 (R2016)

Test sponsor: Mitsubishi Chemical Corporation

Product: Mitsubishi ALPOLIC™ NC

Job number: RTF190153

Test date: 2 July 2019 Revision: R3.0

ilac-MRA NATA

warringtonfire RTF190153 R3.0

Amendment schedule

Version	Date	Information about the report		
R1.0	8 July 2019	Description	Initial issue	
			Prepared by	Reviewed and Authorised by
		Name	Emma Richardson	Anthony Rosamilia
		Signature		
R2.0	11 July 2019	Description	Change to product name	
			Prepared by	Reviewed and Authorised by
		Name	Emma Richardson	Anthony Rosamilia
		Signature		
R3.0	24 July 2019	Description	Change to the company address	
			Prepared by	Reviewed and Authorised by
		Name	Emma Richardson	Anthony Rosamilia
		Signature		

1. Introduction

This report documents the findings of the fire hazard properties of Mitsubishi ALPOLIC™ NC tested in accordance with AS 1530.1:1994 (R2016) and the supplementary standard of ISO 1182:2010 on 2 July 2019.

Warringtonfire Australia did the test at the request of Mitsubishi Chemical Corporation.

Table 1 Test sponsor details

Test sponsor	Address
Mitsubishi Chemical Corporation	1-1, Marunouchi 1 - chome Chiyoda-Ku Tokyo 100-8251 Japan

2. Product description

Table 2 describes the sampled product.

Table 2 Product description

Product name	Description
Mitsubishi ALPOLIC™ NC	The material was comprised of Aluminium Tri-Hydroxide, Calcium Carbonate and a polymer binder as nominated by the test sponsor. The material is to be used as the core of Mitsubishi ALPOLIC™ NC Aluminium Composite Panels, which will be used on internal and external walls as lining and cladding, as nominated by the test sponsor. The material was firm, not brittle, was off white in colour and had a measured density of 1803 $kg \cdot m^{-3}$. Warringtonfire personnel were not involved with the selection of the material. Before conducting these tests, the test specimens were conditioned in a ventilated oven maintained at a temperature of 60±5° C for between 20 and 24 hours. Prior to conducting these tests, the samples were cooled to room temperature in a desiccator.

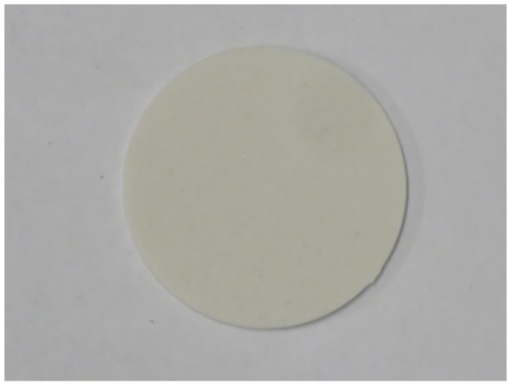

Figure 1 Photo of product

Table 4 Summary of results

Characteristic	Result
Mean furnace temperature rise:	1.7 °C
Mean specimen centre thermocouple temperature rise:	8.5 °C
Mean specimen surface thermocouple temperature rise:	0.4 °C
Mean duration of sustained flaming:	0 seconds
Mean mass loss:	34.4 %

4. Criteria of combustibility

Clause 3.4 of AS 1530.1:1994 (R2016) defines a combustible material as one for which; the duration of sustained flaming – as determined by summing the individual durations of flaming of 5 seconds or longer for all the samples and dividing by five, is greater than zero, or the arithmetic mean of the temperature rise of the furnace thermocouple exceeds 50° C or the arithmetic mean of the specimen surface thermocouple temperature rise exceeds 50° C.

Decision rule

Any measurement resulting in a temperature rise of 50° C or more is taken to meet the temperature rise criteria for combustibility.

5. Observations

Table 5 Test observation

Observations
The top of each specimen charred. Charring started around the edge and spread to cover the top before gradually disappearing.
A light odour and 'crackling' sound were both detected.

Post-test observation

The specimens maintained their shape during testing but became powdery in texture and crumbled with very little force. The colour of the specimens had also changed. The specimens were bright white after having been tested.

6. Comments

The material is NOT DEEMED COMBUSTIBLE according to the test criteria for combustibility specified in Clause 3.4 of AS 1530.1:1994 (R2016).

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

All five tests were ended after 3600 seconds as per Section 7.4.7 in ISO 1182:2010.