

# Industry Alert

Issued 24 February 2016 (Updated 28 June 2016)

## External walls and BCA compliance

Updated to include reference to the publication of AS 5113 *Fire propagation testing and classification of external walls of buildings*, and clarification of the meaning of 'external wall'.

Some terms are used in this Industry Alert which are common building terms but are not defined in the Building Code of Australia. For clarity, the meanings of terms used for the purpose of this Industry Alert are:

**'Attachment'** means:

A supplementary element attached to an external wall or other complete building element.

**'BCA'** means:

Volume One of the National Construction Code.

**'Cladding'** means:

A non-loadbearing covering of a wall system which contributes to the functionality of the external wall, usually but not limited to weatherproofing. (Note: This aligns with common dictionary meanings.)

**'External wall'** means:

The entire wall system which separates the interior air space of the building with the outside air space including any componentry or elements necessary for the external wall to achieve the requirements for structural performance, weather tightness, thermal performance, non-combustibility and *required* FRL if *required* by the type of construction, and any other functionality required under the BCA. This definition excludes any linings, materials and assemblies complying with Clause C1.10 or attachments complying with Specification C1.1 Clause 2.4 that may be applied to the inner or outer surface of the already fully compliant wall.

**'Lining'** means:

Sheet material fixed as an attachment to the external face of an external wall.

Except for 'external wall', terms in *italics* have the same meaning as in the BCA.

### PURPOSE

Following the release of the Metropolitan Fire Brigade's post incident analysis report into the Lacrosse apartment fire and the completed Victorian Building Authority's (VBA) audit of Class 2, 3 and 9 buildings the VBA has become aware of considerable variation in industry understanding regarding the use of aluminium composite panels (ACP) and other *combustible* materials in the construction of external walls. The audit identified that *combustible* materials including ACP have been used in a manner that does not comply with Volume One of the Building Code of Australia.

The purpose of this **Industry Alert** is to clarify circumstances where ACPs and other *combustible* materials may be used in the construction of the external walls of a building in Type A and Type B construction principally in relation to Class 2, 3 and 9 buildings. It is clear from the audit that—

- Building designers, builders and building surveyors are failing to identify whether the material is being used as an integral part of an external wall, or used as an attachment to a complete wall system. This failure can lead to the non-compliant use of a *combustible* material as a component of a wall that is required to be *non-combustible*;
- Appropriate evidence of suitability in accordance with Clause A2.2 was commonly not being provided to, or sought by, relevant building surveyors;

# Industry Alert

- Building designers specifying and relevant building surveyors approving 'generic' brand products such as "**brand name or similar**" where a particular model of that branded product may comply and another model would not.
- Assessments of the use of materials as an attachment have frequently not included an assessment of the conditional requirements of Clause 2.4 of Specification C1.1. Those conditions are that —
  - it is not located near or directly above a *required exit* so as to make the *exit* unusable in a fire; and
  - it does not otherwise constitute an undue risk of fire spread via the facade of the building.
  - the attachment of a facing or finish, or the installation of ducting or any other service, to a part of a building *required* to have an FRL must not impair the *required* FRL of that part
- a *Certificate of Accreditation* issued by the Building Regulations Advisory Committee;
- a Certificate issued under section 238 of the Act by a *professional engineer* registered in the appropriate discipline;
- a current Certificate issued by a product certification body accredited by the Joint Accreditation System of Australia and New Zealand ([JAS-ANZ](#));
- Any other form of documentary evidence that correctly describes the properties and performance of the material or form of construction and adequately demonstrates its suitability for use in the building.

While this **Industry Alert** focusses on ACP's the principles expressed apply to any other material that has **not** been deemed to be *non-combustible* in accordance with AS1530.1 or, under Clause C1.12, may be used where a *non-combustible* material is *required* and used as a component of an external wall or attachment to the external wall of a building.

## EVIDENCE OF SUITABILITY

Evidence to support the use of a material, form of construction or design meets a *Performance Requirement* or *Deemed-to-Satisfy Provision* (D-t-S) as provided for by Clause A2.2 of the BCA may be in the form of:

- a report issued by a *Registered Testing Authority* (Registered with NATA or an authority recognised by NATA);
- a current *Certificate of Conformity* issued under the Australian Building Codes Board (ABCB) CodeMark scheme;

A number of ACP's, and other *combustible* construction products or materials have been issued with *Certificates of Conformity* (Certificate) under the CodeMark scheme. Certificates must be read very carefully to identify the specific requirements of the BCA the building product or material is certified to comply with.

If there is any doubt about a Certificate or other form of evidence of suitability, the body who issued the Certificate should be contacted for clarification. If a Certificate does not provide certainty to a designer or relevant building surveyor regarding the compliance of a product for the particular proposed use, it is not appropriate to rely on the Certificate.

Certificates also commonly contain limitations or conditions for the installation and use of the building material. For instance, a common condition is a requirement that the building material or product must be installed in a particular manner or in accordance with a technical manual supplied by the manufacturer. If a Certificate is accepted then all conditions or limitations listed on the Certificate should be transferred to design documentation including architectural drawings, specifications, and fire engineering reports (FER).

# Industry Alert

## COMPLIANCE PATHWAYS

The BCA contains several pathways to compliance, either D-t-S or a *Performance Solution* or a combination of the two.

In either case the building design must satisfy the relevant Performance Requirements. In relation to fire safety of *external walls*, the principal *Performance Requirement* is CP2. However a number of other Performance Requirements may need to be considered depending on the material used, its location on the *external wall*, the extent of coverage on the wall, whether there are openings in the wall, its location in relation to exits and potential impact on fire brigade intervention.

Given the occurrences at the Lacrosse apartment fire, where the fire threatened to enter the building on numerous floor levels, the failure of the early warning system and the challenge to the fire services, Performance Requirements CP1, CP3, CP4, CP7, CP8 and CP9 may apply and Performance Requirements from other Sections of the BCA may also need to be considered.

## DEEMED-TO-SATISFY (D-T-S)

A number of requirements apply to an *external wall* in Type A or B construction including:

- *Fire-resistance level* (FRL) (Specification C1.1 Tables 3 and 4)
- *Non-combustible* elements (Specification C1.1 Clause 3.1(b) and 4.1(b))
- *Fire hazard properties* of linings, materials or assemblies (Specification C1.10)

## IS IT A WALL OR ATTACHMENT?

### WALLS

The BCA contains a definition of *external wall* which is defined as “an outer wall of a building which is not a *common wall*”. The BCA does not define ‘wall’. A review of dictionary definitions of wall and external wall, and of various provisions and definitions of the BCA leads the VBA to conclude that a reference to an external wall in the context of the BCA is a reference to the entire wall system which separates the interior air space

of the building with the outside air space including any componentry or elements necessary for the external wall to achieve the requirements for structural performance, weather tightness, thermal performance, non-combustibility and *required FRL* if *required* by the type of construction, and any other functionality *required* under the BCA. A simple test to determine whether a material or product is a component of an external wall or an attachment is to determine whether the wall remains fully compliant with all requirements of the BCA if the material or product is removed. If the external wall remains fully compliant, then the material or product is likely to be an attachment. If the external wall is no longer fully compliant or fully functions as an external wall, then the material or product is a component of the external wall.

### Clause C1.1

Clause C1.1 specifies the type of construction *required* for classes of buildings in relation to the *rise in storeys*. Type A construction is required for Class 2, 3 and 9 buildings with a *rise in storeys* of 3 or more and Class 5, 6, 7 and 8 buildings with a *rise in storeys* of 4 or more. Type B construction is required for Class 2, 3 and 9 buildings with a *rise in storeys* of 2 and Class 5, 6, 7 and 8 buildings with a *rise in storeys* of 3. Clause C1.5 provides a conditional ‘concession’ to allow Type C construction in a Class 2 or 3 building with a *rise in storeys* of 2 and a Class 9c building.

### Clauses 3.1(b) and 4.1(b) of Specification C1.1

In accordance with Clauses 3.1(b) and 4.1(b) of Specification C1.1, *external walls* are required to be *non-combustible* for Type A and B construction. In Type A or B construction this means that all componentry of the wall system must be *non-combustible*.

This view is supported by the definition of *non-combustible* which states that “applied to construction or part of a building, constructed wholly of materials that are not deemed *combustible*.”

This means that for external wall construction in

# Industry Alert

Type A or B construction, the outer cladding must be deemed to be *non-combustible* in accordance with AS1530.1 or, under Clause C1.12, may be used where a *non-combustible* material is required<sup>1</sup>.

It is noted that Clause C1.12 provides for 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.

In accordance with C1.12, all laminates of a bonded laminated material including ACP must be *non-combustible* within the meaning of the BCA. Therefore, under the D-t-S provisions of the BCA, ACPs with a polyethylene based core (including with mineral fibre content) or any other bonded laminated material with a laminate that is *combustible* cannot be used as the cladding or any other component of an external wall system in Type A or B construction unless supported by an appropriately formulated *Performance Solution*.

## ATTACHMENTS TO WALLS

### Clause C1.10

Clause C1.10 is principally applied to assess the *fire hazard properties* for internal linings, materials and assemblies, however Clause C1.10(c) provides a list of exempt materials allowed for use as an attachment to an external element of a building under Specification C1.1 Clause 2.4.

In Victoria, Clause C1.10(c)(xiv) “any other material that does not significantly increase the

hazards of fire” has recently been removed as exempt from 15 December 2015. The use of “any other material that does not significantly increase the hazards of fire” must now be justified through an appropriately formulated *Performance Solution*.

### Clause 2.4 of Specification C1.1

Clause 2.4 of Specification C1.1 allows *combustible* materials that meet certain *fire hazard properties* to be conditionally used as an attachment to the outer element of a building with a required FRL. Attachments include “a finish or lining to a wall or roof or other attachments, such as signs, sunscreens, blinds or awnings.” A ‘lining’ should not be mistaken for a cladding.

*Combustible* attachments such as a lining to an external wall are subject to conditions. An attachment such as a lining can only be used on an external wall, including a lightweight *panel wall* that is already compliant with all relevant parts of the BCA. A non-loadbearing wall that is greater than 3m from a *fire-source feature* needs to achieve a FRL of -/-/. The definition of FRL in the BCA states “-/-/ means there is no requirement for an FRL.” The BCA does not provide any concessions that allow *combustible* attachments to be installed on an external wall not having a *required FRL*.

Where a *combustible* lining or other attachment is fixed to an external wall that is *non-combustible* and having the *required FRL*, unless exempt under Clause C1.10, it must meet the *fire hazard properties* of Specification C1.10 and specifically, a lining must attain a Group number of 1, 2 or 3 in accordance with Clause 4 and Table 3, ‘Other areas’.

Attachments other than a lining must comply with Clause 7 and Table 4 and achieve a *Spread of Flame Index* not greater than 9 and a *Smoke Developed Index* not greater than 8 if the *Spread of Flame Index* is more than 5.

As a condition of compliance, sub-Clauses 2.4(a)(ii) and (iii) of Specification C1.1 also requires an assessment of a design to ensure that the lining or

<sup>1</sup> A concession to Clauses 3.1(b) and 4.1(b) of Specification C1.1 is provided by Clause 3.10 or Clause 4.3 of Specification C1.1 or Clause C1.5.

# Industry Alert

other attachment “is not located near or directly above a *required exit* so as to make the *exit* unusable in a fire” and “it does not otherwise constitute an undue risk of fire spread via the facade of the building.” Sub-Clause 2.4(b) also requires that an attachment “must not impair the *required FRL*” of the building element it is attached to.

Many of the buildings audited had canopies/verandahs over the main entrance. Most of these canopies were designed as attachments and were commonly completely lined with ACP. There was no evidence in the entire audit to demonstrate that consideration had been given to sub-Clauses 2.4(a)(ii) and (iii) or Sub-Clause 2.4(b).

These conditions are not supported by established standards and are likely to be difficult to evaluate without suitable analysis. If it is not understood how a particular ACP or other *combustible* material could constitute an “undue risk of fire spread via the façade”, it would be appropriate to obtain the opinion of a person with the necessary expertise such as a registered fire safety engineer. The same would apply in determining how ‘near’ a particular ACP could be to a *required exit* to ensure the *exit* is usable in a fire.

## SUMMARY OF D-T-S:

- A *combustible* material must not be used as a cladding (within the meaning of this document) or any other component of an external wall in Type A or B construction.
- In accordance with Specification C1.1 Clause 2.4, a *combustible* material may be used as an attachment to an external building element with a required FRL if—
  - The *combustible* attachment achieves the required *fire hazard properties* under Specification C1.10
  - The *combustible* attachment is not located near or directly above a *required exit* so as to make the *exit* unusable in a fire.
  - The *combustible* attachment does not constitute an undue risk of fire spread via the façade of the building.

- The *combustible* attachment of a facing or finish must not impair the *required FRL* of the part of the building to which it is attached.

## PERFORMANCE SOLUTIONS

Cases of fires involving external facades have provided some very useful observations about fire behavior involving *combustible* facades. Some of the key observations are that a façade fire has the potential to enter a building at multiple levels and threaten life safety unless mitigating techniques are utilised.

Other contributing risk factors identified are the configuration and alignment of the material on the facade. Vertical alignment, re-entrant corners, channels in the facade, openings in the facade and areas of potential ignition source such as balconies and service areas, including rubbish skip collection points, should all be considered in any risk analysis<sup>2</sup>.

## FIRE TESTS

It is not appropriate to make simple assumptions about the fire properties of any *combustible* material. Many ACP and other *combustible* materials have been subjected to extensive fire testing other than to AS1530.1, including other prescribed BCA referenced fire testing standards and other international fire tests. As no polyethylene based ACP core is *non-combustible* within the meaning of the BCA, where it is proposed to use an ACP as a component of an external wall *required to be non-combustible*, it must be treated as a *Performance Solution*.

Relevant test results for the specific product must be presented for analysis by a registered fire safety engineer to determine its likely behavior in a fire for the proposed use and therefore enable proper analysis of the design for compliance with relevant *Performance Requirement/s* of the BCA. On 30 March 2016

<sup>2</sup> More detailed information can be found in the research paper ‘*Final Report—Fire Hazards of Exterior Wall Assemblies Containing Combustible Components*’ published by the Fire Protection Research Foundation.

# Industry Alert

Standards Australia published AS 5113 *Fire propagation testing and classification of external walls of buildings*. The work to develop this standard is in recognition of the need for an improved method of assessing combustible external walls in Australia.

While this Standard is not yet adopted in the BCA, the VBA encourages proponents of wall systems that do not comply with the D-t-S provisions of the BCA to test combustible wall systems to this Standard. AS 5113 is a full scale facade test and has the ability to assess a complete façade system performance including the impact of the fixing methods, cut and exposed edges, thermal expansion of metals leading to delamination etc.

Data from this testing will provide a registered fire safety engineer a greater level of understanding of the fire behaviour of the entire system when preparing an FER in support of a *Performance Solution* than other currently BCA referenced fire tests.

The material properties of a combustible material, determined from small scale testing, are rarely sufficient to determine if a particular product can be used in an external wall as a *Performance Solution*.

Considering the challenges and complexities a facade fire can present to occupants and fire services, it is also considered that a qualitative analysis is not appropriate. In accordance with the International Fire Engineering Guidelines, a quantitative analysis should be undertaken for a *Performance Solution* which is of a more complex nature such as the use of a *combustible* material as a component of, or attachment to, an external wall.

It is also important that if a specific product, model and method of fixing have been assessed in a FER, the design team must ensure that the particular product and method of fixing is consistent in all documentation and specifications. It has been noted that some specifications nominate a specific brand but not the exact model and often include the words “or similar”. A brand

only nomination is not adequate when a fire safety engineer has incorporated a specific material’s properties into a design. A number of ACP suppliers/distributors have several ‘models’ marketed under the same brand name. These are commonly identified due to the proportion of mineral fibre embedded within a polyethylene core, PE (or solely polyethylene) A2 and FR being common nomenclatures.

The manufacturers/suppliers of ACP products and other *combustible* products may have specific fixing methods that may vary according to the type of construction required, i.e. Type A, B or C. If a specific fixing type has been assessed under a FER, or is required by the manufacturer/supplier, this fixing type must also be transferred to any approved construction drawings and specifications. The specification should also ensure that the builder must seek approval from the fire safety engineer and relevant building surveyor if the builder proposes to use an ACP product and/or model differing from that specified in the FER and other approved documentation.

**If you have a technical enquiry please email:**  
[technicalenquiry@vba.vic.gov.au](mailto:technicalenquiry@vba.vic.gov.au) or  
phone 1300 815 127

Victorian Building Authority  
733 Bourke Street  
Docklands VIC 3008

The VBA acknowledges the contribution made by other State and Territory jurisdictions, the Fire Protection Association Australia, Society of Fire Safety-Engineers Australia and CSIRO in the development of this Industry Alert.