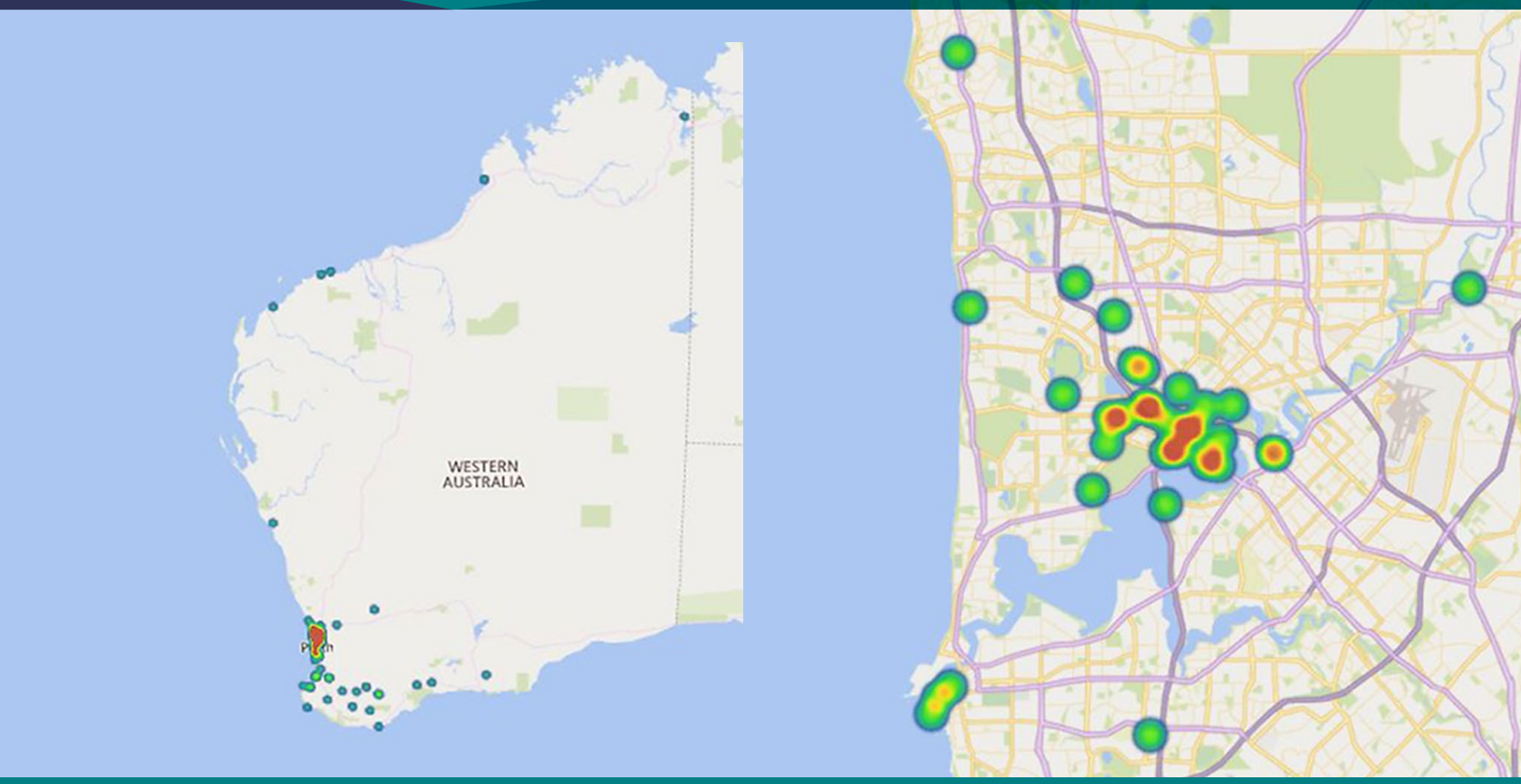
Government of **Western Australia**
Department of **Mines, Industry Regulation and Safety**
Building and Energy

State-wide cladding audit

An audit of combustible cladding on high-rise, high-risk private and public buildings.



Contents

Glossary of terms, acronyms and abbreviations

Acronym, Abbreviation or Term	Full title
ABCB	Australian Building Codes Board
ACP	Aluminium composite panel.
AS 5113:2016	AS 5113:2016 - Fire propagation testing and classification of external walls of buildings.
BCA	Building Code of Australia (volumes 1 and 2 of the National Construction Code)
BMF	Building Ministers' Forum (the group of Australian Commonwealth, State and Territory Ministers with responsibility for building and plumbing regulation).
Building Licence	Permission granted by the permit authority for building work to be carried out (Pre April 2012).
Building Order	An order made by the permit authority where the permit authority has a reasonable belief that the building is in a dangerous state.
Building Permit	Permission granted by the permit authority for building work to be carried out (Post April 2012).
Cladding	The processes of applying one material over another to provide a skin or layer.
CodeMark	The CodeMark Certification Scheme (the Scheme) is a voluntary third-party building product certification scheme.
Combustible	Combustible as determined by AS 1530.1 - Methods for fire tests on building materials, components and structures – Combustibility test for materials.
Composite	A composite building material is one which is made by combining two or more materials. Composites consist of a matrix which binds together fibres or fragments of the other material which is referred to as the reinforcement.
CRIS	Consultation Regulatory Impact Statement
CSIRO	Commonwealth Scientific and Industrial Research Organisation
Deemed-to-Satisfy (DTS)	Provisions that are deemed to satisfy the Performance Requirements of the BCA.
DFES	Department of Fire and Emergency Services
DMIRS	Department of Mines, Industry Regulation and Safety
Expanded polystyrene	A lightweight cellular plastic material consisting of small hollow spherical balls.
Fire compartment	A part of a building separated from the remainder by barriers such as fire wall and/or floors having an appropriate resistance to the spread of fire with any openings being adequately protected.

Acronym, Abbreviation or Term	Full title
Independent Building Surveyor	A building surveyor is an independent building surveyor in relation to an application if – (a) the building surveyor is neither an owner of the land on which the building or incidental structure that is the subject of the application is, or is proposed to be, located, nor an employee of an owner of the land; and (b) the building surveyor is neither the person who proposes to be named as the builder or demolition contractor on the permit, nor an employee of that person.
JAS-ANZ	Joint Accreditation System of Australia and New Zealand
Mineral Fibre	These are fibrous inorganic substances made primarily from rock, clay, slag, or glass. Mineral fibres are used as fillers in thermal insulation and fireproofing materials.
NCC	National Construction Code
Non-combustible	Not deemed combustible as determined by AS1530.1 - Methods for fire tests on building materials, components and structures – Combustibility test for materials.
Polyethylene (PE)	An adaptable synthetic resin made from the polymerisation of ethylene.
Polyvinyl Chloride (PVC)	A synthetic resin made from the polymerisation of vinyl chloride.
Type of Construction	The type of fire resisting construction required for Class 2 – 9 buildings as required by the BCA.
VBA	Victorian Building Authority
Verification Method CV3	A verification method set out in the BCA Volume One Section C which addresses the Performance Requirement CP2 (Spread of Fire) as it relates to external walls.
WA	Western Australia

Figures and tables

Executive summary

This report details the findings of the Building Commissioner's audit of high-risk buildings three storeys or greater with combustible cladding in Western Australia (WA) following the conclusion of Building and Energy's last audit inspection in June 2019.

In July 2017, the Building Commissioner announced an audit into the use of combustible cladding on privately owned, high-risk buildings in Western Australia.

The audit was in response to the Grenfell Tower fire in London in June 2017 and an earlier fire in 2014 at the Lacrosse building in Melbourne. In both cases, the use of combustible cladding was identified as a possible cause for the rapid spread of the fire and in the Grenfell Tower fire, a contributing factor to the significant loss of life. Similar audits were announced by all other Australian State and Territory governments.

The scope of the audit was limited to all Building Code of Australia (BCA) Class 2, 3, 4 and 9 buildings three storeys or greater, built or refurbished after 1 January 2000. These classes of buildings are considered high-risk as they typically include places; where people sleep (apartments, hotels and caretaker accommodation); that house vulnerable occupants (hospitals, nursing homes and child-care centres); or cater for high-occupancy events (entertainment venues and public buildings).

Other classes of buildings, specifically BCA Class 5-8 buildings (which includes retail and commercial buildings), were not included within the scope of the audit as typically employers occupying these buildings are bound by occupational health and safety laws covering fire evacuation procedures and occupants are less likely to ignite fires through candles, cigarettes or barbeques. Excluding these types of buildings also ensured the resources of the audit focussed on buildings that present the greatest potential risk to occupants.

Building and Energy's audit was limited to privately owned buildings.

A total of 1795 buildings were initially identified as falling under the scope of the audit. No building was identified as being an extreme risk.

Audit findings:

- **52** buildings were identified as either high or moderate risk. Of these:
  - **14** Buildings were found to be high-risk
    - 7 x Class 2 - apartment buildings
    - 1 x Class 2 - apartment and mixed use buildings
    - 2 x Class 3 - hotel/motel buildings
    - 2 x Class 9a - hospital/nursing home buildings
    - 1 x Class 9b - private school
    - 1 x Class 9b - assembly/civic building
  - **38** buildings were found to be moderate risk
    - 19 x Class 2 - apartment buildings
    - 6 x Class 2 - apartments and mixed use buildings
    - 4 x Class 3 - hotel/motel buildings
    - 1 x Class 4 - caretaker residences within a different building class
    - 3 x Class 9a - hospital/nursing home buildings
    - 5 x Class 9b - assembly/civic buildings

All owners of buildings identified with an unacceptable risk due to combustible cladding were notified about the audit results and provided with detailed reports. These reports were also referred to local government permit authorities (permit authorities) for enforcement actions.

Following receipt of 52 referrals from Building and Energy, local government permit authorities issued 44 Building Orders. Two buildings had progressed to remediation prior to any enforcement action and four buildings are owned by permit authorities and no enforcement action was necessary to ensure remediation work is undertaken. The two other buildings are working with the permit authority towards a resolution.

As at 30 June 2020, seven buildings have completed replacement works, the remediation works on four other buildings were in progress with a further seven buildings found to be satisfying the Performance Requirements of the BCA. The other buildings were at varying stages of the remediation process including some with the fire engineering reports still in progress. All of the other buildings are likely to require full or partial removal of the combustible cladding.

Building and Energy also assisted State Government departments, agencies and public universities (agencies) with the coordination of assessing and responding to buildings with a combustible façade. Agencies were requested to adopt a similar scope as the one used by Building and Energy for privately owned buildings as a minimum audit scope. Several agencies used more robust scopes than the minimum proposed by DMIRS as an extra precaution including the Departments of Health (DoH) and Education (DoE) which undertook an assessment of all buildings within their respective areas.

A total of 1914 publicly owned buildings were reviewed by state government agencies and entities. As at 30 June 2020, 27 buildings had been identified as requiring some form of remedial action. For five of these buildings remedial work had either begun or had been completed.

Building and Energy continues to monitor and report on the progress of buildings identified as requiring remediation and provide assistance to building owners and permit authorities.

1. Background

On 14 June 2017, a fire in the 24-storey Grenfell Tower in London resulted in the loss of 72 lives. The fire has been reported as having been sparked by a faulty kitchen appliance in a fourth floor apartment. Phase 1 of the inquiry into the fire has been completed and it has been confirmed that the cladding system promoted the rapid spread of the fire on the building façade.[1]

The material used to clad the Grenfell Tower was a type of ACP consisting of two thin sheets of aluminium with a core layer of PE sandwiched between the two sheets. It is this core layer of PE that presents a fire safety concern. A separate combustible insulation material was installed at Grenfell in conjunction with the ACP and this also added to the fuel load.

PE is a plastic typically derived from fossil fuels like petroleum or natural gas. When heated, PE melts and releases flammable gasses and these gasses are a fuel source for fire. The arrangement of PE containing ACPs upon a building and the cavity spaces that may exist behind such ACPs, present routes along which a fire can travel. These routes may span fire compartments and prevent a fire from being contained within a discrete portion of a building. Furthermore, melted and potentially burning droplets of PE can result in secondary fires being ignited on lower floors.

On 18 June 2017, the United Kingdom government commenced an investigation into the use of ACPs in the cladding of high-rise residential buildings owned or operated by local governments and community housing associations. Testing undertaken as part of this investigation has revealed high rates of non-compliance with United Kingdom building standards.

The Grenfell Tower fire was not an isolated incident but rather the most recent and tragic case in a series of high-rise building fires around the world where the inappropriate use of cladding materials or related products have been implicated in or suspected as contributing to the spread, intensity and/or size of a fire.

An example best known to most Australians is the Lacrosse apartment building fire which occurred in the Docklands precinct of Melbourne in 2014. In the early hours of 24 November 2014, embers from an inappropriately disposed of cigarette butt started a fire on an eighth storey balcony. One of the walls abutting the balcony was clad with ACPs with a PE core. The fire on the balcony spread to the ACPs which facilitated the spread of fire to the balcony above and so on all the way up to the twenty third storey (the top of the building).

The 400 plus occupants were safely evacuated and no fatalities or injuries were reported. The damage to the building was estimated at $5 million. The building owners were directed by the Victorian building authorities to remove and replace all similar ACPs on the building. Subsequent litigation action by the building owners against the builder at the Victorian Civil and Administrative Tribunal (VCAT) is partially complete. The VCAT awarded damages of nearly $6 million which was to be paid to the owners by the builder. The VCAT also ordered the building surveyor, architect and the fire engineer to reimburse the builder for that amount in proportions of 33 per cent, 25 per cent and 39 per cent respectively. The other three per cent was attributed to the builder. A further sum claim of nearly $7 million is yet to be resolved. The VCAT decision is currently subject to an appeal. The replacement of cladding for the Lacrosse building commenced in late 2018 by the original builder.

The type of ACPs used on the Lacrosse apartment building incorporated a core layer of PE and was fixed to the sub-frame of the building using adhesive tape. The way these panels were used was not permissible under the BCA. This led to public concern, which in turn, led to the Victorian Building Authority (the VBA) undertaking an audit to identify the extent of non-compliant use of external wall cladding materials in residential high-rise and public buildings. This audit was confined to buildings constructed in the preceding 10 years, in a few inner Melbourne suburbs

1 Grenfell Tower Inquiry: Phase 1 Report – Report of the Public Inquiry into the Fire at Grenfell Tower on 14 June 2017 (October 2019). www.gov.uk/official-documents.

and also to buildings constructed by a particular builder. In its report of 17 February 2016, the VBA noted that of the 170 buildings investigated, 51 per cent were considered to be non-compliant in respect to the use of combustible cladding. The VBA audit scored these non-compliant buildings against a risk-based scale but did not determine whether remedial works were required. This was left to the responsible local governments.

The Lacrosse apartment building fire triggered a similar audit in Western Australia. At the request of the Building Commissioner, the City of Perth and the Town of Victoria Park reviewed their building records for the preceding 10 years to identify apartments, hotels and public buildings, over three storeys in height, which had ACPs incorporated into their design.

On 11 April 2016 the Building Commissioner published an interim report on the preliminary finding of the audit.[2] The Building Commissioner noted that 11 buildings were identified as fitting within the audit scope. In each case, the relevant local government determined that the ACPs specified in the design documents were of a type with a fire retardant core layer and concluded that there was a low risk of fire ignition and spread.

In July 2017, the Building Commissioner announced an audit into the use of combustible cladding on privately owned, high-risk buildings in Western Australia (WA). The audit was in response to the Grenfell Tower fire in London in June 2017 and the earlier fire in 2014 at the Lacrosse building in Melbourne. In both cases, the use of combustible cladding was identified as a possible cause for the rapid spread of the fire and in the Grenfell Tower fire, a contributing factor to the significant loss of life. Similar audits were announced by all other Australian State and Territory governments.

The scope of the audit was limited to all BCA Class 2, 3, 4 and 9 buildings over two-storeys, built or refurbished after 1 January 2001. These classes of buildings are considered high-risk as they typically include places where people sleep (apartments, hotels and caretaker accommodation); that house vulnerable occupants (hospitals, nursing homes and child-care centres); or cater for high-occupancy events (entertainment venues).

2 Aluminium Composite Panelling in High-Rise Buildings – Interim Report (April 2016). www.commerce.wa.gov.au/sites/default/files/atoms/files/acp_interim_report_final.pdf (20 December 2019).

2. State-wide cladding audit – Private buildings

2.1 Audit scope

Taking into consideration the building stock in Western Australia, the Building Commissioner formed the view that the cladding materials that presented the greatest risk were modern composites and plastics.

While there is evidence that these materials were commercially available and in use prior to 1 January 2000, the Building Commissioner, through industry consultation, took into consideration that their use was largely limited to commercial offices and retail premises. The Building Commissioner also considered that buildings that posed the highest risk to life safety were those where people sleep, or those that accommodate vulnerable occupants or high occupancy events, for example, nursing homes, child care centres, disability accommodation, entertainment venues and the like.

The decision to prioritise buildings of Classes 2, 3, 4 and 9 also took into account that owners and occupiers of office and retail buildings generally have good passive and active fire safety systems; workplaces are covered by occupational safety and health laws; and occupants would be familiar

with the building and alert in the event of a fire.

The expanded audit scope covers all buildings:

- that are located within the State of Western Australia or in the Indian Ocean Territories of Christmas Island and the Cocos (Keeling) Islands;
- that were built or refurbished between 1 January 2000 and 30 June 2017;
- that fall within or contain a component that falls within Classes 2, 3, 4 or 9 of the BCA;
- that are three storeys or greater; and
- that have combustible cladding, of any type, attached to or incorporated into the exterior of the building.

The expanded audit scope covers buildings that were built during the applicable date range and buildings that have been refurbished. For refurbishment work to be considered as part of the audit, the work must have:

- constituted building work for which a building licence or permit was required; and
- related to a building's exterior envelope (that is, its external walls or roof).

For the purpose of the expanded audit scope, 'refurbishment' is taken to include alterations and additions to a building.

Combustible façade cladding approved after the audit

Buildings that needed a building permit for new works or facade refurbishment after 30 June 2017 were not captured within the expanded audit scope. It was considered the extensive information and industry awareness that occurred following the Lacrosse Building and the Grenfell Tower fires, would have positively improved industry practices.

The following information has been made available to industry:

- ABCB Advisory Note: Fire performance of external walls and cladding (August 2016)
- Building and Energy Industry Bulletin 54: External Wall Cladding – Fire Safety (May 2015)

Notwithstanding this assumption, Building and Energy is continuing to work with building surveyors to ensure that buildings built or refurbished after 30 June 2017, that otherwise satisfy the audit parameters, comply with the applicable building standards. Also, registered building surveyor contractors were advised in January 2018 to notify Building and Energy of any certificates of design compliance issued from 1 July 2017 which involved a combustible façade cladding and these were added to the list of buildings to be audited. In some instances buildings had already been captured in the audit as they also appeared in DFES referrals data. In total, six buildings were added to the audit as a result of this directions process.

2.2 Audit methodology

An audit team was established within Building and Energy and the audit was conducted from July 2017 to June 2019.

The audit methodology involved obtaining and analysing building records, conducting site inspections and completing preliminary and detailed risk assessments.

The audit comprised three phases:

- Phase One – Planning;
- Phase Two – Execution; and
- Phase Three – Reporting

2.2.1 Phase one – Planning

During phase one, a detailed audit plan and communication plan were developed and a number of stakeholder groups formed to assist with the coordination of the audit.

Audit Regulator Group

The Audit Regulator Group (ARG) was formed on 6 July 2018. The ARG comprised Building and Energy, DFES, WA Local Government Association (WALGA) and representatives of local government permit authorities (Town of Victoria Park; City of Cockburn and City of Perth).

The functions of the ARG were to –

- Contribute to the preparation of an audit scope, audit process and audit tools.
- Contribute expertise in the area of fire safety.
- Provide advice in relation to the operations of Building and Energy, DFES and permit authorities that need to be considered throughout the audit process.
- Facilitate information exchange with local government permit authorities in connection with the audit process in relation to privately owned buildings.
- Provide input and feedback in relation to advisory notes.
- Provide feedback in relation to the final report on the state-wide cladding audit.
- Develop a register of other fire safety risks identified during the audit.

Audit Stakeholder Group - Private buildings

The Audit Stakeholder Group (ASG) was formed on 6 July 2018 and comprised representatives of:

- Australian Institute of Architects
- Australian Institute of Building
- Australian Institute of Building Surveyors
- Building and Energy
- City of Cockburn
- City of Perth
- Construction, Forestry, Mining and Energy Union
- DFES
- Housing Industry Association
- Insurance Commission of Western Australia
- Local Government Insurance Services (LGIS)
- Master Builders Association
- Property Council of Australia
- Society of Fire Safety
- Strata Community Australia WA
- Town of Victoria Park
- WALGA

The functions of the ASG were to facilitate information exchange with key industry groups, local governments, DFES and building owners in relation to privately owned buildings. Building and Energy recognised the importance of providing building owners and their representatives with reports on the outcomes of their building assessments. SCAWA provided considerable assistance in relation to the identification of building owners and owner representatives to facilitate communication with Building and Energy which expedited the process of building assessments.

All stakeholders provided valuable input and feedback in relation to advisory notes and other guidance materials aimed at improving compliance and safety outcomes.

2.2.2 Phase two - Execution

The execution phase of the state-wide cladding audit was conducted in four stages:

Building owners, DFES and permit authorities were kept informed of the status of buildings as they progressed through the audit.

Further information about the state-wide cladding audit scope and process is available at: www.commerce.wa.gov.au/building-and-energy/state-wide-cladding-audit

Stage 1 – Identification of buildings in metropolitan and regional areas of the class and height falling within the audit scope

DFES has, since 2000, maintained an electronic spreadsheet that captures buildings referred to the agency for an assessment against DFES' operational requirements.

The ARG recognised the merit of using these records as the basis for identifying buildings falling within the audit scope. Building and Energy reviewed the DFES data to identify buildings felling with the audit scope. The buildings identified were filtered by Building and Energy by local government areas and sent to each permit authority for verification. This process also identified duplicate entries, buildings that had not progressed to construction and buildings which were not within the audit scope.

While the data provided a basis for identifying buildings within scope, it did not record details of cladding on buildings. Building and Energy carried out external inspections of metropolitan buildings to determine those that required assessment, taking photographs and making notes relating to those buildings. In the regions, local governments assisted the cladding audit team where necessary, by providing the audit team with photographs and notes on buildings for their assessment.

Stage 2 – Preliminary risk assessments

All buildings identified as falling within the audit scope were assessed using a preliminary risk assessment (PRA) tool developed by Building and Energy after consultation with the ARG – see Figure 1. The PRA tool took into account the classification of the building, the building height, the location and distribution of cladding, the alignment of panels as they relate to the possible spread of fire and the presence of adjacent balconies and door or window openings.

The possible outcome of the preliminary assessment was a risk rating of either low, medium or high. The type of cladding was not confirmed at this point and did not affect the risk rating.

Figure 1: Preliminary Risk Assessment Tool

Preliminary Risk Assessment

Building Address:		
Local Government:		
Assessment Officer:		Date:
Comments:		

Outcomes: LOW 0-5 ☐ MEDIUM 5-10 ☐ HIGH 10-15 ☐

Geometry of Building

Classification of building:

2	(2)	☐ Independent Sole Occupancy Units
2	(3)	☐ residential part of a Class 9 building
3	(3)	☐ hotels, hostels, aged or disabled accomm, school/university dormitory
4	(1)	☐ residential part of a Class 5-9 building
9a	(2)	☐ hospitals
9b	(2)	☐ schools, gyms, child cares, public buildings
9c	(3)	☐ aged care building/nursing home
Mixed use	(3)	☐

Effective Height of building

• <10m	(1)	☐
• >10 but <25m	(2)	☐
• >25m	(3)	☐

Location and distribution of panels

Aggregate area of panels per elevation, expressed as a percentage ratio of the overall façade area.
(Points may be adjusted according to percentage e.g. 25% = 0.25 points, 50% = 0.50 points, 75% = 0.75 points, 100% = 1 point)

• Elevation 1	0-25% ☐	25-50% ☐	50-75% ☐	75-100% ☐	=
• Elevation 2	0-25% ☐	25-50% ☐	50-75% ☐	75-100% ☐	=
• Elevation 3	0-25% ☐	25-50% ☐	50-75% ☐	75-100% ☐	=
• Elevation 4	0-25% ☐	25-50% ☐	50-75% ☐	75-100% ☐	=
				TOTAL:	=

Are panels vertically aligned in a way that will act as a bridge to allow fire spread?

• Yes	(2)	☐
• No	(0)	☐

Presence of window, balcony or vent openings within panel arrays or located above a required exit?

• Yes	(2)	☐
• No	(0)	☐

Have the spandrels been bridged?

• Yes	(1)	☐
• No	(0)	☐

All building owners were notified in writing of the outcome following the completion of the preliminary risk assessment. SCAWA provided valuable assistance in identifying member strata managers with whom Building and Energy could communicate. Alternatively, Building and Energy relied upon owner information provided by the relevant local government.

Stage 3 – Detailed cladding risk assessments

The detailed risk assessment specifically assessed whether the building, with its combustible cladding, presented a sufficient risk that it should be subjected to a more thorough assessment by a fire engineer engaged by the building owner.

During this stage, the relevant local government was requested to supply all building records in relation to the building/s rated as medium or high after a preliminary risk assessment which fell within its jurisdiction. These records were carefully reviewed to determine the extent, location and type of specified cladding. In most cases it was necessary to contact the builder, designer or architect to request further information in order to verify what cladding materials were used.

Verification that was considered acceptable by the cladding team was a delivery invoice (or similar) or photographic evidence to prove that a particular product was delivered to site. Where this verification was not available or the information provided was not considered sufficiently reliable to verify the product, Building and Energy arranged the sampling and testing of façade materials. Sample taking and material composition testing was carried out by appropriately qualified and accredited entities engaged by Building and Energy.

The site inspections were carried out by fire engineers, working on behalf of Building and Energy. The fire engineer inspected the internal and external areas of the building and took photographs of the external facades. The inspections took into account the extent and characteristics of the cladding and also existing active and passive fire protection systems within the building. The maintenance level of the active fire protection systems was also recorded. The fire engineer then used the information gathered to populate the detailed Cladding Risk Assessment (CRA) tool which informed the categorisation for the risk of fire spread and evacuation risk and provided the values to complete the matrix, resulting in the risk rating for the building.

An example of the CRA tool output is included below in Figure 2.

DRAFT CLADDING RISK ASSESSMENT TOOL (v12k WA)			
Disclaimer: The Risk Assessment Tool should only be completed after having reference to the most recent version of the supporting Cladding Risk Assessment Tool Guidance document.			
		Version:	v12k WA
		Date:	
		Address:	
		Building ID:	
		BCA Class:	2, 5 and 7a
		Number of Storeys:	6
		Risk Criteria	**Description**
Overall risk factors	1	Building/occupancy type	Class 2, 3, 9b building
	2	Number of occupants / sole occupancy units	1-10 units
	3	Types of cladding present	≤30% PE content ACP
	4	Automatic suppression (sprinklers)	No sprinklers
Risk of fire spread	5	Extent of combustible cladding	0-25% coverage or decorative element only
	6	Configuration of cladding	Unbroken horizontal cladding
	7	Proximity of cladding to potential ignition sources	High
	8	Fire rating of external walls (behind cladding)	Yes
	9	Risk of cladding fire to or from adjacent buildings	> 10m distance
	10	Windows, doors, or other openings adjacent to cladding	Yes
	11	Insulation type behind cladding	No additional insulation
	12	Fixing method	Mechanical
Ability to exit	13	Egress provisions	Poor
	14	Speed of Evacuation	Good
	15	Fire fighting provisions	Good
	16	Active systems connected to a monitoring agency.	Yes
	17	Essential safety measure maintenance	Fair
	18	Building management, 24/7 onsite security or warden system	No

	RESULTS
FIRE RISK	26
Fire risk category	1
EXIT RISK	45.6
Exit risk category	4
Overall Risk	Moderate

Figure 2: Detailed Cladding Risk Assessment Tool (Example)

The CRA tool used for WA buildings was developed by Building and Energy by making minor amendments to the Victorian Draft Risk Scoring Tool v12k, which was originally created by a panel of fire engineering experts drawn together by the Victorian Cladding Taskforce.

The format uses a Windows Excel spreadsheet that is divided into three subject areas: 'Overall Risk Factors', 'Risk of Fire Spread' and 'Ability to Exit', with a total of 18 responses to be provided. Each of the questions is individually weighted and when the responses are inserted, the resulting scoring is subjected to an algorithm whereby the total for each section is automatically calculated to provide an output category for Fire Risk and Exit Risk. These Categories were scored to vary between 1 and 5, with '1' representing the lowest risk and '5' the highest. The risk category scoring was based on the scoring values shown in Table 1 below.

Table 1 - Category scoring regime

Risk Category	Total Fire Risk Score	Total Exit Risk Score
1	0 – 39	0 – 15
2	40 - 59	15– 30
3	60 - 79	30 - 45
4	80 - 99	45 - 60
5	100 +	60+

As the individual scores were entered on the spreadsheet, the sum values and consequently the category values were updated. Once all questions were scored, the spreadsheet automatically provided a cross reference rating of the overall risk. The CRA tool provided an updated overall assessed risk rating based on the matrix as shown below in Figure 3.

	Fire Category 1	Fire Category 2	Fire Category 3	Fire Category 4	Fire Category 5
Exit Category 1	Low	Low	Low	Moderate	Moderate
Exit Category 2	Low	Low	Moderate	Moderate	High
Exit Category 3	Low	Moderate	Moderate	High	High
Exit Category 4	Moderate	Moderate	High	High	Extreme
Exit Category 5	Moderate	High	High	Extreme	Extreme

Figure 3: Risk rating matrix

Building and Energy has not specified remedial measures to reduce the risk to an acceptable level. Instead, this risk assessment was used only to categorise the level of risk to life and property associated with the presence of combustible cladding and to highlight the elements of a building that contribute to that risk. The risk assessment did not assess compliance with the BCA or indicate relative compliance; it is also not a substitute for expert judgement.

Buildings returning a low risk ranking, buildings having cladding confirmed as being non-combustible, or buildings identified as not being within scope due to either their classification or building height, required no further assessment or action.

Stage 4 – Determination of buildings requiring remedial action

The final stage included the referral of DMIRS fire engineering assessment reports with moderate, high or extreme risk ratings, to the relevant permit authority for consideration of enforcement action under the *Building Act 2011* (the Building Act).

Where the permit authority formed a view that the building was in a dangerous state, a Building Order was issued to building owners requiring them to engage a fire engineer.

These four stages operated concurrently and a summary update was published on the DMIRS website on a fortnightly basis.

Building owners were informed in writing of the outcome of each stage along with the relevant permit authority and DFES.

2.2.3 Phase three – Reporting

The final phase of the audit plan was to prepare and publish a report on the state-wide cladding audit.

The audit report provides a detailed overview of the audit of private buildings falling within the audit scope and a summary of audits carried out by government departments and agencies in relation to public buildings.

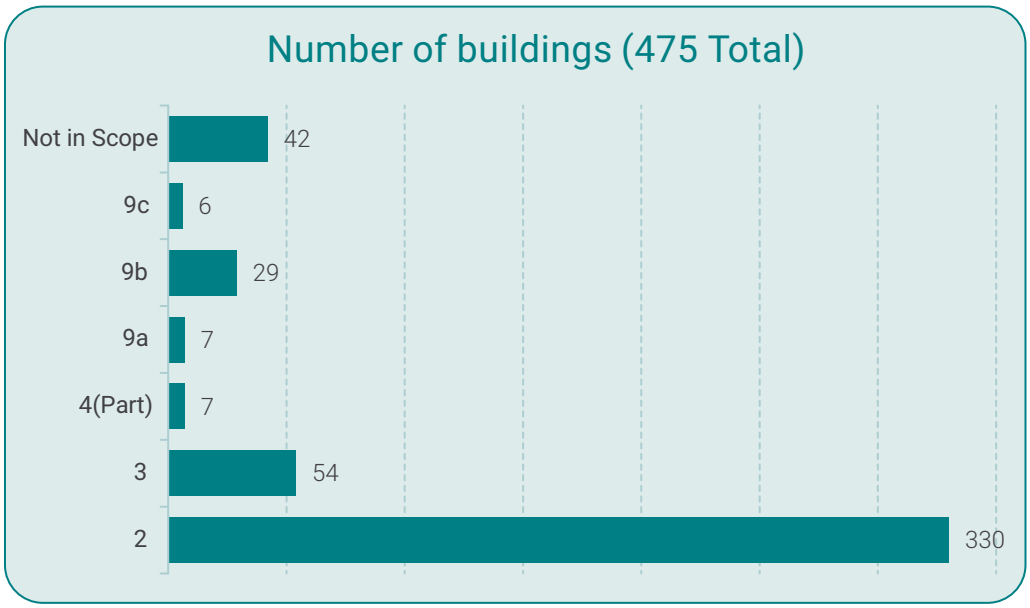
This phase also requires Building and Energy to provide regular updates on the DMIRS website in relation to the progress of remedial activities being carried out in relation to both privately owned and publicly owned buildings.

3. Audit findings – Privately owned buildings

3.1 Stage 1 – Identification of buildings within scope

A total number of 1795 buildings were identified as falling within the audit scope relating to building classification and rise in storey. Of these, 1320 were found to have no external wall cladding as a result of external inspections; leaving **475** buildings to progress to Stage 2. A summary of building classes captured in the 475 buildings within the audit scope is provided in Figure 4 below.

Figure 4: Stage 1 – Breakdown by building classifications



3.2 Stage 2 – Preliminary risk assessments

The 475 buildings confirmed as being within the scope were subjected to a preliminary risk assessment by Building and Energy. See Figure 1 for the PRA Tool.

At the completion of this stage **258** buildings were identified as being medium or high-risk. This left 217 buildings that were determined to be low risk and were not subject to further review during the audit. A summary of building classes captured in the 258 buildings within the audit scope is provided in Figure 5 below.

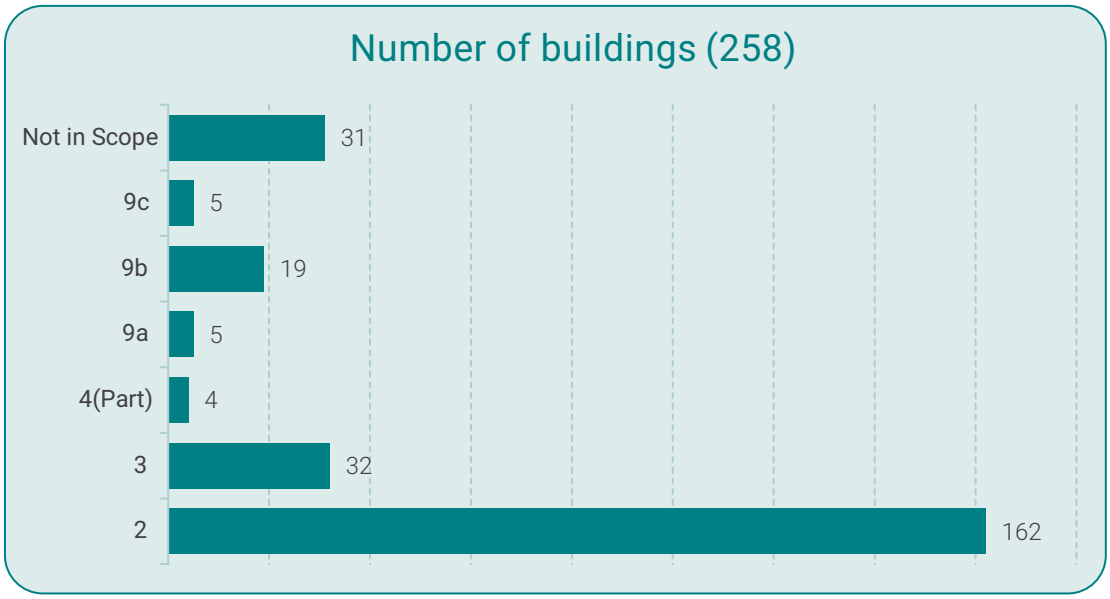


Figure 5: Stage 2 – Preliminary risk assessments - breakdown by building classifications

3.3 Stage 3 – Detailed risk assessments

The 258 buildings identified in Stage 2 were subjected to detailed cladding risk assessments which resulted in 206 buildings being cleared from further review having been assessed as low risk. The 206 cleared buildings included 88 buildings that were assessed as low risk as a result of the cladding being confirmed as non-combustible. The other 52 buildings were assessed as follows: 14 high-risk and 38 moderate risk buildings No building was assessed as 'extreme risk'.

All in-scope privately owned aged care facilities were cleared during this stage. For each building identified as moderate and high-risk, Building and Energy prepared detailed reports.

The 206 cleared buildings were not all cleared as a result of a detailed fire engineering assessment and inspection. On closer inspection of approvals documentation sourced from local government permit authorities, 31 buildings were found not to be within the scope of the audit and were eliminated from further review by Building and Energy. Buildings in this category were found not to fit the scope of the audit due to either their rise in storeys or the classification of the building. The buildings in scope identification data were sourced from DFES. In some instances buildings were later found not to be in scope because the proposal that was referred to DFES had not proceeded to construction with a building of lesser height or of a non-scope classification proceeding in its place. Building and Energy notified building owners and permit authorities of this outcome.

Non-combustibility was confirmed through a process of product verification which included product composition confirmation from builders or suppliers and a Building and Energy site inspection. For most of these 88 buildings the cladding identified is compressed fibre cement sheeting. This type of cladding is readily identifiable through a site inspection process.

The other buildings confirmed as having some form of combustible cladding were subjected to a detailed cladding risk assessment by a fire engineer using the CRA tool and site inspection which resulted in the identification of the 52 moderate or high-risk buildings. A review of approvals documentation confirmed that none of those buildings had a performance solution in place at the design stage for the use of a combustible cladding.

For the majority of the buildings subjected to a detailed assessment, Building and Energy was able to source sufficient approvals documentation, ordering and delivery information or other verification to confirm the product that had been used on the building. For 19 buildings there was

insufficient documentation to confirm the content of the cladding present and, for these buildings, Building and Energy engaged an appropriately accredited sampling and testing laboratory to confirm the composition of the cladding material. The testing outcome identified the type of filler/core in the panel and whether or not the panel core was combustible. Where a combination of combustible and inert fillers was found, the proportions of each were reported. A summary of building classes captured in the 52 buildings within the audit scope is provided in Figure 6 below.

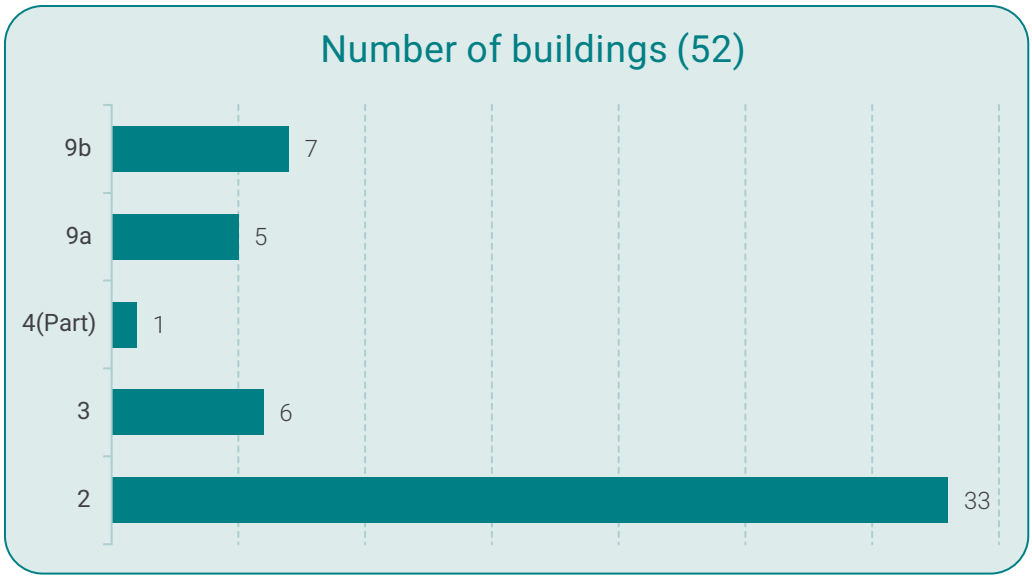


Figure 6: Stage 3 – High and moderate risk assessment outcomes – breakdown by building classifications

The percentage of PE within the core of an ACP is a key factor in the risk ranking of a building in Stage 3. It can be seen in Figure 7 (below) that the use of ACP products with a PE core of less than 30 per cent became more prevalent in Western Australia's buildings (identified as moderate or high-risk) after the Lacrosse building fire of 2014. The figure also displays the increased use of timber composite products on the subject buildings after 2014.

Of the 52 buildings identified as being high or moderate risk, 35 were clad in ACP, 13 had a timber or timber composite cladding, three had a form of insulated panel and one building had an unenclosed EPS cladding.

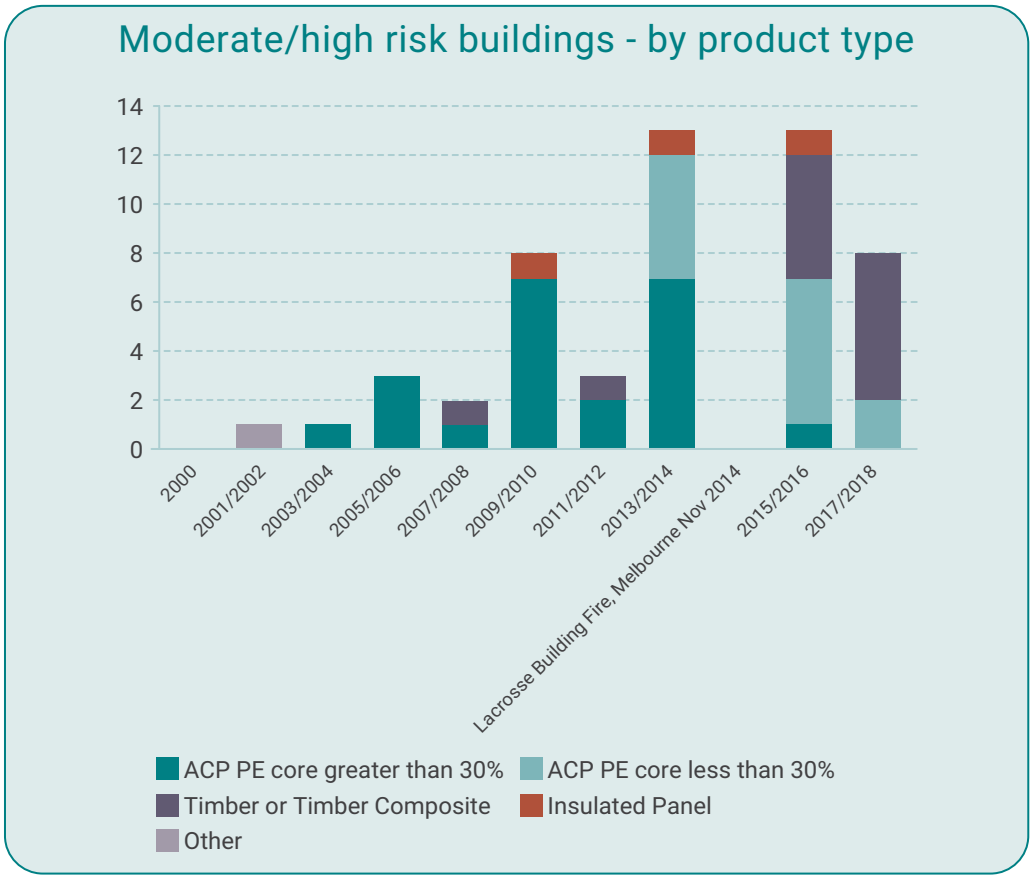


Figure 7: Moderate/high-risk buildings – by product

3.4 Stage 4 – Moderate and high-risk buildings referred to permit authority

The 52 moderate and high-risk private buildings were referred to the relevant permit authority for consideration of enforcement action. This was made up of 14 high-risk buildings and 38 moderate risk buildings. A copy of the report referred to the permit authority was sent to the owners/owners representative. DFES was also provided with a copy to assist in addressing its operational requirements.

The reports prepared by Building and Energy provided permit authorities the information required to consider whether they have a reasonable belief that a building is in a dangerous state. Having satisfied itself this threshold had been met, the permit authorities issued Building Orders requiring owners of the buildings to engage a fire engineer to conduct an inspection of the building and provide a report on whether the building complied with the Performance Requirements of the BCA and, if not, what remediation works were needed. Following receipt of these reports the permit authorities issued the owners a Building Order to facilitate the carrying out of the remedial works as recommended by the fire engineer's report.

Following receipt of the 52 referrals from Building and Energy, local government permit authorities issued 44 Building Orders.

In relation to the remaining eight buildings, two had already progressed to remediation prior to any enforcement action and four buildings are owned by permit authorities with no enforcement action necessary to ensure remediation works are undertaken. The other two buildings continue to work with the permit authority towards a resolution.

Where a building owner was able to provide information regarding their building that was not available at the time of Building and Energy's risk assessment and that information had the potential to alter the outcome of the risk assessment rating, Building and Energy carried out a

review which in some instances resulted in the risk rating changing to low.

As part of its post audit assistance role, Building and Energy provided peer reviews of fire engineering reports that had been submitted to local government permit authorities by owners in response to Building Orders. Building and Energy also provided assistance with any general queries regarding the fire engineering assessment wherever possible. Building and Energy peer reviewed fire engineering reports in relation to 23 buildings over 9 local government permit authorities.

Building and Energy met with fire engineers engaged by building owners to provide reports in response to Building Orders. The intent of these meetings was to clarify the process for fire engineers who may have been unfamiliar previously with the Building Order process.

In response to contact from building owners, Building and Energy offered to meet with them to discuss concerns and to answer any queries they had. These queries included the pathways available for owners to make a formal complaint against a building service provider. Building and Energy met with 11 groups of building owners as a result of this offer.

At the time of completing this report, seven buildings had completed replacement works, the remediation works on four other buildings were in progress with a further seven buildings found to be satisfying the Performance Requirements of the BCA. The other buildings were at varying stages of the remediation process including some with the fire engineering reports still in progress. All of the other buildings are likely to require full or partial removal of the combustible cladding.

Where partial or full replacement of cladding is recommended, the owner-appointed fire engineers have also recommended interim risk mitigation measures until these works are completed. Where proposed, the permit authority has required these interim risk mitigation measures to actioned through a Building Order.

Building and Energy continues to update its fortnightly publications in relation to the progress of cladding remediation. Figure 8 captures an example of the periodical updates provided by Building and Energy in relation to the progress of remedial works.

	Stage 1A - Buildings in audit scope	Stage 1B - Building with cladding	Stage 2A - Preliminary risk assessment completed	Stage 2B - Building requiring detailed risk assessment	Stage 3 - Detailed risk assessments completed	Stage 4A - Buildings where no further actioned required	Stage 4B - Audit assessment completed. Referred to permit authority for further action required	Stage 5A - Enforcement actions commenced	Stage 5B - Removal works complete/compliance demonstrated
Metro-Area									
Perth	407	117	117	57	57	49	8	8	1
Vincent	165	69	69	31	31	21	10	10	5
Belmont	69	22	22	18	18	15	3	3	
Fremantle	60	24	24	15	15	12	3	3	2
Subiaco	76	23	23	13	13	12	1	1	1
Stirling	84	19	19	11	11	7	4	4	
Cambridge	37	10	10	8	8	7	1	1	
Rockingham	50	9	9	9	9	9			
South Perth	91	14	14	8	8	5	3	3	
Victoria Park	65	25	25	8	8	7	1	1	
Cockburn	72	13	13	7	7	6	1	1	
Melville	51	5	5	3	3	3			
Bayswater	43	8	8	3	3	3			
Joondalup	50	5	5	2	2	0	2	2	
All other metro LGs	174	35	35	15	15	15			
Metro Area Total	**1494**	**398**	**398**	**208**	**208**	**171**	**37**	**37**	**9**
Private Hospitals	16	7	7	5	5	0	5	3	2
Aged Care Facilities	19	8	8	4	4	4	0		
Private Schools	24	11	11	6	6	5	1	1	1
Total	**59**	**26**	**26**	**15**	**15**	**9**	**6**	**4**	**3**
Regional Areas									
South West	33	13	13	9	9	4	5	5	
Peel	122	17	17	10	10	8	2	2	
Pilbara	41	15	15	12	12	10	2	2	2
Kimberley	14	4	4	2	2	2			
Goldfields/Esperance	2	2	2	2	2	2			
Mid West	18	0	0	0					
All other regional areas	12	0	0	0					
Regional Areas Total	**242**	**51**	**51**	**35**	**35**	**26**	**9**	**9**	**2**
State-Wide Total	**1795**	**475**	**475**	**258**	**258**	**206**	**52**	**50**	**14**

Figure 8: State-wide cladding audit status update – private buildings – as at 30 June 2020

4. State-wide cladding audit – Public buildings

Following preliminary communications with key stakeholders, Building and Energy formally wrote to all government department and agencies (agencies) in September 2017 regarding the risk presented by combustible cladding and requested that each agency undertake an audit of their respective building portfolios.

4.1 Audit scope

Building and Energy requested that agencies adopt the following as a minimum audit scope:

- all buildings constructed or refurbished after 2000;
- that are three storeys or greater;
- with combustible cladding attached or incorporated; and
- that fall within BCA Classes, 2, 3, 4 and 9.

Several agencies have used a more robust scope than the minimum set out by Building and Energy with some agencies including all its buildings in the audit regardless of classification or rise in storeys. Agencies have engaged fire engineers to undertake assessments in line with DMIRS guidelines.

4.2 Audit methodology

In October 2017 – Building and Energy hosted an information session to further detail the audit of combustible cladding and to provide guidance to agencies in conducting their audits.

From December 2017 to January 2018 – Building and Energy held one-on-one meetings with key property owning agencies.

In February 2018 – Building and Energy established an audit stakeholder group consisting of agencies undertaking audit activities. The purpose of this group was to facilitate the sharing of knowledge, determine best practices and to set target milestones for the completion of their audits.

Most agencies elected to work with the Department of Finance, Building Management and Works division – which is a state permit authority – to engage the requisite expertise needed to undertake preliminary and detailed assessments of their buildings. Others elected to directly engage fire engineers to provide expert advice.

4.3 Audit findings

A total of 24 agencies (including four public universities) reported they had buildings that fell within their respective audit scopes.

Agencies reported 1914 buildings were reviewed as part of the audit. To date, a total of 1783 buildings have been cleared as not having a combustible façade.

A total of 130 detailed risk assessments have been undertaken to date after which 77 buildings have been cleared. This is either due to the materials being confirmed as non-combustible or the use of combustible materials being of low risk due to the extent or disposition of their use. A total of 27 buildings have been identified as requiring remedial works. Works are completed for five of those buildings and two other buildings have remedial works in progress.

In September 2018 DFES and Building and Energy developed a guidance note to assist agencies with a set of interim measures that can be implemented to reduce the fire risk posed from potentially dangerous external cladding, pending more specific measures recommended by fire safety engineers and/or registered building surveyors.

During the audit and up until any required remediation work is complete, agencies have employed interim measures to ensure the building can be used safely by occupants.

Figure 9 is an example of the periodical updates provided by Building and Energy on the DMIRS website.

	Number of buildings within scope reviewed by agency	Number of buildings cleared in initial review	Number of detailed risk assessments commenced	Number of buildings cleared after detailed risk assessment	Number of buildings requiring remedial action	Remedial works in progress	Remedial action complete
Curtin University of Technology	240	223	17	15	2		2
Department of Education	138	111	27	13	3		
Department of Health	97	84	12	3	7	1	
Department of Local Government, Sport and Cultural Industries	89	87	2	1	1		
Department of Training and Workforce Development	3	1	2	0	0		
Edith Cowan University	66	44	22	11	0		
Murdoch University	5	1	4	1	3		3
University of Western Australia	14	7	7	0	7		1
VenuesWest	9	0	9	7	2		2
Department of Communities	646	645	1	0	1		1
Department of Fire and Emergency Services	157	150	7	6	1		
Construction Industry Training Fund	1	0	1	1	0		
Department of Finance	20	14	6	6	0		
Department of Justice	40	39	1	1	0		
Department of Mines, Industry Regulation and Safety	22	21	1	1	0		
Department of Primary Industries and Regional Development	178	178	0	0	0		
Department of Transport	5	**5**	0	**0**	0		
Legal Aid Commission of Western Australia	1	1	0	0	0		
LotteryWest	3	3	0	0	0		
Metropolitan Cemeteries Board	4	4	0	0	0		
Metropolitan Redevelopment Authority	2	**2**	0	**0**	0		
Pilbara Ports Authority	4	4	0	0	0		
Western Australia Police	169	159	10	10	0		
WorkCover Western Australia	1	0	1	1	0		
Total	**1914**	**1783**	**130**	**77**	**27**	**1**	**9**

Figure 9: State-wide cladding audit – public buildings – as at 30 June 2020

5. Actions undertaken to mitigate the risk of combustible cladding

On 6 October 2018 the Western Australian Building Regulations 2012 were amended to restrict the use of combustible material on building facades of high-risk buildings.

The new building regulations restrict the use of performance solutions for cladding on new buildings. This means that combustible cladding on new buildings can only be used where it demonstrates compliance through a strict, prescribed verification method.

Regulation 31HA aims to control the performance of an external wall in relation to the potential spread of fire via that wall. It does that by:

- requiring external walls of buildings with type A and B construction to comply with the 'deemed to satisfy' (DTS) requirements of the BCA of Australia (BCA); or
- if a performance solution is proposed, requiring the performance solution to comply with Verification Method CV3 of the NCC which incorporates full scale fire testing of the wall system in accordance with AS 5113:2016 Fire propagation testing and classification of external walls of buildings; and
- preventing the use of any performance solution for demonstrating compliance with CP2 for avoiding the spread of fire via external walls that is not in accordance with the Verification Method CV3. (CV3 is a method of verifying compliance with the relevant Performance Requirements through product testing the inclusion of cavity barriers and the provision of a fire suppression system.)

6. Next steps

Building and Energy continues to monitor and update cladding audit progress for private and public buildings.

In respect of private buildings this consists of Building and Energy having regular contact with permit authorities and advising DMIRS of the outcome of enforcement action and the progress of required remediation works. For public buildings this consists of regular contacts with, and updates from State Government agencies and entities on the progress of their audit activities and required remedial works. Building and Energy continues to provide support to building owners, permit authorities and State Government agencies as the enforcement and remedial activities progress to completion.

Where the construction of a building has been completed in the last six years, building owners may be able to lodge a building services complaint with Building and Energy. Building service complaints relate to building services not being carried out in a proper and proficient manner or being faulty or unsatisfactory. Further information on the disputes process administered by Building and Energy can be viewed on the DMIRS website:
www.commerce.wa.gov.au/building-and-energy/building-complaint

Other buildings

In November 2019, the State Government decided not to expand the current audit scope to include retail, commercial and office buildings. This decision recognised there is a much lower life safety risk in these classes of buildings due to a number of factors including:

- smoking inside of workplaces is prohibited;
- the infrequent use of candles and barbeques;
- people do not sleep in these buildings; and
- occupational safety and health laws mean occupants must have designated fire wardens and practice fire evacuation drills.

To assist owners of retail, commercial and office buildings Building and Energy has developed additional guides in relation to fire safety and assessments in response to combustible cladding:

- Fire engineering assessment of external cladding
- Fire safety in existing apartment buildings

These guides can be downloaded from the DMIRS website.

Building Confidence

In 2017 the Building Ministers' Forum commissioned a report by Professor Peter Shergold and Ms Bronwyn Weir, *Building confidence: improving the effectiveness of compliance and enforcement systems for the building and construction industry across Australia* (2018) (Building Confidence report). The Building Confidence report observed weaknesses with the compliance and enforcement frameworks across Australia.

In December 2019 a Consultation Regulatory Impact Statement (CRIS), prepared by the Department of Mines, Industry Regulation and Safety – Building and Energy division (Building and Energy), was the first step to towards improving processes to enhance the quality and standard of commercial and apartment buildings in Western Australia by implementing the recommendations in the Building Confidence report.

The CRIS proposes 27 reforms to improve building compliance for class 2-9 buildings in WA. The reform proposals are wide-ranging and seek to address issues identified in the Building Confidence report.

The purpose of this CRIS is to seek feedback from industry and the community on proposals to reform the approvals process for class 2-9 buildings in WA. Building and Energy will analyse all the information gathered through this consultation process and will publish a Decision Regulatory Impact Statement recommending a final policy position.

7. Appendix

Combustible cladding

What is it?

Cladding refers to the processes of applying one material over another to provide a skin or layer. Cladding on buildings achieves thermal insulation, weather resistance, acoustic insulation as well as decorative outcomes with the use of cladding growing in popularity since the turn of the century.

There is a wide variety of cladding used on Australian buildings. Not all cladding is combustible with some products having been deemed non-combustible under the BCA. Examples of cladding include timber, timber composite, glazing, curtain walling, metal profile and sandwich panels. A common form of cladding associated with fire risk is ACP which is a sandwich panel comprising two thin sheets of aluminium on the outside with an internal core made of black polyethylene, known as 'PE'. The three layers are bonded to form a sandwich and produce high structural rigidity while remaining light weight. PE is a mix of polymers and ethylene; ethylene is mainly obtained from petroleum. It burns slowly with a blue flame having a yellow tip and gives off an odour of paraffin.

The highest risk ACPs are those with a 100 per cent PE and this type of cladding is believed to be more prevalent on buildings constructed prior to 2012. Since then manufacturers have introduced ACP with a degree of inert mineral filler; reducing the PE content to as little as seven per cent in some instances. The differing types of ACP are generally referred to as:

- ACP PE – products which typically have a PE black core of greater than 30 per cent.
- ACP FR – products which typically have a PE grey core of 30 per cent or less.
- ACP A2 – products which typically have a light grey PE core of less than 10 per cent.
- Aluminium honeycomb – products that have no PE core. As the name suggests the core is constructed of a honeycomb patterned aluminium.

Timber composite cladding is most commonly the combination of timber in the form of flour, particles or fibres and thermosets or thermoplastic materials under specific heat and pressure to produce a solid cladding material. Thermosets are plastics that once cured, cannot be remelted by reheating and include resins such as epoxies and phenolic. Thermoplastics present a higher risk and are plastics that can be repeatedly melted, such as polyethylene (PE) and polyvinyl chloride (PVC).

How do combustible panels perform in a fire situation?

Fire events can be initiated from a fire occurring inside or external to the building or within close proximity to the building. Externally initiated fires often start as a result of arson or the accidental ignition of rubbish bins or other items on residential balconies. Internally initiated fires can be ignited in a multitude of ways such as an electrical fault, a candle, cigarette, etc. and unless the building has an operable fire sprinkler system, fire can breakthrough an externally facing window or door where, dependent on the combustibility of the façade material, it can rapidly travel up the building potentially re-entering the building on a higher storey, as was the case with Grenfell.

Once a fire has found its way to the building façade, the fire performance characteristics of the materials is critical. Cavities incorporated within an external cladding system can accelerate the spread of fire as the flames elongate in search of oxygen. Likewise, panels which have not been properly sealed at the edges can delaminate as fire takes hold of the core. Even properly sealed ACP can fail once the heat from a fire melts the aluminium as it has a much lower melting temperature than steel. Once a fire does take hold, it can travel up or through an entire façade of a building within minutes, exposing occupants and firefighters to extreme risk of danger and a major property loss.

Delaminated panels pose the additional risk of falling debris as hot metal and burning foam insulation can rain down on the surrounding area, exposing further risk of injury or secondary fires.

Insurance Council of Australia (ICA) – categorisation of combustible cladding

The ICA provides a grading scheme for ACPs in its website publication, 'Insurance Industry Aluminium Composite Panels Residual Hazard Identification/ Reporting Protocol' shown below which was first published on 29 November 2017, and last updated on 2 July 2019. These can be viewed in Figure 10.

The assessment adopted by Building and Energy used a similar composition categorisation as shown below in Table 2. Where other materials were found to be present, these were generally aligned to the categories according to their relative calorific content.

A. 30-100% Organic Polymer and 0-70% inert* – Similar to Category 3 in the BRE appendix

*Inert materials are considered those that do not contribute to combustion.

ACPs in this category typically have close to 100% organic polymer in their core and were identified by most manufacturers as PE (Polyethylene) core. Some core binders are polymers other than PE.

B. 8-29% Organic Polymer and 71-92% inert – Similar to Category 2 in the BRE appendix

Typically identified by ACP manufacturers as fr, FR, Plus or rated Class B per EN 13501 and typically have around 30% organic polymer in the core however some State Regulations limit the PE content to less than 30% for this category.

C. 1-7% Organic Polymer and 93-99% inert – Similar to Category 1 in the BRE appendix

Typically identified by ACP manufacturers as A2, rated as Class A2 per EN 13501. These are considered as having very limited combustibility. Testing to EN 13501 and obtaining Class A2 is a valid alternative.

D. 0% Organic Polymer and 100% inert – Similar to Category 1 in the BRE appendix

Typically, panels tested or deemed non-combustible by the BCA (NCC). These could be aluminum skins with low adhesive aluminum honeycomb cores, compressed fibre cement core or even compressed fibre cement panel. Steel panels with calcium silicate or similar core.

Figure 10 – Insurance Industry Aluminium Composite Panels Residual Hazard Identification/ Reporting Protocol

Source: www.insurancecouncil.com.au/issues-submissions/issues/insurance-industry-aluminium-composite-panels-residual-hazard-identificationreporting-protocol

The insurance industry recognises that buildings should be assessed on a case-by-case basis when evaluating critical exposure for life safety and asset protection. Insurers consider the residual risk of potential damage occurring to affected properties and a claim being made against the policy. Where a greater chance of a damaging event exists this has been reflected in higher property insurance premiums at renewal.

The ICA has been active in the cladding space and has provided regular updates to its website information. The ICA recommends building owners work closely with their property insurer to enable informed, ongoing underwriting of their building.

Table 2 – Categorisation of ACP core materials according to composition

Category	Composition of Core Material	Comment
1.	0% PE	Generally 100 per cent aluminium – the core may be either solid or some form of expanded aluminium/ honeycomb arrangement. Considered to be non-combustible but can melt to deposit molten metal or sections of panels.
2.	<8%PE, >92% mineral fibre	May be given the annotation of A2 or similar in order to provide some differentiation from the 'FR' products. The remaining PE content is relatively insignificant and fire spread that occurs should be correspondingly restrained.
3.	8-34% PE, <92-66% mineral fibre	The panel may typically be given an FR designation. The PE content is sufficient to facilitate fire spread and this material is still considered to be reasonably combustible. The core coloration is generally lighter than that of the higher PE content panels.
4.	35-100% PE, 0-35% mineral fibre	The PE comprising the bulk or all of the core material will probably give the core a dark or black coloration. Panels containing this level of PE in the core are considered to be extremely combustible.
5.	Expanded Polystyrene (EPS)	May be present as blocks painted to match building or laminated to produce sandwich panel. Polystyrene is combustible.

NB: It is important that the composition of the core only is included in the calculation of composition values. There are apparently some manufacturers that also include the external aluminium 'skin' in the calculations.

Building standards

Legislation

The Building Regulations 2012 (WA) (the Building Regulations), made under the Building Act, set out a general position as to applicable building standards, as well as a series of qualifications for particular circumstances and types of building. The general position is that the applicable building standards are those set out as the Performance Requirements in the BCA in effect at the time the building application is made or were in effect 12 months before the building permit application was made.

The Building Regulations 1989 (WA) ceased at the introduction of the 2012 regulations and were made under the Local Government Miscellaneous Provisions Act. They also required compliance with the BCA and allowed a 12 month transition period.

The BCA is a comprehensive set of building standards that is the product of a series of efforts by the commonwealth, state and territory governments during the 1960s, 70s and 80s to develop a uniform national position on building standards.

The BCA was first published in 1988 and has been revised several times. During the audit period of 1 January 2000 to 30 September 2017, 21 versions of the BCA have operated. These versions and their periods of operation are set out in Table 3.

In 2008 the Council of Australian Governments agreed to develop a national code covering building plumbing, electrical, and telecommunications standards. The National Construction Code (the NCC) was published in 2011. To date the NCC only encompasses building and plumbing standards.

The NCC consists of three volumes. Volume One of the NCC deals with building standards for Class 2 to Class 9 buildings (multi-residential, commercial, industrial and public buildings); Volume Two deals with building standards for Class 1 and Class 10 buildings (residential and non-habitable buildings and structures); and Volume Three deals with plumbing standards. The term BCA refers to volumes one and two of the NCC.

A new issue of the BCA was not scheduled to come into operation until 1 May 2019, however at the request of the collective commonwealth and state building ministers, and in light of the heightened concerns regarding cladding products, the ABCB developed an out-of-cycle amendment to the NCC 2016. This amendment is known as the *2016 Amendment 1* was implemented in all states in March of 2018. Western Australia did not allow for a 12 month transition period for compliance with Amendment 1 and it came into effect immediately on its release. Key components of Amendment 1 were:

- revised evidence of suitability provisions;
- new verification method relating to Performance Requirement CP2 (Spread of Fire);
- clarification of certain provisions relating to non-combustibility; and
- Australian Standard for automatic fire sprinkler systems.

Table 3: BCA versions

Version	Period of Operation
BCA 1996 (Amdt 6)	01/01/2000 – 30/06/2000
BCA 1996 (Amdt 7)	01/07/2000 – 31/12/2000
BCA 1996 (Amdt 8)	01/01/2001 – 30/06/2001
BCA 1996 (Amdt 9)	01/07/2001 – 31/12/2001
BCA 1996 (Amdt 10)	01/01/2002 – 30/06/2002
BCA 1996 (Amdt 11)	01/07/2002 – 31/12/2002
BCA 1996 (Amdt 12)	01/01/2003 – 30/06/2003
BCA 1996 (Amdt 13)	01/07/2003 – 30/04/2004
BCA 2004	01/05/2004 – 30/04/2005
BCA 2005	01/05/2005 – 30/04/2006
BCA 2006	01/05/2006 – 30/04/2007
BCA 2007	01/05/2007 – 30/04/2008
BCA 2008	01/05/2008 – 30/04/2009
BCA 2009	01/05/2009 – 30/04/2010
BCA 2010	01/05/2010 – 30/04/2011
NCC 2011	01/05/2011 – 30/04/2012
NCC 2012	01/05/2012 – 30/04/2013
NCC 2013	01/05/2013 – 30/04/2014
NCC 2014	01/05/2014 – 30/04/2015
NCC 2015	01/05/2015 – 30/04/2016
NCC 2016	01/05/2016 – 11/03/2018
NCC 2016 (Amdt 1)	12/03/2018 – 30/04/2019
NCC 2019	01/05/2019 – present

The BCA sets out minimum Performance Requirements that buildings must achieve. A Performance Requirement can be satisfied through the use of a deemed-to-satisfy (DTS) solution, a performance solution (previously known as an Alternative Solution) or a combination of DTS and performance solutions.

A DTS solution is one that follows the prescriptive DTS requirements contained in the BCA. These requirements may cover materials, components and/or construction methods that are to be used and design factors that are to be considered.

A performance solution is any solution other than a DTS solution that satisfies the stated Performance Requirement. Deemed-to-satisfy solutions are typically the 'time proven' methods of construction that are known to produce an acceptable outcome. Such methods may however prove to be inefficient or come with other intrinsic limitations. Performance solutions by contrast are flexible and allow for the development of innovative construction methods and products.

Whichever solution proposed, it must be demonstrated as achieving a level that satisfies the Performance Requirements of the BCA. This is done through the use of one or more of the stated assessment methods.

For a DTS solution these assessment methods are:

Compliance with the DTS provisions of the BCA.

For a performance solution these assessment methods are:

- provision of certain types of documentary evidence;
- verification through the conduct of tests, inspections, calculations;
- expert judgement; and
- comparison with the DTS requirements.

Part A2 of the BCA Volume One contains the acceptance of design and construction provisions. This part outlines the options that can be used as evidence to support that the use of materials, products or forms of construction meet the NCC requirements. New and innovative building products require assessments through the approved evidence of suitability framework that are set out in the BCA.

ACPs have to a large extent addressed the acceptance of design and construction provisions through a voluntary third party building product certification scheme known as CodeMark or CodeMark Australia. Gaining a certificate of conformity from CodeMark has been one of several options available for manufacturers in meeting the evidence of suitability requirements of the BCA. This scheme has been accredited as a product certification body by Joint Accreditation System of Australia and New Zealand (JAS-ANZ). The certificate of conformity contains information about the purpose or use of the product, how the product complies with the BCA and also provides conditions and limitations for the use of the product. Conditions generally relate to the type of construction the product may be used with, installation requirements and in some instances require active safety systems within a building such as sprinkler protection.

In February 2019 JAS-ANZ withdrew certificates of conformity for nine cladding products. Four of those certificates related to products found to be on Western Australian buildings that have been included in the cladding audit. The withdrawal of these certificates meant that they were no longer current and as such were no longer recognised as a form of evidence of suitability. For these products to be used as a cladding product moving forward, practitioners would need to address requirements through another form of evidence of suitability that complies with the BCA provisions.

In July 2019 JAS-ANZ suspended all accreditations of CertMark International which has issued the certificates of conformity mentioned above as part of the CodeMark scheme in their role as a conformity assessment body accredited by JAS-ANZ. The suspension related to scheme accreditation requirements. Although the accreditation scheme was suspended JAS-ANZ advised that existing CertMark CodeMark certificates remained valid unless specifically withdrawn (see above). In October 2019 after a review, JAS-ANZ lifted the suspension subject to conditions relating to any future major findings in relation to technical files and future marketing proposals, which will require JAS-ANZ approval.

Building classification

Before considering the BCA's Performance Requirements for cladding, it is useful to understand the primary classification system used for buildings in the BCA 'Class'. There are ten main classes of buildings and a number of subclasses. Their defining characteristics are summarised in Table 4.

Table 4 – BCA Class

Class	Description
1a	A detached house or a group of attached dwellings separated by fire resistant walls (for example, town houses or villa units) which is not located above or below another building other than a private garage
1b	A boarding house, guest house or hostel with a floor area not exceeding 300m2 which ordinarily accommodates not more than 12 people and which is not located above or below another building other than a private garage
2	An apartment building or group of single storey units located above a communal basement or garage
3	A building, other than a Class 1 or 3 building, which is a common place of long term or transient residence such as (for example, a boarding house, guest house or backpackers accommodation or residential part of a hotel, school or detention centre
4	A dwelling within a building that is otherwise a Class 6, 7, 8 or 9 building (for example, a caretaker's residence or an apartment above a workshop)
5	An office building used for commercial purposes not otherwise captured in Class 6, 7, 8 or 9
6	A shop or other building through which the public is sold goods or services
7a	A carpark structure
7b	A warehouse or a building for the display of goods to be sold on a wholesale basis
8	A laboratory, factory or workshop where business is carried out for trade, sale or commercial gain
9a	A healthcare facility where occupants or patients generally need assistance to evacuate during an emergency (for example, a hospital or care facility)
9b	A building where people assemble for civic, educational, entertainment or transportation purposes
9c	An aged care building
10a	A non-habitable building being a private garage, shed or the like
10b	A non-habitable structure being a fence, swimming pool, retaining wall or the like
10c	A private bushfire shelter

BCA requirements for cladding

The BCA has nine overarching Performance Requirements relating to fire resistance. The second such Performance Requirement (CP2) is relevant to external cladding, it states:

(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 [in Class 2, 3 and 4 buildings]; and

(iii) between buildings; and

(iv) in a building.

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

(i) the function of 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".

The DTS provisions relating to Performance Requirement CP2 that are relevant to external cladding can be divided into two groups:

1. Those dealing with the combustibility of external walls (Clauses C1.1 and C1.9 (previously C1.12); and Specification C1.1, Clause 3.1); and
2. Those dealing with whether a Fire-Resistance Level (FRL) is required for the external wall and, if so, what that FRL needs to be (Specification C1.1, Clause 2.1).

While the requirements contained in both provisions are related, they need to be independently complied with (that is, compliance against one measure does not mean compliance with other measures).

Clause C1.1 establishes three Types of fire-resisting construction. The Type required depends upon a building's BCA Class and its height in storeys. Table 5 sets out the requirement for the Type of construction to be used.

Each Type of construction corresponds to a different set of DTS clauses that need to be complied with for DTS solution. The clauses relating to Type A construction are the most stringent and those relating to Type C construction are the least stringent.

Table 5 – Type of construction

Rise in storey	BCA Classes 2, 3 and 9
4 or more	Type A
3	Type A
2	Type B
1	Type C

NB: Class 4 buildings are, by definition, components of buildings of different classifications. The type of construction required for a Class 4 building will depend on the classification of the rest of the building.

Most buildings falling within the scope of this audit needed to meet the requirements of Type A construction, however as can be seen from Table 4; some buildings may only need to meet the requirements for Type B construction.

For both Type A and Type B construction, external walls, being a building's outer walls other than those shared with an adjoining building, must be constructed wholly of non-combustible materials under the DTS requirements.[3]

3 NCC 2016 – Volume One, Section C, Specification clause 3.1(b), page 118.

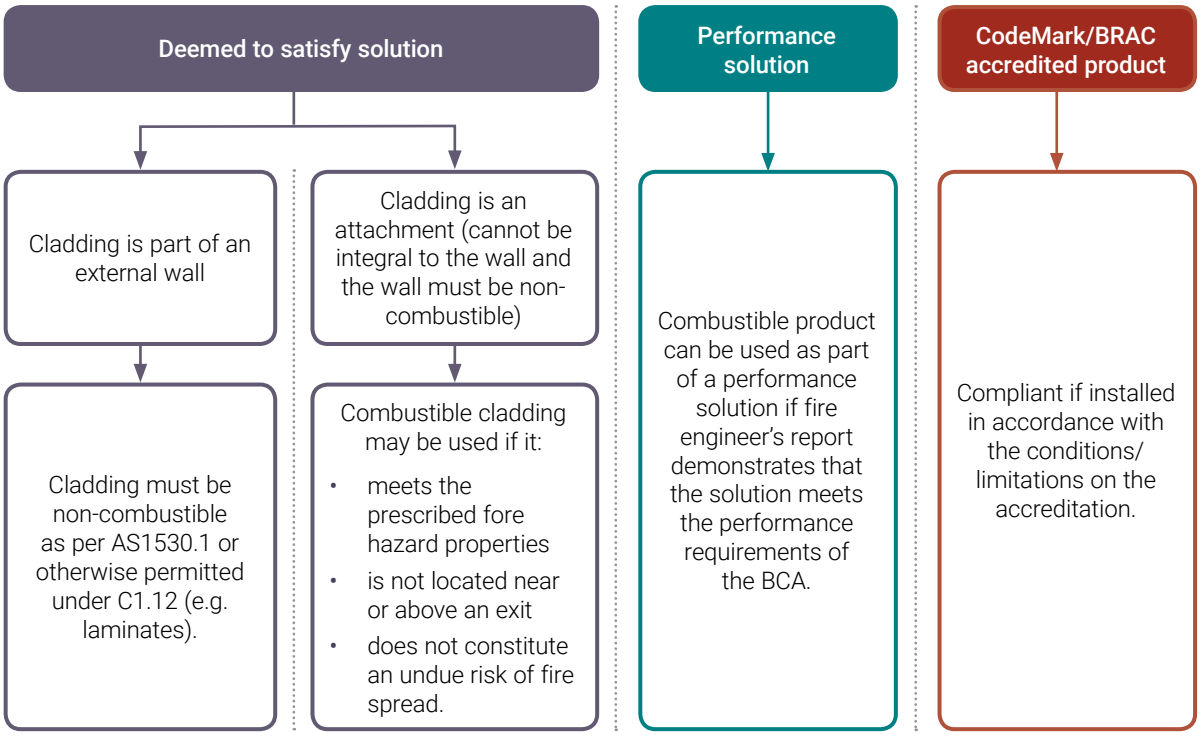
AS1530.1 combustibility test

Whether or not a material is deemed combustible is determined under an AS1530.1-1994 (R2016) combustibility test. Under this test, small samples of the material are placed in a testing furnace and the furnace is heated to 750℃. If, during a testing period of at least 30 minutes, the temperature of the material sample or the furnace spikes more than 50℃ above the corresponding average temperature or if a sample 'flames' for a period longer than five seconds, the material is deemed to be combustible.

The Australian Standard notes that this test is not appropriate for coated, faced or laminated products however clause C1.9 (previously C1.12) of the BCA allows the use of bonded laminate materials where each lamina including the core is non-combustible. The Australian Standard also notes that anomalous results may occur with material that have melting point below 750℃ (for example, aluminium melts at 660.32℃ and zinc melts at 419.53℃ [both of which are used as or in cladding products]).

In clause C1.9 (previously C1.12) the BCA sets out a series of exceptions for the use of certain types of material that while potentially not meeting the exacting standard of non-combustibility set by the DTS provisions, are known to provide acceptable levels of fire safety.

Figure 11 outlines the requirements for Classes 2, 3 and 9 buildings above two storeys (Type A construction).



Source: Victorian Cladding Taskforce – Interim Report – 2017

Figure 11: Cladding compliance pathways for Type A & B construction

Any combustible cladding proposed to be used on new buildings in Western Australia needs to demonstrate it has passed the large-scale fire test required under Australian Standard AS 5113 or receive approval from the Building Commissioner since the introduction of regulation 31HA to the Building Regulations in October 2018. This regulation requires compliance with a particular Verification Method for the use of cladding (CV3) which in addition to the large-scale testing requires the provision of a sprinkler system and installation of cavity barriers.

The Building Commissioner's power to audit

The Building Services (Complaint Resolution and Administration) Act 2011 (BSCRA Act)

The BSCRA Act enables the Building Commissioner to investigate the work and conduct of registered building service providers which includes builders and building surveyors.

A person authorised by the Building Commissioner may carry out an inspection of a building and the Building Commissioner may authorise people to:

- monitor whether a builder or building surveyor is carrying out work with the required level of competency; and
- inspect any building to ascertain:
  - how building services have been carried out; and
  - how building standards have been applied.

The Building Commissioner may publish a statement identifying any building services carried out in an unsatisfactory or dangerous manner.

Building Commissioner's cladding audit team

To carry out the state-wide cladding audit the Building Commissioner established a team consisting of:

- state-wide cladding audit director;
- two building surveyors;
- one fire engineer supported by an external panel of fire engineers; and
- support staff.

The building surveyors are registered building surveyor practitioners and have relevant experience in the assessment and approval of commercial and industrial buildings.

Building approvals process

The Building Act provides that a person must not carry out building work without a building permit. The definition 'building work' is cast broadly and, amongst other things, includes:

- the construction, erection, assembly or placement of a building; and
- the renovation, alteration, extension, improvement or repair of a building.

In order to obtain a building permit a person must apply to the responsible permit authority (typically their local government) and an application can be made in a certified or an uncertified form.

A certified application will include a certificate of design compliance which is a document signed by an independent building surveyor stating that if the building is constructed in accordance with the plans and specifications provided, it will comply with the applicable building standards.

An uncertified application will not include a certificate of design compliance but will include all the necessary plans and specifications for the permit authority's building surveyor to assess compliance with the applicable building standards. If the permit authority's building surveyor is satisfied that the plans and specifications provided show a building that, if so constructed, would be in compliance with the applicable building standards, a certificate of design compliance will be issued.

The uncertified pathway is not available for Class 2-9 buildings. Applications for these buildings are required to be certified.

Provided all other requirements are met, a building permit will be issued.

Upon the completion of a Class 2-9 building, and prior to its occupation or use, an occupancy permit must be obtained. In order to obtain an occupancy permit, an application must be made to the relevant permit authority and must be accompanied by a certificate of construction compliance. A certificate of construction compliance is a document signed by an independent building surveyor which states that:

- the building has been constructed in accordance with the plans and specifications that were assessed as part of the earlier certificate of design compliance process; and
- the building otherwise complies with each applicable building permit including each condition that applies to the permit.

Prior to the Building Act coming into operation in April 2012, the building approval process was regulated under the *Local Government (Miscellaneous Provisions) Act 1960* (WA) (the LGPM Act). The LGMP Act contained a similar set of checks as those contained in the Building Act.

Prior to April 2012 building approvals were in the form of a building licence with the application being assessed by the relevant local government as private certification had not yet been enabled.

The enforcement role of permit authorities

In Western Australia the role of enforcing compliance with the Building Act rests with the permit authority. The permit authority for a building or incidental structure is generally the local government in whose district the building or incidental structure is, or is proposed to be located unless a State Government Permit Authority issued the Building Permit for buildings that would be owned and managed by the state.

A permit authority may make an order (Building Order) in respect of one or more of the following –

(a) particular building work;

(b) particular demolition work;

(c) a particular building or incidental structure, whether completed before or after commencement day.

A Building Order can be issued by the permit authority if a building or incidental structure is reasonably believed to be in a dangerous state or unfit for human occupation.

Through the application of the Building Commissioner's powers to investigate the work of registered builders and building surveyors, Building and Energy was able to produce expert reports capable of being relied upon by the permit authority to form a reasonable view that a building was in a dangerous state. Permit authorities were then able to use their powers under the Building Act to issue a Building Order to ensure the building is appropriately remediated.

Government of Western Australia

Department of Mines, Industry Regulation and Safety

Building and Energy

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