

Fire performance of Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating

Assessment Report

Author: Russell Collins
Assessment Number: FCO-3189
Quote Number: CO4694

Date: 18 April 2016
Version: Revision A draft

Client: CSP - Architectural & SGI - Architectural

Commercial-in-confidence

Enquiries should be addressed to:

Fire Testing and Assessments	Author	The Clients	
NATA Registered Laboratory 14 Julius Avenue North Ryde, NSW 2113 Australia Telephone +61 2 94905444	Infrastructure Technologies 14 Julius Avenue North Ryde, NSW 2113 Australia Telephone +61 2 94905445	CSP - Architectural 1029 – 1035 Ballarat Road Deer Park, VIC 3023 Australia Telephone +61 3 9361 9999	SGI – Architectural Unit 31 / 5-7 Inglewood Place Baulkham Hills NSW Australia




Assessment Report Details

Report CSIRO Reference number: FCO-3189/4694.

Report Status and Revision History

VERSION	STATUS	DATE	DISTRIBUTION	ISSUE NUMBER
Revision A	Final for issue	18/04/2016	CSIRO; CSP Architectural; SGI – Architectural	FCO-3189

Test Report Authorisation

AUTHOR	REVIEWED BY	AUTHORISED BY
Russell Collins	Brett Roddy	Brett Roddy
		
18 April 2016	18 April 2016	18 April 2016

Copyright and disclaimer

© 2016 CSIRO To the extent permitted by law, all rights are reserved and no part of this publication covered by copyright may be reproduced or copied in any form or by any means except with the written permission of CSIRO.

Important disclaimer

This assessment report will lapse on 30 April 2021. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

CSIRO advises that the information contained in this publication comprises general statements based on scientific research. The reader is advised and needs to be aware that such information may be incomplete or unable to be used in any specific situation. No reliance or actions must therefore be made on that information without seeking prior expert professional, scientific and technical advice. To the extent permitted by law, CSIRO (including its employees and consultants) excludes all liability to any person for any consequences, including but not limited to all losses, damages, costs, expenses and any other compensation, arising directly or indirectly from using this publication (in part or in whole) and any information or material contained in it.

Contents

Executive summary.....	4
1 Introduction	5
2 Supporting Data	5
2.1 CSIRO Certificate of Test numbered FNE11686A.....	5
2.2 CSIRO Certificate of Test numbered FNC11685.....	5
2.3 Fire Protection Handbook.....	6
3 Proposal.....	6
4 Analysis.....	6
5 Conclusion.....	7
6 Term of validity	7
References.....	8

Executive summary

This report provides the assessment of this Division on the likely performance of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” when assessed to the non-combustible materials requirements specified by Part C1.12 of the Building Code of Australia.

“Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” was described as an aluminium composite sandwich panel comprising of 6 layers:

- Layer 1: 26- μ m thick polyvinylidene fluoride (PVDF) coating;
- Layer 2: 0.5-mm thick aluminium sheet;
- Layer 3: 50- μ m thick 9.3 g/m² polymeric membrane adhesive;
- Layer 4: 3-mm thick core comprising 99.5% inorganic and 0.5% organic compounds;
- Layer 5: 50- μ m thick 9.3 g/m² polymeric membrane adhesive;
- Layer 6: 0.5-mm thick aluminium sheet.

Based on the AS/NZS 1530.3 test results in CSIRO Certificate of Test FNE114686A, AS 1530.1 test results in CSIRO Certificate of Test numbered FNC11685, and requirements specified in Part C1.12 of the Building Code of Australia, “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” may be used where non-combustible materials are required.

Fire performance of Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating

1 Introduction

This report provides the assessment of this Division on the likely performance of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” when assessed to the non-combustible materials requirements specified by Part C1.12 of the Building Code of Australia.

This Division conducted an AS/NZS 1530.3 test on “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating”, reported in CSIRO Certificate of Test FNE11686A, and an AS 1530.1 test on the core material of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating”, reported in CSIRO Certificate of Test FNC11685. The data from these tests is used to support this assessment report.

2 Supporting Data

2.1 CSIRO Certificate of Test numbered FNE11686A

On 20 November 2015 this Division conducted a fire test on “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” to AS/NZS 1530.3-1999. Certificate of Test numbered FNE11686A, issued 11 April 2016 by CSIRO, details the test results. The results of this test were:

Ignitability Index:	0
Spread of Flame Index:	0
Heat Release Index:	0
Smoke Developed Index:	1

“Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” was described as an aluminium composite sandwich panel comprising of 6 layers:

- Layer 1: 26- μ m thick polyvinylidene fluoride (PVDF) coating;
- Layer 2: 0.5-mm thick aluminium sheet;
- Layer 3: 50- μ m thick polymeric membrane;
- Layer 4: 3-mm thick core comprising 99.5% inorganic and 0.5% organic compounds;
- Layer 5: 50- μ m thick polymeric membrane;
- Layer 6: 0.5-mm thick aluminium sheet.

The layers were adhered together using polymeric membrane adhesive with an application rate of 9.3 g/m².

2.2 CSIRO Certificate of Test numbered FNC11685

On 16 December 2015 this Division conducted a fire test on the core material of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” to AS 1530.1-1994. Certificate of Test

numbered FNC11685, issued 11 April 2016 by CSIRO, details the test results. The maximum furnace temperature rise was 2.8°C for all specimens, the maximum temperature rise for the specimen surface thermocouple was 1.8°C for all specimens and the duration of sustained flaming was 0 seconds. The material is NOT deemed COMBUSTIBLE according to the test criteria specified in Clause 3.4 of AS 1530.1-1994.

The core material of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” was described as a core material made of inorganic compounds comprising of calcium carbonate (CaCO₃), magnesium hydroxide (Mg(OH)₂) and aluminium hydroxide ((Al(OH)₃), and 0.5% organic compounds.

2.3 Fire Protection Handbook

Table 8.16.1 of the Fire Protection Handbook indicates that aluminium in solid state will ignite above 1000°C.

3 Proposal

You have proposed the design of an aluminium faced bonded laminated material, with a core comprising 99.5% inorganic and 0.5% organic compounds. The core comprises of calcium carbonate (CaCO₃), magnesium hydroxide (Mg(OH)₂) and aluminium hydroxide ((Al(OH)₃), and 0.5% organic compounds, faced with 0.5-mm thick aluminium skin finished with polyvinylidene fluoride, and backed with 0.5-mm aluminium thick skin.

4 Analysis

Part C1.12 (e) of the Building Code of Australia (BCA), 2016, states that ‘Pre-finished metal sheeting having a combustible surface finish not exceeding 1 mm thickness and where the Spread-of-Flame Index of the product is not greater than 0’ may be used wherever a non-combustible material is required. Based upon Certificate of Test FNE11686A the facing of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” aluminium sheet fits these criteria.

Part C1.12 (f) of the Building Code of Australia (BCA), 2016, states that ‘Bonded laminated materials...’ where: ‘...

- i. Each laminate is *non-combustible*; and
- ii. Each adhesive layer does not exceed 1 mm in thickness; and
- iii. The total thickness of the adhesive layers does not exceed 2 mm; and
- iv. The *Spread-of-Flame Index* and the *Smoke-Developed Index* of the laminated material as a whole does not exceed 0 and 3 respectively.’

Your product comprises facings of aluminium sheet. To deem a material combustible when tested to AS 1530.1, the material is tested in a tube furnace at 750°C. Table 8.16.1 of the Fire Protection Handbook indicates that aluminium in solid state will not ignite at this temperature. Consequently, the aluminium base of these facings would not be deemed combustible when tested to AS 1530.1 and would meet the definition of non-combustible in the Building Code of Australia. CSIRO Certificate of Test FNC11685 shows that the a core material of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” is not deemed combustible when tested to the requirements of AS 1530.1-1994

Each layer of the sandwich panel comprises non-combustible material; each adhesive layer is not greater than 1-mm thick and the total thickness of adhesive layers is not greater than 2-mm; the Spread-of-Flame Index and Smoke-Developed Index for the sandwich panel was 0 and 1 respectively.

Considering the above information, the finished panel meets both (e) and (f) of Part C1.12 of the Building Code of Australia, and consequently, according to Part C1.12, may be used where non-combustible materials are required.

5 Conclusion

Based on the factors detailed previously it is the assessment of the Division that your “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating” may be used where non-combustible materials are required, as specified by Part C1.12 of the Building Code of Australia.

6 Term of validity

This assessment report will lapse on 30 April 2021. Should you wish us to re-examine this report with a view to the possible extension of its term of validity, would you please apply to us three to four months before the date of expiry. This Division reserves the right at any time to amend or withdraw this assessment in the light of new knowledge.

References

The following informative documents are referred to in this Report:

AS 1530.1-1994	Australian Standard 1530, Method for fire tests on building components and structures, Part 1 – Combustibility test for materials. 1994
AS/NZS 1530.3-1999	Australian/New Zealand Standard 1530: Method for fire tests on building materials, components and structures, Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release, 1999
FNE11686A	AS/NZS 1530.3-1999 Certificate of Test on “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating”
FNC11685	AS 1530.1 Certificate of Test on the core material of “Alcadex A1 - 4mm Fireproof Aluminium Composite Panel with PVDF coating”
BCA	Building Code of Australia (BCA), 2016
Fire Protection Handbook, Nineteenth Edition, Volume II, NFPA 2003	

CONTACT US

t 1300 363 400
+61 3 9252 6000
e enquiries@csiro.au
w www.csiro.au

YOUR CSIRO

Australia is founding its future on science and innovation. Its national science agency, CSIRO, is a powerhouse of ideas, technologies and skills for building prosperity, growth, health and sustainability. It serves governments, industries, business and communities across the nation.

FOR FURTHER INFORMATION

Infrastructure Technologies

Russell Collins
Fire Testing Officer
t +61 2 94905436
e russell.collins@csiro.au
w www.csiro.au/Organisation-Structure/Flagships/Future-Manufacturing-Flagship/Infrastructure-Technologies/Fire-safety.aspx

Infrastructure Technologies

Brett Roddy
Manager, Fire Testing and Assessments
t +61 2 94905449
e brett.rodny@csiro.au
w www.csiro.au/Organisation-Structure/Flagships/Future-Manufacturing-Flagship/Infrastructure-Technologies/Fire-safety.aspx