NCC 2022 Public Comment Draft
Supporting information

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Introduction

This document provides background information concerning proposed changes included in the NCC 2022 public comment draft. This information is provided to inform and support public comment.

Acronyms

The following acronyms are used in this document.

Table 1 Acronyms

Acronym	Meaning
ABCB	Australian Building Codes Board
ANSI	American National Standards Institute
AS	Australian Standard
BCA	Building Code of Australia
BMF	Building Ministers' Forum
COAG	Council of Australian Governments
DTS	Deemed-to-Satisfy
ECC	Early childhood centres
FAQs	Frequently asked questions
HVAC	Heating, ventilation and air conditioning
LHDG	Livable Housing Design Guidelines
NCC	National Construction Code
NSF	National Sanitation Foundation
NQF	National Quality Framework
PCA	Plumbing Code of Australia
QRA	Quantified risk assessment
RIA	Regulatory Impact Analysis
RIS	Regulation Impact Statement
SPTC	Section, Part, Type, Clause

Improved NCC useability (All Volumes)

As part of the ABCB's commitment to delivering a NCC that is user-friendly and modern, NCC 2022 comes with some important changes to its structure and format. The improved NCC useability project builds on the successful implementation of free online access to the code in 2015.

The ABCB is committed to delivering an NCC that is user-friendly and modern, through a range of initiatives. This initiative forms part the Board's long-term strategy to provide a more user-friendly online NCC that is better understood by a broad base of practitioners, with the next round of enhancements coming in NCC 2022.

These enhancements focus on digitisation of the code and improving its readability. Because the code has evolved over many decades and was originally designed as a print publication, changes to its structure and format are required. This is to ensure the NCC operates in a consistent and predictable way, within and across its volumes, without changing the intent of the code in any way.

On 20 April 2021, the ABCB presented the *A new look for NCC 2022 webinar - Information and Q&A session*. After the webinar, the ABCB reviewed the questions asked by participants to identify some common themes and frequently asked questions (FAQs). This document sets out those themes and FAQs along with answers to help explain changes to the structure and format for NCC 2022.

The changes cover three broad categories:

- Consistent volume structure
- Section, Part, Type, Clause (SPTC) referencing system
- Web content accessibility.

These FAQs form part of the suite of resources the ABCB has developed to support practitioners through the changes, explain why and how the code is changing, and what it means in practice.

Further, detailed information is also provided on the ABCB website at: abcb.gov.au/ncc-useability.

General

Will there be PDF versions of the new format NCC?

Yes, online and PDF versions will be provided.

Can I still buy a printed version?

The ABCB no longer produces printed editions of the NCC. However, printed editions of the NCC can be purchased from the commercial providers listed on the ABCB website.

Can I filter the NCC to see only what applies to a specific class of building?

Yes. The new look NCC 2022 online will provide filtering and improved search functionality. The filtering function, known as 'build your own code', will enable the NCC to be filtered by state/territory, building classification and climate zone. This improvement is made possible by ensuring the NCC has a consistent volume structure, numbering system and clause structure throughout. This is planned for the Preview publication of NCC 2022.

'Build your own code' sounds great but what about its legal status; can I rely on it?

'Build your own code' is intended for guidance purposes only. Whilst every effort will be taken to ensure its accuracy, it should not be relied upon for regulatory purposes.

Consistent volume structure

Is Volume Two being merged into Volume One?

No. Volume Two will remain separate but will have the same structure as Volumes One and Three. The 2015 readability review of the NCC recommended a consistent volume structure but did not recommend merging these two NCC Volumes.

What happened to Section H in Volume One?

The 2019 content of NCC Volume One Section H will be moved to Section I, which is currently vacant. This will allow the 'H' designation to be used exclusively for Volume Two.

Why is there only a Section H in Volume Two?

The Section H designation has been reserved for Volume Two to avoid number clashes with Volume One, which is important given that many practitioners work with both.

Previously, number clashes were avoided through Volume Two having a completely different structure and numbering system. Now that all three Volumes use the same structure and system, a new solution is needed to ensure that users can tell instantly whether a clause belongs to Volume One or Volume Two. If the clause number starts with 'H', you know it is from Volume Two (think 'H' for 'housing').

Section H will, of course, be preceded by the Governing Requirements (Section A), which are standard for all three Volumes.

Why do the Acceptable Construction Practices need to be separated out of Volume Two?

Separating out the ACPs was the only way to achieve a consistent volume structure while also preserving the choice of using either the ACP or a referenced Standard such as an Australian Standard (i.e. Acceptable Construction Manual).

Will the Housing Provisions have the same status as the NCC?

The Housing Provisions will form a part of the NCC Suite, but will not be an NCC volume in their own right. Rather, they will apply only when they are referred to by Volume Two, as part of that volume's Deemed-to-Satisfy (DTS) Provisions.

This means that the Housing Provisions will be more like a referenced document of the NCC, but with one key difference which is that the Housing Provisions will take precedence to the extent of any conflict between it and any other NCC referenced

document (see the ‘Application’ box for clause A4G1 in the NCC 2022 public comment draft).

Because the Housing Provisions are derived from the former ACP content of Volume Two, they will not cover all aspects of housing construction regulated by Volume Two. The reason for this is that not all Parts of NCC Volume Two included an ACP compliance option.

Section, Part, Type, Clause (SPTC) referencing system

Will SPTC cause confusion for NCC users?

As with any significant change to an existing system, there is likely to be some initial confusion. To address this, the new NCC will include an ‘archive number’ to the right of every clause title so that not only can practitioners easily identify clauses using a system they might be familiar with but also to allow search engines to easily find a reference. So, for example, typing EV3.2 into Google or our NCC search engine will take you straight to E3V2.

The archive number will appear in square brackets with the prefix “2019:”. Clauses that were added after NCC 2019 will have the words “New for 2022” in place of the archive number.

It is important to note that the archive number is intended only for reconciling SPTC clause numbers with the clause numbers used in NCC 2019. The archive number does not indicate whether or not the text of a clause has been amended as part of NCC 2022.

Can we keep using the existing referencing system?

Industry resources are expected to start using the SPTC system from September 2022 onwards when the 2022 edition of the code is adopted. If you choose to refer to clauses using the old system in conversation with your colleagues, that’s up to you. Over time, usage the SPTC system will become the widespread.

What will happen to the Guide to NCC Volume One?

The Guide will be updated to use the SPTC referencing system as part of the general update process for the Guide for NCC 2022. Similar updates will also be rolled out for other ABCB publications that refer to specific NCC clause numbers.

How will the changes affect state and territory variations?

State and territory variations, including additions, will be converted to the SPTC system as part of the general process of updating state and territory variations for NCC 2022.

Web content accessibility

Will the word search function in NCC online be improved?

Yes, this is one of many improvements made possible by the changes to how the NCC is structured and presented. It is expected that NCC 2022's search function will be powered by Google's search function, which will provide all the power of Google search but operating just within NCC online.

Quantification of Performance Requirements (All Volumes)

Performance in the NCC

The NCC is a performance-based code containing all Performance Requirements for the construction of buildings. A building, plumbing or drainage solution will comply with the NCC if it satisfies the Performance Requirements, which are the mandatory requirements of the NCC.

The key to the performance-based NCC is that there is no obligation to adopt any particular material, component, design factor or construction method. This provides for a choice of compliance pathways. The Performance Requirements can be met using either a Performance Solution or using a DTS Solution. For more information please visit the ABCB website.

Rationale for quantification

Quantification is part of the ABCB's Increased and Competent Use of Performance project. It aims to better establish the level of performance required through the Performance Requirements. This is intended to ensure a consistent level of performance across Performance Solutions, reducing uncertainty for practitioners, certifiers and building users. With quantified Performance Requirements, pure performance approaches to meeting the Performance Requirements will be more practically viable for industry use, thanks to the enhanced clarity.

The intention is to provide greater clarity, without changing the level of stringency. This has informed the levels at which each metric has been quantified, in order to maintain consistency with the levels of performance offered by other pathways.

The quantification changes proposed for NCC 2022 are only in relation to the Performance Requirements. They do not include changes to the DTS pathway, nor to any existing Verification Methods and, so, will have no impact on DTS Solutions or solutions using the existing Verification Methods.

Many of the Performance Requirements have been quantified in this edition of the NCC, with a particular emphasis on those related to health and safety. The project of quantification will continue, with the intention of providing quantified metrics for all Performance Requirements in the future.

Structural reliability (Volumes One and Two)

Performance Requirements B1P1 (previously BP1.1) in Volume One and H1P1 (previously P2.1.1) in Volume Two, relating to structural safety, have been revised to include quantified acceptable annual probabilities of failure.

Probability of failure

The proposed annual probabilities of failure represent the maximum acceptable notional probability of failure, rather than target values. The stringency specified varies depending on the importance of a building part, member or connection, the type of failure and the impact of that failure were it to occur. These gradients of stringency reflect the consequences that a failure would bring.

The levels of reliability specified have been chosen to maintain a consistent level of performance with other compliance pathways, in conjunction with experts in the field through the assistance of Consult Australia. Using the annual notional probability of failure provides a metric which is intelligible to users, as well as a solidly defined level of performance.

A number of reports have been produced to support the development of this proposal. These reports are available on request from Quantification@abcb.gov.au.

Glass at risk of human impact (Volumes One and Two)

Quantified metrics have been included in Clauses B1P3 (previously BP1.3) and H1P1(4) (previously P2.1.1(d)), the Performance Requirements associated with the risk of glass breaking when subjected to human impact.

Metrics

There are three metrics which have been introduced, covering each aspect of performance. The probability of glass penetrating a person's skin provides a consistent way of measuring the risk of injury. The energy of impact which must be absorbed without breakage provides a consistent way to confirm that an installation will resist a reasonably foreseeable human impact. Finally, the marking requirement allows the visual distinctiveness to be measured, while allowing for other equivalent options. The levels of these metrics have been set based upon consideration of the DTS Provisions, to maintain a consistent level of performance across pathways.

Bushfire prone areas (Volumes One and Two)

Buildings in bushfire prone areas are covered by H3P1 (previously P2.7.5) and G5P1 (previously GP5.1), while bushfire shelters are covered by H7P6 (previously P2.7.6). Both of these have been quantified in NCC 2022 with metrics defining the design bushfire.

Basis

The core of the change to these Performance Requirements is the introduction of a more clearly specified design event. This is the design bushfire's annual exceedance probability, which thereby specifies the severity of conditions a building or bushfire shelter must withstand. The annual exceedance probabilities vary in accordance with the importance of the building between the Performance Requirements in order to maintain consistency of performance across compliance pathways.

This approach provides a metric which is familiar and intelligible to practitioners through its use in the existing Verification Method and which provides greater clarity on the minimum conditions a performance-based design must meet.

Fire safety (Volume One)

Part A8 is a new addition to NCC 2022, providing metrics to be used in interpreting the fire safety Performance Requirements. These new risk and probability metrics

provide a consistent and holistic method of measuring the fire safety performance of buildings.

Implementation

Unlike other changes discussed in this supporting document, this quantification has been included within the Section A Governing Requirements instead of within the individual Performance Requirements. This is because the metrics used cover a range of Performance Requirements, and cannot be readily reduced to aspects associated with individual Performance Requirements. The new Part A8 is able to quantify them all holistically.

Part A8 informs the interpretation of the fire safety Performance Requirements listed in A8G1(1) and A8G1(2). Application of the DTS Provisions or Verification Methods remains unchanged. However, other Performance Solutions must be developed in consideration of Part A8 when determining the level of stringency set by the fire safety Performance Requirements. Part A8 guides the appropriate interpretation of these Performance Requirements, which are not quantified or are written subjectively. For instance, requirements which are specified "*to the degree necessary".*

Risk

The new Governing Requirements in A8G2 specify allowable levels of risk of exposure to unsafe conditions, both on individual and societal levels. They have been set to ensure that the individual risk to life is no more than 1% of the background risk level and the societal risk is in accordance with tolerance limits used for other societal risks by government. These are metrics which allow the risks to life of different systems to be compared to a consistent standard, and are used in other holistic risk standards internationally. The hazards, intervention measures and means of managing the consequences that should be considered in an analysis to meet the associated Performance Requirements have also been specified.

In A8G3, maximum probabilities have been specified for each of the scenarios that are considered a failure to prevent the spread of fire. These have been set based on

the proportion of fires with flashover potential and on effectiveness levels typical of fire suppression systems.

A number of reports have been produced to support implementation of Part A8. The reports cover data, tenability criteria, education, guidance and case studies. These reports are available on request from Quantification@abcb.gov.au.

Noise isolation (Volume One)

Quantified metrics have been included in Clause F7P1 through to F7P3 (previously FP5.1 through to FP5.4), together with a reorganisation to eliminate the need for the NCC 2019 Performance Requirements regarding the impact of penetrations.

Basis

Both the metrics used and levels at which they have been set are based upon the NCC 2019 Verification Methods FV5.1 through to FV5.4. These pathways were introduced in BCA 2004 (for FV5.1 and FV5.2) and NCC 2019 (for FV5.3 and FV5.4) to establish the appropriate levels of protection against airborne and impact generated sound. These have been elevated to the Performance Requirements, as metrics which accurately define the level of performance. They are also familiar and clear to practitioners through their use in the Verification Methods.

This change also presents an opportunity to integrate what were FP5.3 and FP5.6 in NCC 2019 into the other Performance Requirements relating to sound transmission. This is done by including the requirements for soundproofing penetrations within the quantified levels of performance, eliminating the need for separate Performance Requirements.

Fire detection and early warning (Volume Two)

Performance Requirement H3P2 (previously P2.3.2), regarding warning occupants of smoke, is newly quantified using an effectiveness metric, in order to provide a consistent level of performance.

Metric

The effectiveness metric is a combination of efficacy and reliability, which accounts for both the risk of the warning system not activating and the risk of it activating, but the activation being insufficient to achieve the design objective. The level of performance has been set based upon an evaluation of the levels of performance achieved by DTS Solutions. This metric has been chosen to provide flexibility in approaches and familiarity to practitioners, as a definition which is used in fire safety engineering.

Flow rate and pressure (Volume Three)

Various Performance Requirements in Parts B1, B2, B3 and B6 (previously BP1.2, BP2.3, BP3.3 and BP6.2) cover the aspects of performance required of water supply services. Two of these elements have been quantified: the flow rate requirements, using a time of exceedance measure; and the pressure levels, using an allowable range of pressures.

Time of exceedance

The Performance Requirements relating to the supply of water at appropriate flow rates have been quantified by requiring that the pipework water velocity doesn't exceed 3 m/s for more than 1% of the time that water is required during the peak hour. This method has been used internationally in the Universal Plumbing Code and is related to the fundamentals behind the existing DTS Provisions. The velocity and fraction of time specified have been set at a level which is equivalent to the DTS Provisions, to maintain the same level of performance.

Pressure limits

The allowable pressures were also qualitative in the NCC 2019 Performance Requirements. These have been quantified by nominating static pressures at outlets of not less than 50 kPa and not more than 500 kPa, to reflect the levels required by the DTS pathway. Pressures outside this range are allowed where it is required for correct functioning of the fixture or appliance.

Flow rate and pressure in fire systems (Volume Three)

Performance Requirements B4P1 to B4P4 (previously BP4.1) associated with the provision of water to fire-fighting equipment has been quantified using a different approach to the other water supply Performance Requirements. This has been set to a nominated level of system performance.

Fire systems approach

The approach taken to this Performance Requirement differs from that of other types of water supply systems. This echoes the alternate DTS Provisions present across fire systems and other water systems. Considering this, fire systems have been required to maintain 95 percentile system performance to reflect the level of performance demanded by the DTS pathway for these types of systems.

Water efficiency (Volume Three)

The efficient use of drinking water in Performance Requirements B1P2 to B1P6 (previously BP1.2(d)) has been quantified through the elevation of the existing DTS Provisions. This sets the level of performance consistent with the DTS pathway, while allowing for other equivalent approaches through the inclusion of an option for other water saving measures.

Sanitary plumbing imbalance (Volume Three)

Performance Requirement C1P1 (previously CP1.1(1)(c) and CP1.1(2)(c)) work together to protect building occupants from adverse health effects caused by sewer gases. They have been quantified together, through the specification of requirements for the likelihood of trap seal pressures exceeding set levels and the allowable depths of trap seals at those pressures incorporated in both Performance Requirements.

Trap seals

In order to provide an equivalent level of performance to that of the DTS pathway, maximum positive and negative pressures of 375 Pa have been specified. This

follows from the minimum retained water trap height required by the DTS pathway of 25 mm, which is also specified for the allowable minimum trap seal depth at these pressures. The likelihood of exceeding the 375 Pa pressure level is set to 1%, in order to account for very occasional situations which are outside normal operating conditions. The 1% chance of exceedance corresponds to a 1% likelihood of trap seals being depleted to less than 25 mm, not a 1% chance of foul air entering a building. The option of providing an equivalent level of safety to human health is also present, in order to allow for innovative approaches.

Microbial growth (Volume Three)

The Performance Requirement relating to prevention of Legionella growth has been quantified by including a precise limit on the count of Legionella colony forming units (cfu) allowed per millilitre (mL).

Legionella

Legionella bacteria are present in freshwater environments. In buildings, however, the raised temperatures of hot water systems encourage Legionella to grow and cause health issues. By setting a maximum limit of colony forming units per mL, the conditions which are considered to avoid the likelihood of growth are established. This limit of 10 cfu/mL has been set for consistency with other regulations[1] regarding Legionella limits in water.

[1] For example, NSW Department of Health Policy Directive PD2015_008 (2015) and the South Australian Government Guidelines for the Control of Legionella (2013)

Accessible housing (Volumes One and Two)

In 2017, the former Building Ministers' Forum (BMF), supported by the then Council of Australian Governments (COAG), directed the ABCB to undertake a regulatory impact analysis (RIA) into the possible inclusion of minimum accessibility requirements for Class 1a buildings (houses) and Class 2 sole-occupancy units (apartments) into the NCC. The RIA process commenced in 2017-18 and was completed in 2020-21.

The BMF required the options assessed to be based on the 'Silver' and 'Gold' specifications in the Livable Housing Design Guidelines (LHDG), along with other options as appropriate.

The objective of this task has been to ensure that housing is designed to meet the needs of the community, including older Australians and those with mobility limitations.

The draft changes for NCC 2022 have been included as result of a decision of Building Ministers on 30 April 2021.

RIA documentation related to the proposed changes is available on the ABCB website.

Draft changes for NCC 2022

The draft changes are based on the LHDG Silver level, as determined by Building Ministers. Where necessary, adjustments have been made in order to convert the LHDG—which was originally drafted as a voluntary guideline—into a document suitable for use as a regulatory standard.

The draft changes will apply to Class 1a buildings and Class 2 sole-occupancy units (apartments) only. Common areas in Class 2 buildings will continue to be covered by current NCC provisions and the *Disability (Access to premises — Buildings) Standards 2010*.

The draft changes also include a limited set of exemptions from the step-free access path requirement for Class 1a buildings. The exemptions are designed to apply to steep sites, small sites and dwellings where a high floor level is required. The exemptions are subject to the limitations set out and explained at clauses H8P1 and H8D2 in NCC Volume Two.

Note: Building Ministers also agreed a separate voluntary Gold level standard, based on the LHDG, will also published by the ABCB in 2022 and sit outside of the NCC.

Structure of the draft changes

Principal components of the draft accessible housing requirements, such as Performance Requirements and their corresponding DTS Provisions, are included in NCC Volumes One and Two (the draft changes do not affect Volume Three). The exemptions are also set out within the NCC.

Technical details are set out in a separate ABCB Standard for Livable Housing Design, which is referenced by the DTS Provisions. Compliance with the ABCB Standard will achieve compliance with the DTS Provisions that refer to it, and therefore also the relevant Performance Requirements.

As with any other part of the NCC, only the Performance Requirements will be mandatory. The DTS Provisions (the ABCB Standard for Livable Housing Design) provide an option for meeting the Performance Requirements.

Early childhood centres in high-rise buildings (Volume One)

The current NCC DTS Provisions for Early Childhood Centres (ECCs) mitigate the risks to occupants from fire, through active and passive measures that suppress its effects and ability to spread. However, they do not explicitly address circumstances where the ECC is located on upper levels of a multi-storey building and/or at levels where direct access to a road or open space is not available. The potential for long distances of travel, without additional fire safety systems, have been shown to pose an unacceptable level of risk to the life safety of vulnerable occupants of ECCs.

Children, particularly those under the care of others in ECCs, are among the most vulnerable occupants of buildings. They also present a very complex and multi-faceted problem when considering which fire safety systems to provide and how to facilitate egress. This is often made more complex by the size, height and layout of the building, and particularly the level on which an ECC is located. ECCs therefore rely on the building's fire safety systems and emergency procedures to ensure there is adequate time for safe evacuation. The distance of travel to an exit including direct egress to an open space, the number of stairs and the tenability of the evacuation route are of utmost importance.

In metropolitan areas, high-rise buildings are increasingly being built as mixed-use, with retail and car parking on lower levels. ECCs are increasingly being incorporated as a value proposition to owners and tenants.

Most states and territories regulate the standards of care in ECCs under a scheme known as the National Quality Framework (NQF). The NQF covers any service providing, or intending to provide, education and care on a regular basis to children under the age of 13 years. Services must meet the requirements set out in the NQF. A number of requirements under the NQF address the safety of children during evacuation. This includes staff-to-children ratios and emergency evacuation procedures. As these matters sit outside the NCC, and are regulated separately by the states and territories, they have not formed part of this project, other than awareness that they exist.

DTS Provisions were included in the public comment draft for NCC 2019 Amendment 1. Public comments recommended that further DTS Provisions could be considered as part of the NCC 2022 process, pending further fire engineering analysis. The ABCB was also requested, through Building Ministers' consideration of the ABCB work program, to continue to develop NCC 2022 DTS Provisions for ECCs located on the upper storeys of high-rise buildings. The ABCB subsequently engaged a consultant to review the proposed DTS Provisions and to update them to address the concerns raised through public comment on NCC 2019 Amendment 1.

Given the above, the proposed changes for Volume One of NCC 2022 have been developed to address the current limitations of the DTS Provisions for ECCs in high-rise buildings. The amendment seeks to:

- ensure that the level of fire safety provided by the NCC's DTS Provisions, to vulnerable occupants of an ECC, is acceptable given the characteristics of the occupants and the function and use of the building
- ensure that an ECC located on an upper level of a high-rise building does not expose the occupants of the building to greater risk than the occupants of a single storey building
- where possible, ensure that the levels of absolute risk to occupants of ECCs are minimised, and
- provide clear and consistent regulatory solutions that cater to the needs of a changing market where ECC's are located in mixed-use buildings, over more than one level and at levels where direct access to a road or open space is not available.

Rationale for the proposed changes

Table 2 Rationale for the proposed changes for ECC in high-rise buildings

NCC Section	Rationale
Part A6 Building classification	• Clause A6G1 (previously A6.0) – Determining a building classification: Exemption for Class 9b early childhood centres from the 10% rule. This is expected to reduce the risk of any ECCs not classified as Class 9b from being exempt from additional requirements due to its location on a relatively large floor plan, for example an ECC located within a large office building.
Part C3 (previously C2) Compartmentation and separation	• Clause C3D6 (previously C2.5) – Class 9 buildings (Compartmentation and separation): Includes two fire compartments, two horizontal exits 9 m apart, and smoke lobbies in lieu of fire compartments for smaller ECCs (up to 500 m^2). The key objective of fire compartmentation within ECCs is to mitigate the risk of fire spread and to provide occupants with a safe refuge area to which they horizontally evacuate and wait, before they are individually evacuated (vertically) by staff from the storey/building.

NCC Section	Rationale
Part D2 (previously D1) Provision for escape	• Clause D2D3 (previously D1.2) – Number of exits required (Provision for escape): Includes exits required from each part of the building including from fire compartments. This amendment is expected to address ECC designs that do not occupy a full storey or a full building. At least two exits are required to mitigate the risk of a single fire event potentially blocking the only available exit, to limit travel distances to an exit (or place of relative safety) and to also improve evacuation times. This provides the necessary redundancy in the evacuation strategy to ensure that staff are able to undertake emergency evacuation as efficiently as possible by evacuating vulnerable occupants from the fire-affected spaces. • Clause D2D4 (previously D1.3) – When fire-isolated stairways and ramps are required: extend the clause to require ECCs to have fire-isolated exits in all instances where it is located above a storey that provides direct egress to road or open space. • Clause D2D23 – Egress from primary schools (previously D1.18 – Egress from early childhood centres): Remove Clause D1.18 including the explanatory information as it currently requires designs for ECCs above ground level to follow a Performance Solution approach. D1.18(a) is superseded by C3D6 and D1.18(b) is superseded by the suggested DTS Provisions for ECCs in high rise buildings.

NCC Section	Rationale
Part D3 (previously D2) Construction of exits	• Clause D3D7 (previously D2.6) – Required smoke lobbies to be pressurised by a dedicated system if connected to an exit that is pressurised to keep the lobby clear of smoke creep. • Clause D3D27 (previously D2.16) – Barriers to prevent falls: Additional requirements to fire-isolated exits (stairs) serving Class 9b ECC parts in a building remove the exemption from compliance with Clause D3D27 (previously D2.16) in instances of an open or split stair configuration in a building containing an ECC, a balustrade or barrier that does not permit the passage of a 300 mm sphere. • Clause D2D33 (previously D2.17) – Handrails: Update clause to include secondary handrails at a lower height for children within stairs serving Class 9b ECCs. The requirement currently exists in the NCC for primary schools and the scope has been expanded to include ECCs. Both Clause D3D17 (previously D2.16(a), (b) and (c)) and D2D33 (previously D2.17) are intended to provide practical and suitable evacuation measures, to assist with the efficient evacuation of children, and to protect children from falling through balustrades and to have low hand rails as fire stairs are difficult to manage with handrails above their reach. • Clause D3D27(1) (previously D2.22(a))– Re-entry from fire-isolated stairs: Fire-isolated exits serving Class 9b ECCs are to be provided with re-entry provisions back into the Class 9b ECC storey or part.
Specification 17 (previously Specification E1.5) Fire sprinkler systems	• Clause E1D4 (previously E1.5) / Specification 17 (previously Specification E1.5) – Sprinklers (Fire-fighting equipment): Sprinklers to be provided not just in the ECC but throughout an entire building that incorporates ECCs above ground floor level, where the ECC is not wholly within a storey that provides direct egress to a road or open space. Additional requirements set out what type of sprinkler system is required and that within ECCs, the sprinklers must be fast-response. This measure helps to control fire growth/spread and assists in increasing time available for evacuation, by maintaining tenability in evacuation routes.

NCC Section	Rationale
Part E2 Smoke hazard management	• Clauses E2D14 – E2D20 (previously Table E2.2b) Specific provisions – In addition to any other DTS smoke hazard management measures, all ECCs above ground level not wholly within a storey that provides direct egress to a road or open space must have a smoke detection and alarm system provided throughout the building. This requirement is to enable early warning to building occupants of a fire in the ECC or anywhere else in the building.

Primary schools in high-rise buildings (Volume One)

The ABCB is proposing changes to the NCC to protect children in high-rise buildings in the event of fire. Clause D2D23 (previously D1.18) of Volume One is proposed to be updated in recognition of the difficulties associated with the evacuation of primary schools in high-rise buildings, due to the occupants' vulnerabilities.

While most primary schools in Australia are single-storey buildings, families increasingly live in city centres and there is increased demand for schools in these catchments. This, combined with reduced availability of land to build traditional schools, is resulting in some primary schools being located in multi-storey buildings.

Proposed changes for NCC 2022

The proposed changes to clause D2D23 (previously D1.18) have been developed to address the current lack of DTS Provisions specifically for primary schools in high-rise buildings. The proposed amendment is to require that egress from primary school buildings of more than four storeys and/or containing another class, be direct to a road or open space.

Reasons for the proposed changes

The proposed changes are designed to protect primary school occupants by recognising that they may be slow to evacuate high-rise buildings and/or need supervision to do so safely.

The proposed changes minimise evacuation distance and time by requiring that primary schools in high-rise buildings are within storeys providing direct egress to a road or open space. Where compliance with these DTS Provisions is not feasible, including where a building is above four storeys and/or contains another Class, a Performance Solution may be used to meet the NCC's Performance Requirements. In developing Performance Solutions, building practitioners will be expected to have specific regard for the vulnerabilities of the building's users.

Based on quantitative risk analysis commissioned by the ABCB, the proposed changes are not intended to apply to buildings of four-storeys or less only used as a school.

External wall combustibility (Volume One)

The ABCB, in response to the Lacrosse Apartment and Grenfell Tower external cladding fires, developed and implemented a range of measures in 2018 to help address risks associated with external cladding products and components of external walls on high rise buildings, including a national Advisory Note and amendments to the NCC.

Since that time, the ABCB has been monitoring international technical code and standards responses to the Grenfell Tower fire and their applicability in the Australian context, to assist in identifying possible future development of the fire safety provisions of the NCC.

This work, alongside that of a technical working group, has resulted in a suite of proposed clarification and technical amendments for NCC 2022.

It is anticipated that work necessitating more extensive analysis, including impact analysis, will be undertaken for the purposes of potential amendment for NCC 2025.

Proposed changes for NCC 2022

A number of minor changes are proposed for Section C of Volume One, including:

1. **C2D10 Non-combustible building elements (previously C1.9)**

   Additional concessions for minor, combustible building elements, as well as identification of concrete, steel, masonry and aluminium as materials that can be used wherever a non-combustible material is required.

2. **C2D14 Ancillary elements (previously C1.14)**

   Clarification amendments.

3. **C2D15 (new for NCC 2022)**

   A new requirement for mechanical fixing for bonded, laminated external cladding.

Reasons for the proposed changes

The proposed amendments result from the identification of opportunities for clarification, as well as opportunities for improvement by the incorporation of practical concessions, whilst maintaining or improving building safety.

Bushfire protection for Class 9 buildings with vulnerable occupants (Volume One)

The proposed changes stem from the 2009 Victorian Bushfires Royal Commission and subsequent investigations. The Royal Commission recommended that bushfire protection provisions for certain non-residential buildings with vulnerable occupants be included in the NCC. The proposed changes reflect the analysis and recommendations of a quantified risk assessment (QRA).

The QRA confirmed that vulnerable people are exposed to significantly higher risks than the general population during a bushfire event. Accordingly, the QRA recommended a number of changes to the NCC for non-residential buildings with vulnerable occupants, including:

- Development of a new Performance Requirement.
- Modification of the existing bushfire Verification Method.
- Appropriate DTS Provisions.

These changes are intended to provide additional protections to buildings when used by the occupants as a place of last resort during a bushfire when early evacuation is unsafe or impractical (sometimes referred to as a 'defend in place' strategy).

Two key points must be noted in considering these draft changes to the NCC:

1. 'Defend in place' does not involve building occupants actively defending the property. Active defence necessitates provisions that are more stringent and comprehensive than those found in AS 3959. [2]

2. Compliance with the proposed changes does not guarantee the safety of building occupants during a bushfire event. This limitation is consistent with the scope of AS 3959 which states explicitly that compliance does not guarantee that a building will survive a bushfire event.

[2] *Australian Standard (AS) 3959: 2018 Construction of buildings in bushfire-prone areas,* as referenced in NCC 2019.

Building classifications

The proposed changes affect the following building classifications:

- **Class 9a** buildings which are **health-care buildings**.

  The term ‘health-care building’ is defined in the NCC as ‘a building whose occupants or patients undergoing medical treatment generally need physical assistance to evacuate the building during an emergency and includes—

  - a public or private hospital; or
  - a nursing home or similar facility for sick or disabled persons needing full-time care; or
  - a clinic, day surgery or procedure unit where the effects of the predominant treatment administered involve patients becoming non-ambulatory and requiring supervised medical care on the premises for some time after the treatment.’

- **Class 9b** buildings which are used as either an early childhood centre or a primary or secondary school.

  The term ‘early childhood centre’ is defined in the NCC ‘as any premises or part thereof providing or intending to provide a centre-based education and care service within the meaning of the *Education and Care Services National Law Act 2010 (Vic)*, the *Education and Care Services National Regulations* and centre-based services that are licensed or approved under State and Territory children's services law, but excludes education and care primarily provided to school aged children in outside school hours settings.’

- **Class 9c** residential care buildings.

  The term ‘residential care building’ is defined in the NCC as a ‘building which is a place of residence where 10% or more of persons who reside there need physical assistance in conducting their daily activities and to evacuate the building during an emergency (including any aged care building or residential aged care building) but does not include a hospital.’

Face-mounted balustrades (Volumes One and Two)

The ABCB had noted inconsistent application of Volume One D2.16 and Volume Two 3.9.2.2 to face-mounted balustrades. Specifically, some practitioners allow a gap (such as a gap created by a spigot) of 125 mm between the face of a trafficable surface and the balustrade, whereas others consider that such a balustrade is not 'provided along the side' of the trafficable surface (D2.16 and 3.9.2.2).

Proposed changes for NCC 2022

Volume One D3D19 (previously Table D2.16a) and Housing Provisions 11.3.4 (previously Volume Two 3.9.2.3) contain a new provision permitting a face mounted barrier to create a gap so long as the passage of a 40 mm sphere is prevented.

Reasons for the proposed changes

A 125 mm gap is considered hazardous and not intended by the current BCA. At the same time, a face-mounted barrier will require some gap (e.g. on account of material movement and/or construction tolerance). Select industry consultation concluded that a gap of 40 mm is both safe and practical, yet comment on this dimension is welcomed through this public comment process.

Lead in plumbing products in contact with drinking water (Volume Three)

In 2018, the ABCB commissioned Macquarie University to undertake a literature review on the extent plumbing products and materials contribute to lead levels in excess of those permitted by the NCC. The report identified that the most likely source of lead in drinking water at the outlet was from the installation of copper alloy plumbing products from within the premises. Subsequently, the report recommended that the ABCB consider reducing the permissible lead levels in the manufacture of copper alloy plumbing products in contact with drinking water.

Lead is currently used in the manufacture of plumbing products and is permitted by Australian Standards. The exact lead content of products varies by component, though some products in contact with drinking water can contain up to 6% lead as a proportion of raw material.

In 2019, the ABCB convened a Lead in Plumbing Products forum with representatives of plumbing manufacturers, Standards Australia's technical committees responsible for the relevant product standards, enHealth and plumbing suppliers and retailers. During the forum, participants considered the need to further reduce lead levels in plumbing products and a survey of attendees revealed that 92% agreed that lead content in plumbing products in contact with drinking water should be reduced.

In December 2020, the ABCB released a Consultation Regulation Impact Statement (RIS), which considered whether reducing the lead content in plumbing products in contact with drinking water would have a measurable impact on reducing the lead content in drinking water and blood lead levels found within the general population. The Consultation RIS concluded that of the options considered, requiring all copper alloy plumbing products in contact with drinking water to contain a maximum weighted average lead content of 0.25% when measured across the wetted surface area, would have the largest net benefit to the community. As such, this technical change has been reflected in the NCC 2022 public comment draft.

A copy of the Macquarie University Report and Consultation RIS can be found on the ABCB's website.

Proposed changes for NCC 2022

The proposed changes are contained within A5G4 (previously A5.3) 'Evidence of suitability' in the NCC Volume Three.

The proposed changes require all new copper alloy plumbing products in contact with drinking water to have a weighted average lead content of no more than 0.25%, as verified through one of following options:

Option 1: A test report provided by an Accredited Testing Laboratory, in accordance with NSF/ANSI 372 'Drinking Water System Components – Lead Content'

Option 2: A WaterMark licence, provided it includes compliance with NSF/ANSI 372.

Scope of the proposed changes

The following products are within scope of the proposed changes:

- Fittings
- Valves
- Fittings on stainless steel braided hoses
- Taps
- Mixers
- Appliances for the delivery of drinking water
- Water heaters
- Water dispensers (boiling and cooling units).

The following products are not within scope of the proposed changes:

- Residential fire sprinklers
- Fire-fighting equipment
- Irrigation
- Appliances, including washing machines and dishwashers
- Commercial boilers (associated with HVAC systems)
- Toilets
- Emergency deluge showers, eyewash and eye-face wash equipment

- Showers for bathing
- Recycled water systems (such as residential dual pipe reuse systems or dual reticulation systems
- Plumbing products in contact with drinking water made from materials other than copper alloy.

An explanation of the product inclusions and exclusions is provided below, under the heading ‘Reasons for proposed changes’.

How to calculate the wetted surface area

A worked example of how an accredited laboratory would calculate the weighted average lead content of a plumbing product is shown in Table 3.

Table 3 NSF/ANSI 372 – 2016: Annex A (Informational) Example of weighted average lead content calculation

Component no.	Wetted surface area (total = ∑ D)	Ratio wetted surface area	% lead content	% lead contribution
1	1,142.27	0.0453	0	0.0000
2	4,472.17	0.1774	0.25	0.0444
3	157.58	0.0063	0.55	0.0034
4	1,013.50	0.0402	0.25	0.0101
5	382.60	0.0152	0	0.0000
6	695.74	0.0276	0	0.0000
7	425.85	0.0169	0	0.0000
8	16,915.63	0.6711	0.02	0.0134
TOTAL	25,205.34			**0.0713%**

Explanatory information on the above table:

1. The example assumes that there are eight components in the one product with varying degrees of wetted surface area.

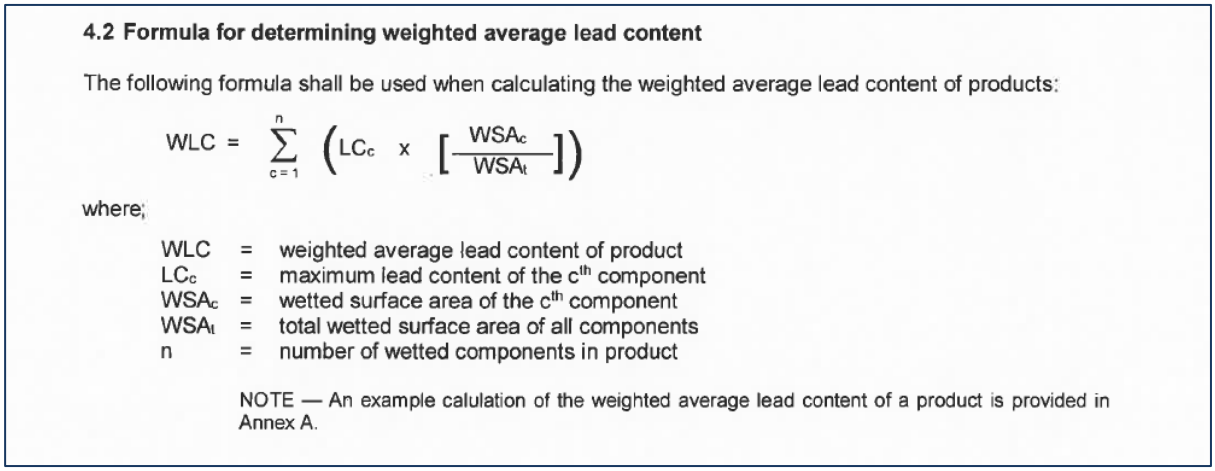
2. The wetted surface area is measured by the total sum of diameter (D) in contact with drinking water. That is, the length of the pipe or fitting in contact with drinking water multiplied by its diameter.

3. The ratio wetted surface area is the wetted surface area of the component divided by the total wetted surface area of all components.

4. The percentage of lead contribution is calculated by multiplying the ratio of wetted surface area by the percentage of lead content (e.g. 0.1774 x 0.25 = 0.0444).

5. The formula used to derive the weighted average lead content is provided in the below extract of NSF/ANSI 372.

Figure 1 Extract from NSF/ANSI 372



4.2 Formula for determining weighted average lead content

The following formula shall be used when calculating the weighted average lead content of products:

$$WLC = \sum_{c=1}^{n} \left(LC_c \times \left[\frac{WSA_c}{WSA_t} \right] \right)$$

where;

WLC	=	weighted average lead content of product
LC_c	=	maximum lead content of the c^{th} component
WSA_c	=	wetted surface area of the c^{th} component
WSA_t	=	total wetted surface area of all components
n	=	number of wetted components in product

NOTE — An example calulation of the weighted average lead content of a product is provided in Annex A.

Reasons for the proposed changes

The proposed changes have been developed having regard to how the problem of lead in drinking water is addressed by other jurisdictions. In this regard, NSF/ANSI 372 is an American National Standard that establishes a standardised methodology for the determination and verification of product compliance aimed at minimising lead contaminants. NSF/ANSI 372 serves as a basis to establish conformance with the requirements of the United States Safe Drinking Water Act.

NSF/ANSI 372 includes:

- A maximum weighted lead content requirement of 0.25% (0.2% for solders and fluxes).

- A formula for calculating the weighted average lead content of each product prior to testing.
- Specific procedures for testing products for lead content.

It should be noted that under the proposed changes, conformance to AS/NZS 4020 will remain to ensure that the maximum lead content in drinking water (10 µg/L) is satisfied. It is, however, anticipated that this threshold could be lowered over time once a suitable transition to a lower allowable lead level within the product has been completed.

In accordance with the Governing Requirements (A4G2, previously A4.1), the NCC over-rules any differences between it and its primary or secondary referenced documents. However, it is also envisaged that the required limits of product and material specifications could be amended to align with this requirement following the decision to adopt the changes as part of NCC 2022.

The scope of the proposed changes reflects the importance of maintaining consistency with the model regulation. This is to ensure that the Australian plumbing products industry remains competitive and allows for an immediate supply of suitable products.

The scope of the proposed changes deliberately excludes certain products on the basis of:

- Insufficient evidence to indicate lead leaching from plumbing products in contact with drinking water other than from copper alloy products; and,
- The low likelihood of water being consumed primarily for drinking purposes from certain products (e.g. products associated with showering and/or bathing). While water can be consumed for drinking purposes from these products, they contribute a very small proportion to overall exposure. Including such products would also create an inconsistency with the model regulation, prohibiting NSF/ANSI 372 compliant products from being used in Australia.