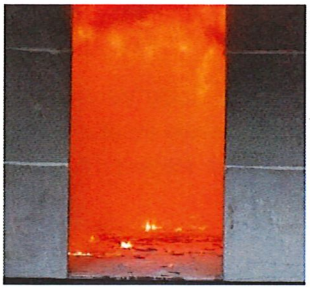
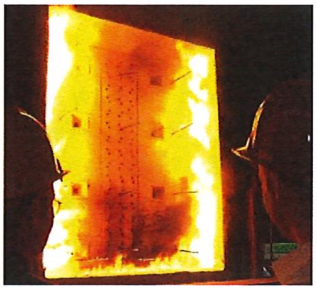
BRANZ
1222 Moonshine Road
Judgeford RD1
Porirua 5381
New Zealand
T +64 4 237 1170
F +64 4 237 1171
branz@branz.co.nz
www.branz.co.nz


FIRE ASSESSMENT REPORT

FAR 4047

ASSESSMENT REPORT ON ALUCOBOND PLUS

CLIENT
Kaneba Limited (Alucobond NZ)
9-11 Rothwell Avenue
Rosedale
North Shore 0632
New Zealand

ASSESSMENT OBJECTIVE

This report gives BRANZ's assessment of the fire performance in accordance with the New Zealand Building Code C/VM2 (ISO 9705) in respect to the fire performance of wall and ceiling linings for "Alucobond plus".

CONCLUSION

It is considered that in accordance with the New Zealand Building Code Verification Method C/VM2 Appendix A, the results of the "Alucobond plus" panels installed and tested in accordance with ISO 9705:1993 as described in Test Report Number 14576A, would achieve the following performance.

Group Number Classification	**1-S**
The average smoke production rate less than the 5.0 m^2/s limit.	

LIMITATION

This report is subject to the accuracy and completeness of the information supplied.

BRANZ reserves the right to amend or withdraw this assessment if information becomes available which indicates the stated fire performance may not be achieved.

This assessment report may only be quoted or reproduced in full.

TERMS AND CONDITIONS

This report is issued in accordance the Terms and Conditions as detailed and agreed in BRANZ Services Agreement for this work.

CONTENTS

SIGNATORIES

Author

P. N. Whiting
Senior Fire Engineer/Fire Testing Team Leader

Reviewer

E. Soja
Senior Fire Safety Engineer

DOCUMENT REVISION STATUS

ISSUE NO.	DATE ISSUED	DESCRIPTION
1	20 April 2013	Initial Issue

1. INTRODUCTION

This report gives the BRANZ assessment of the New Zealand Building Code Group Number Classification for "Alucobond plus" based on testing in accordance with ISO 9705 1993.

The "Alucobond plus" panels comprise nominally 0.5 mm thick aluminium to each face of a nominally 2.8 mm thick mineral filled core, with the aluminium facings of the panels lacquered on the outer faces.

2. BACKGROUND

In Warringtonfiregent test report 14576A, "Alucobond plus" panels were installed onto an aluminium structural grid and subjected to testing in accordance with ISO 9705 – 1993 for a duration of 20 minutes without flashover.

Alucobond (3A Composites) has granted authority to Kaneba Limited to reference the test results in the above report in support of this assessment.

3. NEW ZEALAND BUILDING CODE

The New Zealand Building Code (NZBC) clause C3.4 requires materials used as internal surface linings in specified areas of a building that must achieve a Group Number through performance determined under the conditions prescribed in ISO 9705:1993 (the test standard). This is defined in the Verification Method C/VM2 Appendix A: Establishing Group Numbers for lining materials.

The Group number for a material or assembly is determined based on the 'time to flashover' as follows:

- Group 1 – does not reach flashover during the 20 minutes test
- Group 2 – reaches flashover after 10 minutes
- Group 3 – reaches flashover after 2 minutes, and before 10 minutes
- Group 4 – reaches flashover within 2 minutes.

In the Building Code, where Group 1 or 2 materials are required, the average smoke production rate (SPR) is also considered. If the SPR is lower than the prescribed limit of 5.0 m^2/s, the material may be used in buildings with or without a sprinkler system and is thus denoted with a "S" postscript to the Group Number. A Group 1 or 2 material with a SPR exceeding the limit may only be used in buildings protected with a sprinkler system.

The SPR is to be determined from the ISO 9705 test over the period from 0 to 20 minutes for a Group 1 material and over the period from 0 to 10 minutes for a Group 2 material. The SPR is not used in relation to a Group 3 or 4 material.

4. DISCUSSION

In Report 14576A, the "Alucobond plus" panels were face fixed to a metal grid frame within the ISO 9705 room facility. The test was conducted in accordance with ISO 9705, the specimen subjected to a heat output from the burner of 100 kW for first 10 minutes followed by 300 kW from the second 10 minutes. The burner was extinguished 20 minutes after the start of the test.

In the above test, the "Alucobond plus" panel lined room did not reach flashover at any time during the 20 minute test, recording a maximum rate of heat release of 820.3 kW (burner output of 300 kW + burning specimen contribution of 520.3 kW) at 1200 s. During the test, the SPR recorded a maximum of 0.9 m^2/s at 1041 s.

The smoke production rate recorded a maximum of 0.9 m^2/s (at 1041 s) during the 20 minutes test. Therefore the smoke production rate when averaged over the entire 20 minutes duration of the test could not exceed the NZBC limit of 5.0 m^2/s. In accordance with Verification Method C/VM2 Appendix A, results achieving either a Group number classification 1 or 2, and with an averaged smoke production rate less than 5.0 m^2/s are identified with "S" post-script to the Group number

5. CONCLUSION

It is therefore considered that in accordance with the New Zealand Building Code Verification Method C/VM2 Appendix A, the results of the "Alucobond plus" panels installed and tested in accordance with ISO 9705:1993 as described in Test Report Number 14576A, would be deemed to achieve a Group Number 1-S classification.

Group Number Classification	**1-S**
The average smoke production rate less than the 5.0 m^2/s limit.	

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Unit 1, 9-11 Rothwell Avenue,
Rosedale, Auckland, 0632
PO Box 303-388, North Harbour,
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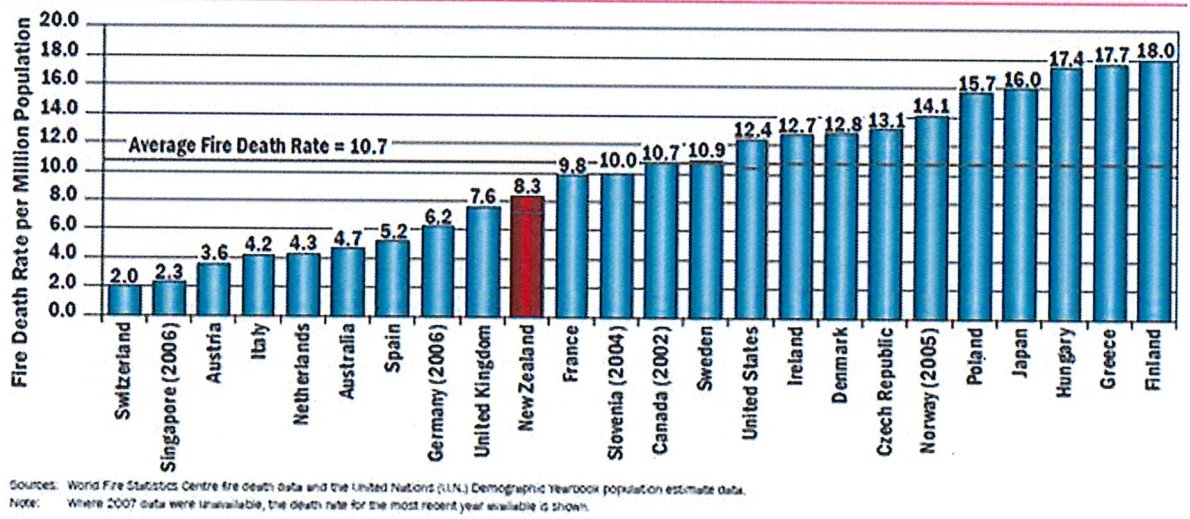
ALUCOBOND NZBC SECTION C3 COMPLIANCE

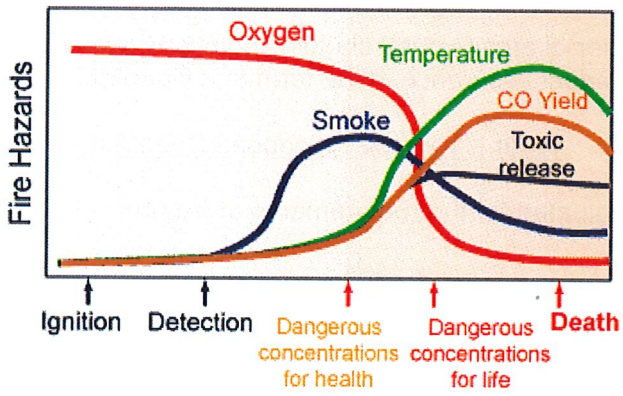
OVERVIEW

For valid reasons the New Zealand Building Code requires buildings to be constructed so that there is a low probability of harming people, even if they are not in close proximity to a fire source. People in a property or neighbouring property could also be harmed through **spread of flame of the exterior cladding** of a building, or by **spread of flame and smoke development inside a building**.

Figure 1. 2007 International Fire Death Rates per Million Population



Sources: World Fire Statistics Centre fire death data and the United Nations (U.N.) Demographic Yearbook population estimate data.
Note: Where 2007 data were unavailable, the death rate for the most recent year available is shown.



Reasons for fatalities:
1) 23% Smoke inhalation and burns
2) 51% Smoke inhalation only
3) 25% Burns only
4) 1% Other

NFPA Estimates 2003 – 2007: All fire related deaths, not only those in buildings

THE ALUCOBOND PLUS SOLUTION

The generic term for Alucobond is aluminium composite material (ACM) and there are many different ACM manufacturers. ACM is not used to stop fire since it consists of two aluminium skins covering a core material, usually 3mm thick; however quality ACM designed for use on a building can be expected to not spread flame in the event of a fire.

The facts are:

1) Many ACM manufacturers promote an "FR" version of their ACM product. Could FR reasonably be misinterpreted as Fire Rated, Fire Resistant or Fire Retardant? Some suppliers incorrectly refer to their FR product as non-combustible[1]. The reference FR is therefore relative and does not assure a certain performance.

   To avoid confusion Alucobond have two product versions featuring low combustibility and name them **Alucobond PLUS** and **Alucobond A2**.

2) "FR" versions between different ACM brands perform differently when exposed to fire. Naming a panel FR is therefore not stating it meets a minimum standard – it is just a product code and is solely dependent on the manufacturer's definition of FR.

   The Burnable Thermal Units (BTU) of the core material sandwiched between the aluminium skins affects the performance of an ACM under exposure of flame. Alucobond PLUS and A2 have low BTU values enabling it to pass testing accepted by the NZBC.

3) When evaluating ACM for suitability on a building section C3 *"fire affecting areas beyond the fire source"* of the NZBC stipulates the requirements for exterior and interior surface finishes. According to the definition of the code ACM is considered a surface finish on buildings and the acceptable performance measured as follows:

   a. Externally > Evaluated on the ability to not spread flame
      Alucobond PLUS complies by passing testing under NFPA 285.

   b. Internally > Evaluated by the amount of smoke production and heat released
      Alucobond PLUS complies by passing testing under ISO 9705 and is classified a group 1-S material, the best classification group available.

4) Alucobond PLUS is therefore suitable for both exterior and interior application in all risk groups of the NZBC. Alucobond "A2" is manufactured with an even higher specification which is less combustible and is mostly used in European countries.

At Kaneba we strive to be the most trusted provider of architectural cladding solutions in New Zealand, which is why we provide the ultimate product assurance in the form of a CodeMark.

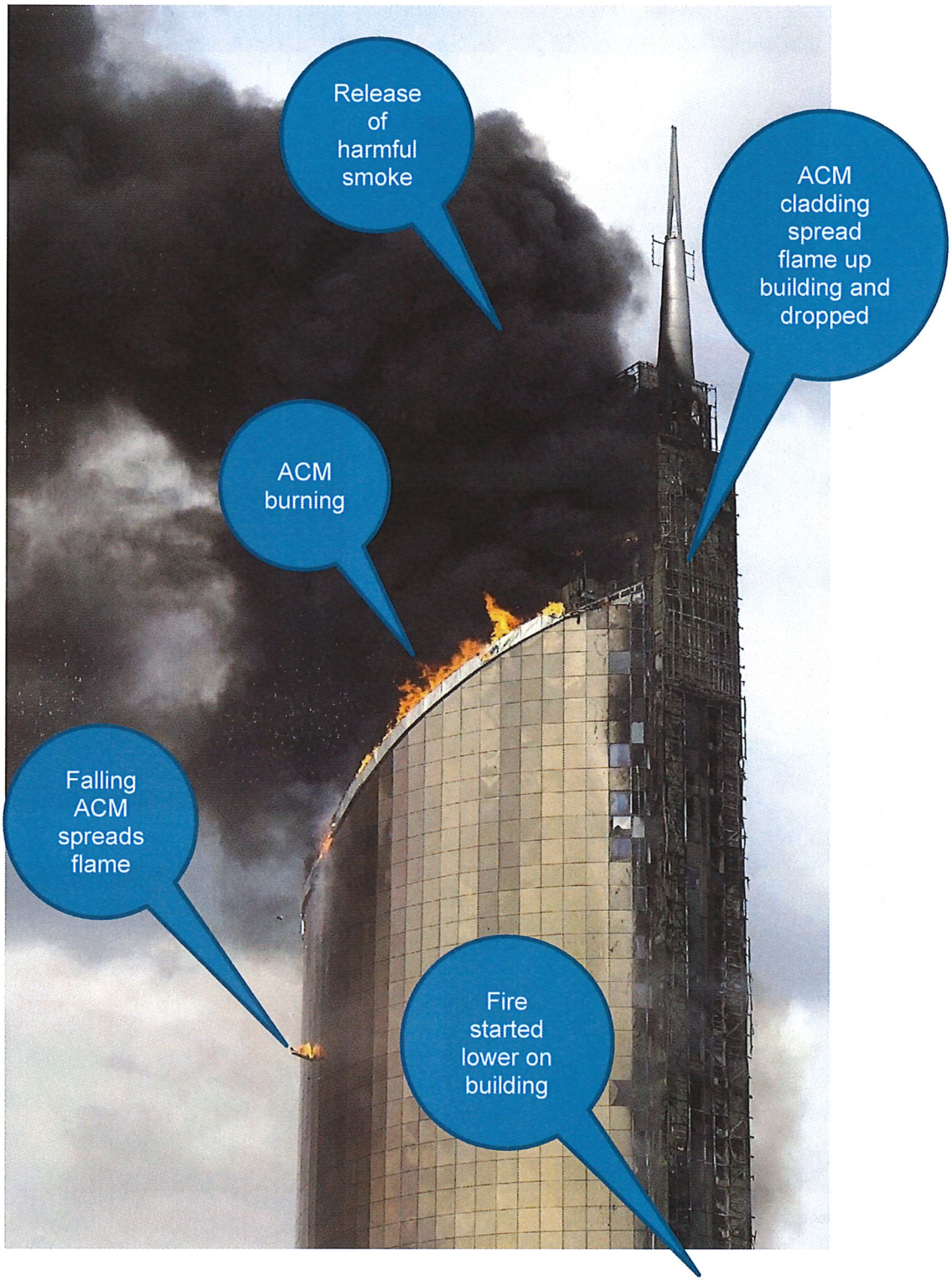
Kaneba Alucobond CodeMark certificate What is Kaneba Alucobond CodeMark?

It is essential that the job specific fire report is evaluated for the requirements of exterior and interior surface finishes.

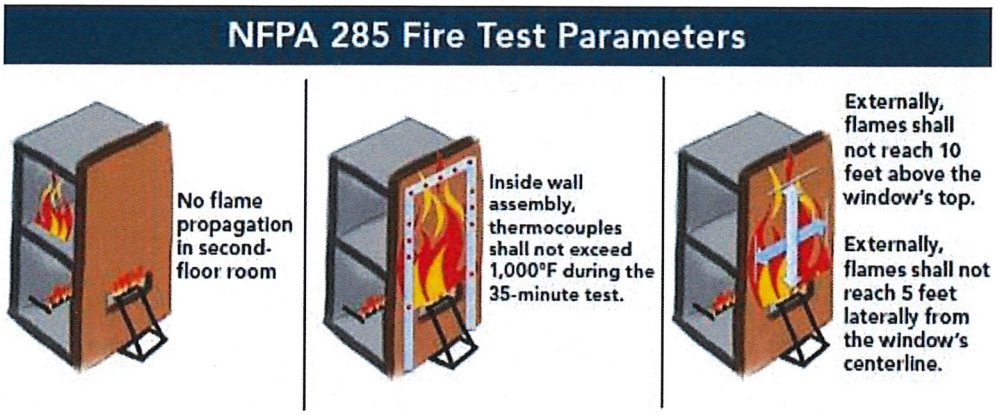
For further support please e-mail jan@kaneba.co.nz

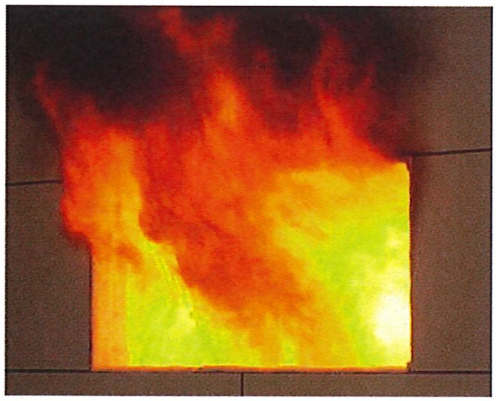
[1] In relation to the NZBC as determined under AS1530 Part 1.

EXAMPLE OF UNSUITABLE ACM APPLICATION SPREADING FLAME

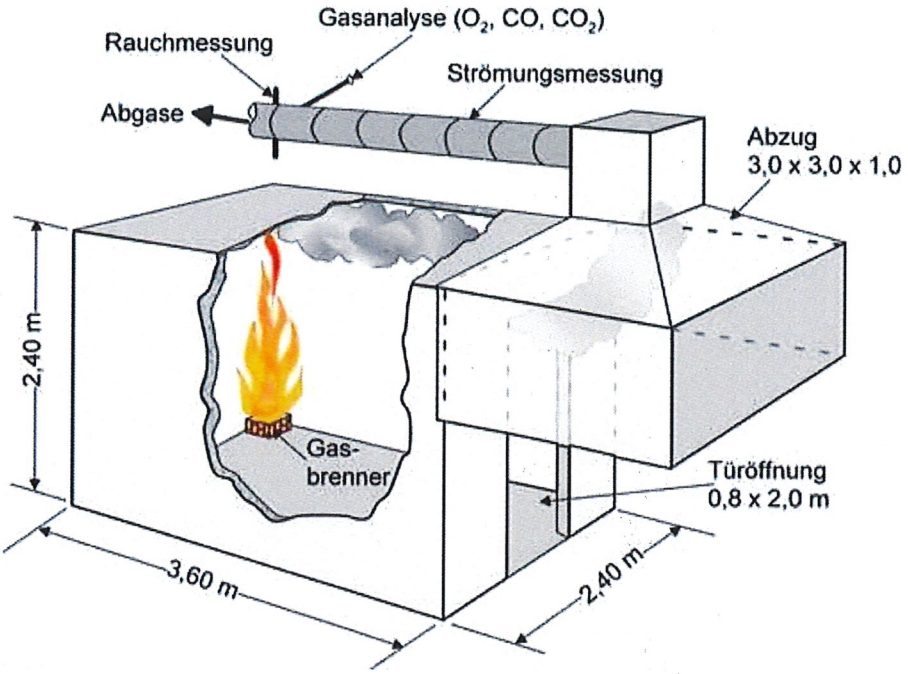


EXAMPLE OF WHERE ALUCOBOND PLUS IS TESTED FOR EXTERIOR APPLICATION

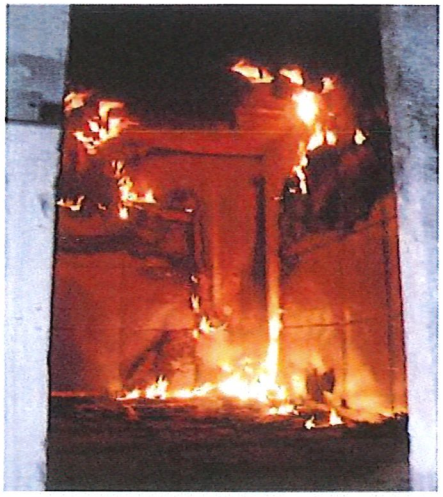


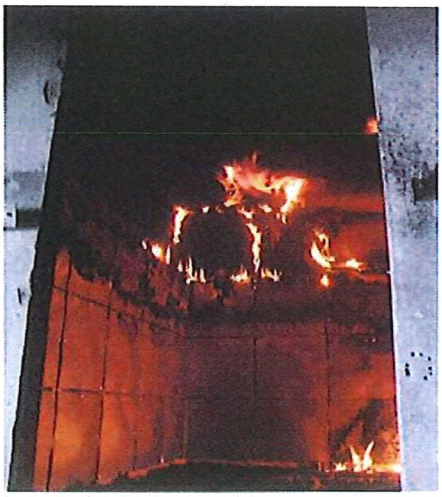


EXAMPLE OF WHERE ALUCOBOND PLUS IS TESTED FOR INTERIOR APPLICATION



Fire in room corner test according to ISO 9705





Images taken while testing Alucobond PLUS in accordance with ISO 9705

Thickness		**Standards**	**Unit**	**3 mm**	**4 mm**
Thickness of Aluminium Layers			[mm]	0.5	
Weight			[kg/m²]	5.9	7.6
Width			[mm]	1000 / 1250 / 1500 (1575 / 1750)	

Technical properties

Section modulus	W	DIN 53293	[cm³/m]	1.25	1.75
Rigidity	E·J	DIN 53293	[kNcm²/m]	1250	2400
Alloy / Temper of Aluminium Layers		EN 573-3 EN 515		EN AW 5005A (AlMg1) H22 / H42	
Modulus of Elasticity		EN 1999 1-1	[N/mm²]	70.000	
Tensile Strength of Aluminium		EN 485-2	[N/mm²]	$R_m \geq 130$	
0.2 % Proof Stress		EN 485-2	[N/mm²]	$R_{p0,2} \geq 90$	
Elongation		EN 485-2	[%]	$A_{50} \geq 5$	
Linear Thermal Expansion		EN 1999 1-1		2.4 mm/m at 100°C temperature difference	

Core

Mineral filled polymer

Surface

Lacquering				Coil Coating Fluorocarbon (e.g. PVDF)	
Gloss (initial value)		EN 13523-2	[%]	30-80	
Pencil Hardness		EN 13523-4		HB-F	

Acoustical Properties

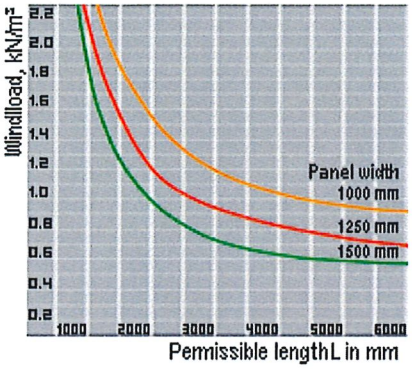
Sound Absorption Factor	α_s	ISO 354		0.05	
Sound Transmission Loss	R_w	ISO 717-1	[dB]	≥ 25	

Thermal Properties

Thermal Resistance	R	DIN 52612	[m²K/W]	0.007	0.009
Thermal conductivity	λ	DIN 52612	[W/mK]	0.49	0.44
Heat transition coefficient	U	DIN 52612	[W/m²K	5.68	5.58
Temperature Resistance			[°C]	-50 to +80	

Wind load and permissible panel sizes

ALUCOBOND® plus 4 mm



The graphs for 4 mm thick **ALUCOBOND® plus** indicate the maximum permissible panel length ($\sigma = 51$ N/mm²) (without having to add a stiffener) based in applicable design wind load and panel width. Values apply to 4-side supported panels. Values for other systems on request.

Approvals

Country	Approval	Name	Approval authority
Belgium	ATG 12/2368	**ALUCOBOND®** Cassettes; Bardage rapporté	UBATc, Bruxelles
Czech Republic	c.216/C5a/2013/0022	**ALUCOBOND®**	PAVUS a.s., Praha
France	n° 2/09-1372	**ALUCOBOND®** Riveté	CSTB, Paris
France	n° 2/09-1371	**ALUCOBOND®** Cassettes	CSTB, Paris
Germany	Z-33.2-6	**ALUCOBOND®** Fassadensystem	DIBt, Berlin
Great Britain	No 05/4214	**ALUCOBOND®** Cladding System	British Board of Agrément (BBA), Garston
Poland	AT-15-4058	**ALUCOBOND®**	Instytut Techniki Budowlanej, Warszawa
Russia	TC 3750-13	**ALUCOBOND®** Panels and cassettes elements	ФЦС, Moskau
Singapore	011937	Product listing scheme: class 2	PSB Singapore
Slovakia	TO-06/0275	**ALUCOBOND®**	TSUS, Bratislava
Spain	No 345	Sistema de revistimiento de fachadas ventiladas mediante bandejas procedentes de paneles **ALUCOBOND®**	Instituto Eduardo Toroja, Madrid
Spain	No 346	Sistema de revistimiento de fachadas	Instituto Eduardo Toroja,

ventiladas mediante placas remachadas procedentes de paneles **ALUCOBOND®** Madrid

Fire classification

Country	Test accord. to ...	Classification
EU	EN 13501-1	Class B, s1, d0
Germany	EN 1187 (method 1) / DIN 4102-7	passed
France	NF P 92-501	Class M1
Great Britain England / Wales / Scotland	 BS 476-6/7 BS 476-6/7	 Class 0 Class 0
Switzerland	VKF	Class 5.3
Poland	PN-90/B-02807	NRO
Russia	GOST 30244-94 GOST 30402-95 GOST 12.1.044-89 GOST 12.1.044-89	G1 (combustibility) W1 (flammability) D2 (smoke emission) T2 (smoke flammability)
Australia	AS ISO 9705 AS 1530.3 Indices	Group 1 material SMOGR A 1.385 m2 / s2 0 (ignitibility) 0 (flame spread)

	0 (heat evolved)
	0 – 1 (smoke developed)
EN 13501.5	B, s1, d0