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*Review*

# Australia's Combustible Cladding Crisis—A Failure in Delegated Legislation?

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**Abstract:** Australia's combustible cladding crisis is estimated to cost approximately $6 billion to remediate. No study has been published which determined the causative factors for the magnitude of this issue. Investigators for the Federal Building Ministers' Forum stated that building practitioners misinterpreted or ignored the requirements of the National Construction Code. However, research by the authors showed that the cause of Australia's combustible cladding crisis are likely deficiencies in the National Construction Code itself. A comparative analysis of historic National Construction Code requirements and recent National Construction Code changes in response to cladding fires showed that the factors which contributed to Australia's combustible cladding crisis were present for nearly 20 years. Findings also showed that some of the newly introduced measures incorporated in the National Construction Code to address the combustible cladding crisis do not fully address combustible cladding risks and fail to completely address the historical deficiencies.

**Keywords:** national construction code; combustible cladding; performance-based design; fire safety; delegated legislation



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## 1. Introduction

Since 1997, performance-based design for fire protection engineering is permitted under building Acts across Australian states and territories by incorporating the National Construction Code. These Acts, via the National Construction Code, allow designers such as fire protection engineers to adopt first-principles design methods of analysis over prescriptive methods, the latter of which had been the only means of design over the preceding decades. The first principles performance-based design methods enable fire protection engineers to develop designs which, at the most fundamental level, address occupant safety and damage to other property using any method available if it complies with the relevant performance criteria. This performance-based design approach was welcomed as a new way to design for the construction industry [1] but is really the adoption of common law principles which always required building owners to take (non-prescriptive) precautionary measures to address harm to persons (such as occupant safety) and damage to other property for centuries without prescriptive measures. But where harm to persons or damage to property does occur as a result of poor design, the doctrines of negligence and nuisance apply, respectively, by way of an actionable claim in tort [2].

In the case of Australia's building laws, the National Construction Code was first published in 1988 by the Australian Uniform Building Regulations Co-ordinating Council. This National Construction Code was purely prescriptive. The option for the performance-based design was added to the existing National Construction Code in 1997. The prescriptive component within the National Construction Code subsequently became defined as the Deemed-to-Satisfy solution. The Deemed-to-Satisfy, when followed in full, is 'deemed' to legally comply with the National Construction Code. Such design solutions rarely engage the services of a specialist engineer since the application of the Deemed-to-Satisfy does not require any specialist expertise.

The word 'deemed' in the Deemed-to-Satisfy is important, as 'deeming' is a statutory method that is commonly used in drafting and enacting legal instruments such as the National Construction Code. To quote a passage used by Gibbs J in Redland Council v Stradbroke Rutile Ltd. (1974): "It commonly happens that, because legislation contains a deeming provision, there may arise a question of construction which turns, not so much upon the meaning of the word "deemed", as upon a view concerning the statutory purpose for which it has been used. Such a question may turn, for example, upon whether the legislature is intending to create a statutory fiction or whether, on the other hand, it is merely making a provision for the removal of doubt which might otherwise exist". The Australian Law Dictionary also gives a general definition of 'deem', namely [3]: "Assumed to be the case, by operation of law". The National Construction Code also confirms the effect of 'deeming' at A2G3 [4]: "A solution that complies with the Deemed-to-Satisfy provisions is deemed to have met the performance requirements".

A Deemed-to-Satisfy design is assumed to comply with the performance requirements of the National Construction Code, but due to the characteristics of 'deeming', it cannot be said that any Deemed-to-Satisfy design factually does comply with the applicable National Construction Code performance requirements. If any element of the 'deeming' assumption should not be correct—that is, a 'deeming' provision fails to meet the performance requirements or adequately respond to the doctrines of negligence or nuisance—there could be a serious deficiency in the Deemed-to-Satisfy.

In the case of the Australian combustible cladding crisis (described in Section 2 in more detail), if deficiencies in the Deemed-to-Satisfy was a causative factor for the prevalence of combustible cladding across Australia, this has not been answered in the literature to date. Instead, doubt about the construction industry's ability to comply with the National Construction Code was the line of enquiry, whether it be via the Deemed-to-Satisfy or a performance-based design. The Building Confidence Report [5] (the report commissioned by the Australian Government to look into building failures, motivated by the prevalence of combustible cladding) contains numerous statements to this effect, the following being an example, "Many stakeholders report that building practitioners across the industry do not have a sufficient understanding of the National Construction Code or its revisions. This has led to non-compliance or poor-quality documentation of compliance. Misinterpretation or ignorance of the requirements of the National Construction Code is not uncommon. Indeed, this failure has been offered as one explanation for the prevalence of non-compliant cladding on buildings across Australia." Furthermore, the Building Confidence Report did not specifically determine the causative factors for the prevalence of combustible cladding: "Our Terms of Reference do not specifically refer to the concerns regarding combustible cladding. However, this issue has been a dominant underlying theme of the consultations we have held. As we have developed the recommendations we have asked ourselves a simple question: "would our recommendations significantly reduce the likelihood of the misuse of cladding occurring in the future?". We believe we can answer in the affirmative". Thus, the Building Confidence Report did not identify which National Construction Code requirements relate to combustible cladding and, therefore, did not explore the possibility that deficiencies in the Deemed-to-Satisfy, performance requirements, or both, were a possible causative factor permitting the use of combustible cladding across Australia. Finally, as the Building Confidence Report did not investigate any building failure whereby harm or damage (loss) occurred because of combustible cladding (and it is only by investigating evidence relating to loss can the causative factors that give rise to an actionable claim in negligence or nuisance can conclusions be drawn [5]), its findings warrant scrutiny.

As a result of the Building Confidence Report not reviewing any loss nor any potential deficiency in the National Construction Code, the possibility of deficiencies in the National Construction Code is important to investigate, as it may explain why there is an estimated AUD 6 billion worth of combustible cladding on buildings across Australia that needs to be removed. Moreover, errors, omissions, deficiencies, and the like, are a well-known problem in delegated legislation, a type of legal instrument that the National Construction Code falls within (Sections 4 and 5 of this paper addresses this issue in more detail). Thus, if any element of the National Construction Code does not adequately address external vertical spread of fire, then the inadequateness of the National Construction Code itself may explain the prevalence of combustible cladding across buildings in Australia given the National Construction Code is legally prescribed in every Australian state and territory's respective building Act.

This paper investigates the technical and legal soundness of the National Construction Code for both its Deemed-to-Satisfy and performance-based building code requirements for mitigation measures against vertical external spread of fire. The paper shows that the National Construction Code was not a robust instrument for preventing combustible cladding being installed on buildings across Australia via the following method:

1. Explaining the extent of the combustible cladding problem in Australia (Section 2);
2. Further explaining the research methodology (Section 3);
3. Explaining how instruments such as the National Construction Code and the Deemed-to-Satisfy fits in to Australia's legal system as delegated legislation (Sections 4 and 5);
4. Analyzing the Deemed-to-Satisfy and National Construction Code in a manner consistent with Australian law for the purposes of mitigating against vertical spread of fire (Section 6);
5. Discussion of findings (Section 7);
6. Conclusions (Section 8).

## 2. Combustible Cladding—The Problem

Regrettably, thousands of multi-story buildings in Australia were built with external combustible cladding installed on the exterior walls [6]; the problem is commonly referred to as the 'combustible cladding crisis'. The effect, should the combustible cladding ignite, is not without precedent. On 24 November 2014, a fire broke out in Lacrosse Tower [7], a 21-story residential high-rise building located in Melbourne, Australia. The fire started on the eighth-floor balcony of one of the residential units. The external cladding was made from an aluminum and combustible plastic polymer composite material [7]. As the fire grew on the balcony, it ignited the external cladding and within minutes the fire had raced up the exterior of the building to the 21st floor (the highest floor). It has been since established that there are thousands of buildings in Australia that have combustible cladding installed on their exterior [6] and this cladding needs to be removed and replaced with a non-combustible equivalent.

In the United Kingdom, almost three years after the Lacrosse Tower fire, another combustible cladding fire occurred in London on 14 June 2017, where a fire started in an apartment on the fourth floor of the Grenfell Tower building, the fire spread to the external cladding, and within minutes reached the 24th floor (the top floor), killing 72 people [8]. Again, the external cladding was an aluminum and combustible plastic polymer composite material.

There are many manufactured permutations of what form combustible external cladding can take but the general structure is largely the same, namely, an exterior aluminum skin (often with a finishing coat) with a plastic core made from a combustible plastic, usually polyethylene or polypropylene [9]. This type of cladding is used for insulation and/or decorative purposes, has excellent insultation and durability qualities, is low cost, but is also highly combustible. Figure 1 below illustrates the basic structure of combustible cladding, which has been placed on thousands of Australian multi-story buildings.

The events of the Lacrosse Tower fire and Grenfell Tower fire had a significant impact on those who work and operate in the construction industry in Australia, whether it be engineers, architects, builders, insurers, or cladding manufacturers, not to mention those who live in buildings which may still be clad in combustible cladding and, therefore, be exposed to the effects of cladding fires. The most notable legal impact being the fire protection engineer, architect, and building certifier who were collectively sued for $5.7 million for their contribution to specifying combustible cladding for the Lacrosse Tower building [10].

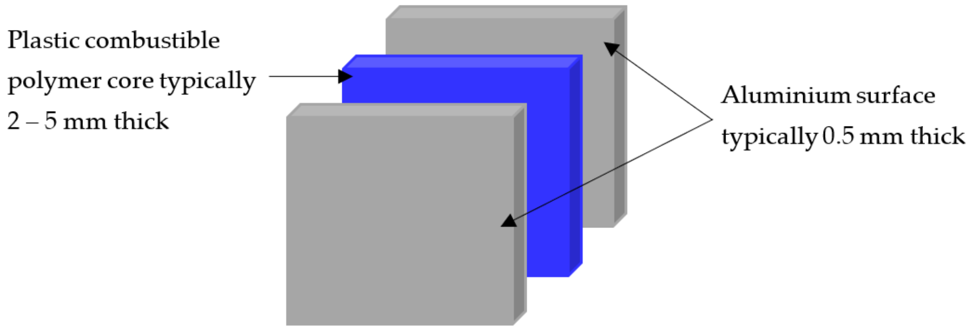


**Figure 1.** Basic structure of combustible cladding.

## 3. Research Methodology

The research methodology here consists of comparing and assessing the Deemed-to-Satisfy and the performance requirements of the National Construction Code from the period of 1996 to 2018 for mitigation measures against vertical external spread of fire, a period where Deemed-to-Satisfy changes to a key clause C1.12 (or its historical equivalent) remained largely static. This method of analysis is consistent with the methods of interpretation statutory law and its regulatory counterparts via textual (plain meaning), contextual (meaning not to be considered in isolation from its context), and purposive (intention of the statute) methods [11]. This clause is then compared to a recently amended version of the same clause, published by the ABCB in 2018 [12], likely in response to cladding fires. The two clauses [13] are compared to determine if there has been any deficiency in the Deemed-to-Satisfy provisions of the National Construction Code, which would explain the prevalence of combustible cladding across Australia, since if the National Construction Code was historically deficient on suitable mitigation measures against combustible cladding, this would provide a reason why combustible cladding was installed on thousands of buildings.

A similar comparative analysis is then carried out for the new National Construction Code verification method which proposes to address vertical spread of fire—namely CV3—for compliance with performance clause CP2 (a verification method is a testing or calculation procedure that is deemed as an accepted means of demonstrating compliance with the National Construction Code). Where it was found there were deficiencies in the National Construction Code, whether they be the Deemed-to-Satisfy, CV3, performance criteria, or all, this paper proposed that it was these deficiencies that likely revealed why the prevalence of combustible cladding across Australia is so significant.

Before delving into analyzing the National Construction Code for any possible deficiency, the National Construction Code's legal characteristics must be described. To do this, Australia's legal system must be described. This is carried out in the following section.

## 4. The Laws of Australia and the Role of Delegated Legislation

Australia's legal system is based on the United Kingdom's Westminster system [14], whereby the Government is divided into three separate co-equal arms, namely:

1. Legislature: The Legislature consists of the House of Representatives where laws (typically statutory Acts) are passed into effect. Statutory law (statutes) is the supreme law. Statutes (mostly) have substantive laws—laws that create, define, and regulate people's rights, duties, powers, and liabilities.
2. Executive: The Executive consists of Ministers and government departments. The Executive's role is to recommend policy, propose and pass delegated legislation under statutes, and administer laws. Delegated legislation cannot be produced without an enabling statute to permit it.

3. Judiciary: The Judiciary consists of the Courts and their judges, who interpret and apply the law and produce case law, whether it be the interpretation of statutory law, common law, or both.

Thus, each arm of Government produces laws, albeit of a different character. From a building Act perspective, delegated legislation such as the National Construction Code is produced by the Australian Building Codes Board (a federal entity). The National Construction Code is then adopted by each state and territory's respective building Act and is a type of delegated legislation, which is an instrument such as a regulation, rule, standard, etc., and in this case includes the National Construction Code, Deemed-to-Satisfy, standards, and all other documents referenced within these instruments.

The National Construction Code (and all its references) must be 'within' ('intra vires'), the parent Act they are passed under; it cannot permit what is illegal under the parent Act ('ultra vires'). Delegated legislation (such as the National Construction Code) is also subject to review by each state and territory's respective supreme court for its legality (via judicial review) as the Judiciary can strike out any delegated legislation if the delegated legislation in question is not within the parent Act. This is discussed in the next section.

## 5. Executive Oversight and Judicial Review

There are many legal principles and doctrines that govern how judicial reviews are ruled for delegated legislation and are well beyond the scope of this paper. Therefore, only a summary into the most applied judicial review doctrines and principles that can be used to challenge delegated legislation is presented here [15]:

1. Simple ultra vires: There are two parts to simple ultra vires. The first is if the empowering statutory Act approves a person or a body to make delegated legislation, that person or body must exercise the power. Second, the court must determine if the delegated legislation exceeds the scope of the empowering statutory Act.
2. Inconsistency: This ground of review is usually self-evident and delegated legislation cannot be inconsistent for its purpose(s). The court will find it invalid if the delegated legislation is inconsistent.
3. Uncertainty: If the delegated legislation is clear but the stated action is prohibited or uncertain, then it is invalid. Moreover, if it is vague to the point of being beyond interpretation, it is not applicable.

There are many instances in Australia where the Judiciary overruled the Executive on the above grounds. However, it is the inconsistency doctrine that is of most interest here, as the torts of negligence and nuisance are actionable under each state and territory's respective civil harm statutes (e.g., New South Wales' Civil Liability Act 2002), where losses caused by fire are actionable in the courts (where there is a valid claim in tort), and therefore, delegated legislation such as the National Construction Code cannot operate outside these laws. That is, regulatory instruments such as the National Construction Code cannot have provisions (or lack thereof) which fail to proactively address actionable claims in negligence or nuisance.

As a further note of importance, judicial review operates under common law principles, and unless the parent Act prohibits judicial review with some type of ouster or privative clause preventing judicial review, the common law right to have access to the courts applies, and there is no clause in any of Australia's building Acts that restrict judicial review on whether the National Construction Code is inconsistent, etc.

## 6. Analysis of Deemed-to-Satisfy Clause C1.12 and CV3

### 6.1. Analysis of Deemed-to-Satisfy Clause C1.12

The National Construction Code was updated annually until 2016, after which it was updated every three years. Whilst amendments and alterations were made to the Deemed-to-Satisfy clauses, these changes were often minor. From the period 1990–2018, the Deemed-to-Satisfy clause that addressed non-combustible materials was C2.6 and C1.12 and did not apply to a building that was sprinkler protected (e.g., Lacrosse Tower):

"C2.6 Vertical separation of openings in external walls"

(a) If in a building of Type A construction, any part of a window or other opening in an external wall is above another opening in the storey next below and its vertical projection falls no further than 450 mm outside the lower opening (measured horizontally), the openings must be separated by—
   i. a spandrel which—
      A. is not less than 900 mm in height; and
      B. extends not less than 600 mm above the upper surface of the intervening floor; and
      C. is of non-combustible material having an FRL of not less than 60/60/60; or
   ii. part of a curtain wall or panel wall that complies with (i); or
   iii. construction that complies with (i) behind a curtain wall or panel wall and has any gaps packed with a non-combustible material that will withstand thermal expansion and structural movement of the walling without the loss of seal against fire and smoke; or
   iv. a slab or other horizontal construction that—
      A. projects outwards from the external face of the wall not less than 1100 mm; and
      B. extends along the wall not less than 450 mm beyond the openings concerned; and
      C. is non-combustible and has an FRL of not less than 60/60/60.

(b) The requirements of (a) do not apply to—
   i. an open-deck carpark; or
   ii. an open spectator stand; or
   iii. a building which has a sprinkler system complying with Specification E1.5 installed throughout; or
   iv. openings within the same stairway; or
   v. penings in external walls where the floor separating the storeys does not require an FRL with respect to integrity and insulation.

(c) For the purposes of C2.6, window or other opening means that part of the external wall of a building that does not have an FRL of 60/60/60 or greater".

Thus, under C2.6 for buildings such as the Lacrosse Tower, there was no requirement to be restricted to non-combustible materials.

A relevant clause, C1.12, also made no reference to external wall combustibility:

"C1.12 Non-combustible materials"

The following materials, though combustible or containing combustible fibres, may be used wherever a non-combustible material is required:

(a) Plasterboard.
(b) Perforated gypsum lath with a normal paper finish.
(c) Fibrous-plaster sheet.
(d) Fibre-reinforced cement sheeting.
(e) Pre-finished metal sheeting having a combustible surface finish not exceeding 1 mm thickness and where the Spread-of-Flame Index of the product is not greater than 0.
(f) 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.

Reviewing C1.12, subclauses a–c are all building materials used within building interiors, with subclause d used on the interior or exterior of a building; however, as subclauses a–c clearly address internal building materials and subclause d may be for both, uncertainty exists over whether subclause d only addresses internal building materials, since subclauses e–f (discussed in the next paragraph) use fire tests that are only suitable for interior use and are, therefore, similar in technical character to subclauses a–c.

For subclause *e*, Spread-of-Flame Index is defined as: "Spread-of-Flame Index means the index number for spread of flame as determined by AS/NZS 1530.3". AS/NZS 1530.3 [16] is an Australian/New Zealand Standard titled: "Methods for fire tests on building materials, components and structures Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke release". Within the preface of this standard, the following is stated: "The test provides data for assessing the potential hazard of wall linings during the early growth of a fire in a compartment". Clearly, AS 1530.3 is a fire test that does not address the issue of external vertical fire spread on cladding materials, since its purpose is to assess early growth of a fire "in a compartment", not the exterior of a building. Furthermore, when comparing this to the purpose of the US standard NFPA 285 [17]: "Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components", s 1.2 of NFPA 285 states: "The purpose of this standard is to provide a standardized fire test procedure for evaluating the suitability of exterior wall assemblies and panels used as components of curtain wall assemblies that are constructed using combustible materials or that incorporate combustible components for installation on buildings". Thus, there is a clear difference between the purpose of AS 1530.3 and NFPA 285. Hence, subclause e is clearly focused on fires inside buildings and makes no reference or suggestions on whether it is suitable for testing external claddings.

For the remaining subclause f, all subitems of f(i)–f(iv) must be met, where again, Spread-of-Flame Index criteria must be met, along with an additional requirement, namley: Smoke-Developed Index. For completeness Smoke-Developed Index is defined in the National Construction Code as: "The index number for smoke as determined by AS/NZS1530.3". Again, since passing AS/NZS1530.3 is a criterion for subclause f, subclause f is clearly focused on interior fire growth, and not exterior fire spread via combustible cladding elements, as there is no tort-based reason why smoke development is a relevant factor to determine the risk of external vertical fire spread. Therefore, there was no subclause of C2.6 or C1.12 that conclusively indicated any prescriptive criteria to address external fire spread via combustible cladding elements.

Now, comparing the next National Construction Code revision in 2018 (which was an out-of-cycle amendment, National Construction Code 2016 Amendment 1 [12], the first time the National Construction Code was amended out-of-cycle after its introduction in 1988), the updated clause C1.12—relocated at C1.9—specified the following (note: items C1.9 (b)–(d) were omitted as they related to shafts and internal walls):

"C1.9 Non-combustible building elements"

(a) In a building required to be of Type A or B construction, the following building elements and their components must be non-combustible:
   (i) External walls and common walls, including all components incorporated in them including the facade covering, framing and insulation.
   (ii) The flooring and floor framing of lift pits.
   (iii) Non-loadbearing internal walls where they are required to be fire-resisting.
(b) The following materials may be used wherever a non-combustible material is required:
   (i) Plasterboard.
   (ii) Perforated gypsum lath with a normal paper finish.
   (iii) Fibrous-plaster sheet.
   (iv) Fibre-reinforced cement sheeting.
   (v) Pre-finished metal sheeting having a combustible surface finish not exceeding 1 mm thickness and where the Spread-of-Flame Index of the product is not greater than 0.
   (vi) Bonded laminated materials where—

(a) each lamina, including any core, is non-combustible;
(b) and each adhesive layer does not exceed 1 mm in thickness and the total thickness of the adhesive layers does not exceed 2 mm; and
(c) the Spread-of-Flame Index and the Smoke-Developed Index of the bonded laminated material as a whole do not exceed 0 and 3, respectively.

Of note is the addition of subclause a, which is specific to external walls requiring all components to be non-combustible. This is a significant addition, as prior to the National Construction Code 2016 Amendment 1, there was no explicit clause that addressed the combustibility of external walls for the purposes of addressing cladding-based combustibility issues. Hence, amendments to C1.12 (by way of its successor C1.9), clearly showed a Deemed-to-Satisfy provision that did not historically address the combustibility of externals.

*6.2. Analysis of CV3*

Added to the National Construction Code 2016 Amendment 1 was a new verification method: CV3. CV3 states the following (abbreviated to remove criteria irrelevant to this analysis):

"CV3 Compliance with CP2 to avoid the spread of fire via the external wall of a building is verified when—

(a) compliance with CP2(a)(iii) to avoid the spread of fire between buildings, where applicable, is verified in accordance with CV1 or CV2, as appropriate; and
(b) the external wall system—
    i. has been tested for external wall (EW) performance in accordance with AS 5113; and
    ii. has achieved the classification of EW;
(c) in a building of Type A construction, the building is protected throughout by a sprinkler system complying with Specification E1.5
(d) in a building of Type B construction, the building is—
    i. a Class 5, 6, 7 or 8 building or Class 4 part of a building; or
    ii. a Class 2, 3 or 9 building that—
        (a) is protected throughout by a sprinkler system complying with Specification E1.5; or
        (b) has any openings in external walls complying with C2.6(a)(iv)".

CV3 mandates (inter alia) the external wall system must comply with AS 5113: "Fire propagation testing and classification of external walls of buildings (2016)", and where the external wall system complies with AS 5113, it (therefore) complies with the performance requirement of CP2 (in conjunction with complying with CV1 or CV2).

To analyze CV3 for its relevance to CP2, verification methods CV1 and CV2 are first discussed. Both CV1 and CV2 specify distances that buildings must be separated from other buildings and/or adjoining allotments. Distances are based on maximum permitted heat fluxes (in $kW/m^2$) from structure fires. Putting aside questions such as whether the prescribed heat fluxes or distances are deficient or efficient, the factors that CV1 and CV2 address (which is fundamentally radiative horizontal spread of fire) are not inconsistent with CP2(a)(iii), which addresses spread of fire between buildings. For completeness, CP2 is stated in full below:

"CP2

(a) A building must have elements which will, to the degree necessary, avoid the spread of fire—
    i. To exits; and
    ii. To sole-occupancy units and public corridors; and
    iii. Between buildings; and
    iv. In a building

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

i. The function or use of the building; and
ii. The fire load; and
iii. The potential fire intensity; and
iv. The fire hazard; and
v. The number of storeys in the building; and
vi. Its proximity to other property; and
vii. Any active fire safety systems installed in the building; and
viii. The size of any fire compartment; and
ix. Fire brigade intervention; and
x. Other elements they support; and
xi. The evacuation time".

However, CV3 states it is a verification method that addresses spread of fire via the external wall of a building, despite performance requirement CP2(a)(iii) making no reference to external vertical spread of fire—let alone any reference in CP2 to external walls—the latter which is defined in the National Construction Code as: "External wall—an outer wall of a building which is not a common wall". Furthermore, AS 5113 states that its objective is: "to provide procedures and criteria for the classification of external walls of buildings according to their tendency to limit the spread of fire via the external wall and between adjacent buildings and limit falling debris that could be hazardous to evacuating occupants and fire fighters", and therefore, AS 5113 has a different objective to CP2(a)(iii). Additionally, the instrumentation in AS 5113 is also nearly identical to that of BS 8414: "Fire performance of external cladding systems" (also NFPA 285), with the scope of BS 8414 stating the following: "This part of BS 8414 is solely intended to give an indication of fire spread across or within an external cladding system. The purpose of the test is to provide data to enable evaluation of the fire performance of the components when combined to form a complete cladding system", which is similar in intent to that of the purposive statement in s 1.2 of NFPA 285.

When comparing the testing instrumentation for NFPA 285 [17], AS 5113 [18], and BS 8414 [19], in all instances, thermocouples are used to measure temperature changes that occur with convective heat transfer (a relevant factor for vertical spread of fire but not horizontal radiative spread of fire), together with testing of visual assessments of horizontal and vertical fire spread on the cladding assembly. Table 1 below summarizes assessment methods for each standard to show that all three standards address vertical spread of fire but not horizontal spread of fire, and therefore, has no relevance to CP2(a)(iii) and spread of fire between buildings:

Thus, amendments in National Construction Code 2016 Amendment 1 by way of C1.12 and CV3 clearly address external vertical spread of fire, despite no amendment to CP2—or any other National Construction Code performance requirement—to address vertical spread of fire (discussed further in the next section).

Perhaps the best example of the clear deficiency CP2 (regarding vertical fire spread) is comparing CP2 with the UK Building Regulations 1985 vertical fire spread requirements. In Schedule 1 Part B Fire Requirement of the Building Regulations 1985 (UK), functional requirement B4(1) addresses the combustibility of external walls: "The external walls of the building shall offer adequate resistance to the spread of fire over the walls and from one building to another, having regard to the height, use and position of the building".

The UK's Building Regulations 1985 functional requirement B4(1) is very clear about the requirement to address fire spread that may occur if combustible cladding is present, c.f., the National Construction Code's CP2 which makes no reference to external walls, despite external walls being defined in the National Construction Code and referenced in other performance clauses.

**Table 1.** Assessment Methods for Each Cladding Standard (sections/chapters for each standard addressing assessment methods cited).

| Assessment Method | AS 5113 (2016) | BS 8414 (2020) | BS 8414 (2020) |
|---|---|---|---|
| Are thermocouples required and located at spatial locations across external claddings? | 5.4.3: (a) | 5.7 | Ch. 6: 6.1 and 6.3 |
| Is there a requirement for visual observation of vertical fire spread horizontally and vertically across cladding? | 5.4.3: (e) and (f) | 8.4 | Ch. 9, 9.4 |
| Are radiometers required to measure heat flux across horizontal distance from cladding? | Nil | Nil | Nil |
| Is there are requirement for visual observation of horizontal fire spread from cladding? | Nil | Nil | Nil |

## 7. Findings and Discussion

Fundamentally, what we observed regarding the issues identified within Deemed-to-Satisfy C1.12, CP2, and CV3 is questionable delegated legislation which does not address the losses that can occur via vertical spread of fire (whether they be of a negligence or nuisance-based tort), which is inconsistent with the requirements to address the doctrines of negligence or nuisance, whether those doctrines be incorporated into a statute or part of the common law.

In the case of the National Construction Code, it is passed into law not by each state and territory's respective Legislature (via parliament where statutory Acts are passed into law), but under the respective building Act in question via the Executive. For example, under New South Wales' Environmental Planning and Assessment Act 1979 ('EPA79'), the National Construction Code was brought into legal effect under Division 4.10 s 4.64 Part (4) c (4) of the EPA79 by the NSW Department of Planning and Environment. Errors are not unknown to occur with delegated legislation, with the Judiciary (by way of senior courts, e.g., New South Wales Supreme Court) having the power to rule delegated legislation illegal on a variety of legal grounds where delegated legislation is not consistent with the parent Act. For example, in Kwiksnax Ltd. v Logan City Council (Queensland), the council passed a by-law that favored local traders. The by-law was passed under the Local Government Act (Queensland); however, the Local Government Act placed no such restriction on trade. The Queensland Supreme Court ruled the by-law invalid on the grounds there was no basis to restrict trade, with the Court ruling the common law doctrine of freedom of contract was allowed to operate under the Act.

One of the methods the Judiciary uses to determine if delegated legislation is correct (thus legal) is by reviewing the purpose or object of an Act against the clause(s) of the delegated legislation that is passed under the relevant Act to determine if it is consistent with the Act's object or purpose [11]. Applying this method to the National Construction Code's Deemed-to-Satisfy C1.12, CV3, and CP2 against s 1.3(h) of EPA79 which states the objective: "to promote the proper construction and maintenance of buildings, including the protection of the health and safety of their occupants", it is clear such a substantive objective would not condone buildings to be clad with combustible materials which would propagate vertical spread of fire in a manner that would threaten life safety; therefore, any delegated legislation (such as the National Construction Code) which did not address vertical spread of fire would be inconsistent with the doctrines of negligence and/or nuisance.

However, the term 'external wall' was not referenced in any of the National Construction Code performance clauses which address fire safety, other than CP5 (tilt-up concrete panel design) even though it has always been referenced in DP3 (fall prevention barriers) and FP1.4 (weatherproofing).

To explain the prevalence of widespread combustible cladding across Australia, either fire protection engineers were undergoing considerable amounts of performance-based design across Australia relating to cladding-based systems in the absence of any performance clause which addresses vertical spread of fire, or, defective delegated legislation (by way of an incomplete National Construction Code) did not explicitly prohibit external cladding that would facilitate vertical spread of fire via the (likely accidental) omission of clauses that prohibited external combustible cladding for Deemed-to-Satisfy designs, which do not even require the engagement of a fire protection engineer (a Deemed-to-Satisfy design does not require a fire protection engineer). The authors are of the opinion that given the changes to National Construction Code clause C1.12 made after the Lacrosse Tower fire, as well as the Australian Building Codes Board not taking up recommendations to amend clause C1.12 in 2010 to address external vertical spread of fire issues [10]—4 years before the Lacrosse Tower fire—deficiencies in the Deemed-to-Satisfy and National Construction Code are the likely causative factor in the prevalence of combustible cladding across Australia, and therefore, the statement in the Building Confidence Report: "Our Terms of Reference do not specifically refer to the concerns regarding combustible cladding. However, this issue has been a dominant underlying theme of the consultations we have held. As we have developed the recommendations we have asked ourselves a simple question: "would our recommendations significantly reduce the likelihood of the misuse of cladding occurring in the future?". We believe we can answer in the affirmative" cannot, in the authors' view, be considered a comprehensive answer without also reviewing the soundness of cladding-related delegated legislation (or lack thereof). Additionally, there are still no performance criteria under the National Construction Code that address vertical spread of fire; therefore, vertical spread of fire risks remain in Australia. This is because neither the Deemed-to-Satisfy nor the VM3 are mandatory; that is, performance-based design is permitted and CP2 still does not address vertical spread of fire.

With these findings, the other point in this paper taken from the Building Confidence Report can now be responded to, namely: "Many stakeholders report that building practitioners across the industry do not have a sufficient understanding of the National Construction Code or its revisions. This has led to non-compliance or poor quality documentation of compliance. Misinterpretation or ignorance of the requirements of the National Construction Code is not uncommon. Indeed, this failure has been offered as one explanation for the prevalence of non-compliant cladding on buildings across Australia". As this study showed, the National Construction Code itself is deficient in its addressing external vertical spread of fire, resulting in the prevalence of combustible cladding across Australia. Furthermore, if misinterpretation or ignorance of the requirements of the National Construction Code were a causative factor in Australia's combustible cladding crisis (as the Building Confidence Report asserts), then widely prevalent combustible cladding would not be the only serious problem across Australia's building stock as the 'misinterpretation argument' cannot only apply to one aspect of the National Construction Code; 'misinterpretation' would result in many observable problems, and this is not the case.

The phenomenon of defective delegated legislation causing problems in the building industry is not new. In New Zealand, the 'leaky building crisis' (buildings which were found to rot within the exterior wall cavities after only a few years of weather exposure) began to proliferate across the New Zealand built environment in the late 1990s. This was estimated to cost NZD 20 billion or more [20] in damage. In one of New Zealand's most notable leaky building cases, Judge William-Young noted that Acceptable Solution B2/AS1 (Durability) was a causative factor in Attorney-General v Body Corporate No. 200,200 in paragraphs (28) to (30) (below) and probably not suitable as 'deeming' solution:

> "(28) Prior to the mid-1990s, radiata pine used for framing was usually treated to protect against insect attack. This treatment also provided a measure of resistance to fungal decay. In 1995, the Standards Association of New Zealand published NZS 3602:1995 which permitted the use of untreated timber for framing.
>
> Para 105.5 of this document is in these terms:
>
> Radiata pine framing members that have been kiln dried at 74 °C or above, to 18% moisture content or less and have been planer gauged do not require

preservative treatment, provided they are not exposed to ground atmosphere or in any position where the timber moisture content will exceed 18%.

(29) In February 1998, the BIA issued "Acceptable Solution B2/AS1" which recorded

Timber

3.2.1 NZS 3602: Part I is an acceptable solution for meeting the durability requirements of timber building elements.

(30) Primarily (although not exclusively) implicated in leaky building syndrome is the use of face fixed monolithic cladding systems directly over untreated pinus radiata timber. It is now clear that where such systems are used over untreated pinus radiata, careful design and workmanship are required to limit water ingress and particular provision must be made for ventilation and general water management".

It also appears that the UK equivalent of the Deemed-to-Satisfy, the Approved Document B, does not meet Schedule 1 Part B Fire Requirement B4(1) for vertical spread of fire (thus, a possible causative factor for Grenfell Tower). For example, under oath, a government administrator responsible for the Approved Document B confirmed that a fire investigation into a building fire in Manchester in 2005 found external fire spread occurred via combustible cladding that complied with the Approved Document B; thus, the Approved Document B may have been deficient [21].

## 8. Conclusions

This paper reviewed the National Construction Code to determine if the cause of Australia's combustible cladding crisis was due to omissions or errors in the National Construction Code, whether they be in the Deemed-to-Satisfy or performance clauses, given Deemed-to-Satisfy Clause C1.12 not (historically) explicitly addressing external combustible cladding, and performance clause CP2 still not addressing vertical spread of fire. It was found that historical errors and/or omissions likely contributed to the prevalence of combustible cladding across Australia, and that, as a result of these deficiencies, the doctrines of negligence and nuisance were not addressed via delegated legislation and therefore, the National Construction Code is likely inconsistent with building statues across Australia, tort-based statutory laws, and the common law (where not superseded by statutory law). Moreover, the newly introduced verification method CV3 incorrectly made references to CP2(a)(iii) for vertical spread of fire, the latter which relates to external spread of fire between buildings, and addresses the issue of combustible cladding superficially.

The Building Confidence Report did not address the potential of delegated legislation that is likely to have been the causative factor in cladding fires in Australia, and therefore, does not consider all relevant factors that would explain the prevalence of combustible cladding. In the opinion of the authors, many of the Building Confidence Report's conclusions [5] by Prof. Peter Shergold and Ms. Bronwyn Weir warrant further investigation. An analysis of the new clause in the National Construction Code—A2.2(4)—a direct result of the Building Confidence Report's findings, is one such investigation by the authors [22], for not only its efficacy in addressing issues such as combustible cladding, but also its wider economic implications.

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