

Performance-Based Design (or How to Bake a Cake)



by [Lee Wilson](#)

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PERFORMANCE-BASED DESIGN IN AUSTRALIA

Since the release of BCA96, Australia has had a performance-based building code. This might come as a surprise to some building practitioners. However, after 21 years it is widely recognised that the uptake in the use of Performance Solutions across the construction industry has been limited.

This has been credited to a lack of acceptance across all sectors of the building industry and a reduced level of awareness and understanding of how compliance with the building codes can be achieved through a performance-based solution.

The objectives of a performance-based building code are to create an environment that has more flexibility to develop innovative and cost-effective solutions by focussing on the outcomes that the building is required to deliver.

NATIONAL CONSTRUCTION CODE 2016

The current National Construction Code or NCC now includes:

- Volume One Amendment 1: Requirements for Class 2 to 9 (multi-residential, commercial, industrial and public) buildings and structures.
- Volume Two: Requirements for Class 1 (residential) and Class 10 (non-habitable) buildings and structures.
- Volume Three: Requirements for plumbing and drainage for all classes of buildings.
- Guide to Volume One Amendment 1: Companion manual to Volume One providing clarification, illustration and examples for complex NCC provisions.
- Consolidated Performance Requirements Amendment 1: A compilation of all NCC Performance Requirements.

COMPLIANCE WITH THE NCC

For those not familiar with how compliance with the NCC is achieved, the following is a quick summary.

Ultimately, as a performance-based document, the legal compliance requirement in each part of the NCC is the applicable 'Performance Requirement'. A Building Solution will only comply with the NCC if it satisfies the Performance Requirements. These Performance Requirements are outlined at the start of each part of the NCC (i.e. in Volume One these include structural, fire resistance, access and egress, services and equipment, health and amenity, and energy efficiency).

Compliance can be achieved by one of three paths when assessing a building design against the applicable Performance Requirements. This was best explained during the recent national NCC seminar series when the Australian Building Code Board representative used an analogy of baking a cake.

The first method of compliance is by strictly following the recipe. The NCC outlines a set of prescriptive requirements within the various parts of the NCC and following this

recipe to compliance is referred to as being 'Deemed-to-Satisfy'. This prescriptive path needs you to use all the same ingredients and follow the same instructions each time to meet the Performance Requirements (for example, baking a nice cake).

The second method is by way of a 'Performance Solution', which is defined as a building solution that complies with Performance Requirements, other than by satisfying the Deemed-to-Satisfy provisions. This path allows flexibility, innovation and industry expertise to deliver the same (or better) outcome. Performance-based design allows you to substitute some ingredients based on experience, follow a different recipe or use an alternate cooking method, to meet the Performance Requirements (i.e. an equally nice cake, but with perhaps a little less sugar).

The third method is through a blended approach, often seen in Australia, where compliance with many Deemed-to-Satisfy provisions is possible or desirable, but some aspects of the design will be developed as Performance Solutions. From experience, this is the approach most often used in accessibility-related Performance Solutions, particularly during upgrades of existing buildings.

PRODUCTIVITY GAINS IN PERFORMANCE-BASED DESIGN

The fire engineering profession was an early adopter of performance-based design, but other professions have been slower to accept the use of performance solutions. As a result, the ABCB is now actively promoting the use of Performance Solutions and attempting to increase awareness and acceptance of their use as an accepted pathway to compliance.

There is evidence to support this approach. A 2013 report found that 70% of the \$1.1 billion per annum productivity gains delivered by ABCB reforms was derived from the use of a performance-based code. The report also suggested that future gains would be increased with more acceptance and use of Performance Solutions. ABCB representatives have suggested that these benefits could, in fact,

be doubled with the use of performance-based design.

Whilst the Australian Fire Code Reform Centre (FCRC) published the Fire Engineering Guidelines prior to the release of the first performance-based building code (BCA96), up until very recently there has been little guidance material available for other building disciplines developing Performance Solutions.

MOVING FORWARD WITH PERFORMANCE SOLUTIONS

To change this situation, the ABCB has a three-pronged approach to increase the use of Performance Solutions:

1. Engendering a Performance Mindset
2. Capacity Building
3. Quantification (including Verification Methods)

THE ABCB, NCC 2019 AND WHAT YOU NEED TO KNOW

CREATING A PERFORMANCE-BASED MINDSET

There is great potential to extend the use of performance-based design into other areas such as energy efficiency, accessibility and structural engineering. To do this, the ABCB has embarked on an industry-wide communication strategy to highlight the compliance options available to industry. This has included dedicating a significant amount of time from the recent NCC seminars to the concept of Performance Solutions. Earlier in March 2018 the ABCB also announced the establishment of a volunteer Subject Matter Expert Network.

SUBJECT MATTER EXPERT NETWORK

The Subject Matter Expert (SME) Network has recently been established to support the architecture and building design sectors in shifting towards a performance-based mindset. The SME Network is a pilot program comprising 10 volunteers, each being an industry leader in either energy efficiency, building codes, fire engineering or accessibility.

ACAA will have three representatives on the SME Network, each being an accredited member of ACAA. These members will be working together to ensure a consistent approach when engaging with the ABCB and providing information and responses to members of the public.

The SME Network will operate as an internal referral process within the ABCB and will provide advice and support on the best practice application of Performance Solutions. The Network will also help to develop guidance material, develop new Performance Solution case studies, respond to public enquiries and highlight opportunities for applying performance-based design by Architects and Building Designers.

CAPACITY BUILDING

The ABCB aims to progressively release new awareness, educational and other supporting materials to help support an enabling environment.

Earlier this year the following initiatives related to access and egress for people with disability have been released as part of this program, and in preparation for the release of NCC 2019:

- Public Comment Draft of NCC 2019, Volume One (comments close 13 April 2018);
- Proposed NCC 2019 Verification Methods:
 - Fire Safety Verification Method;
 - Ramps Verification Method (DV3);
 - Access to and within a building overview of proposed Verification Method (DV2)
- Performance Solution Case Study: Disability Access - Disability Access: Riley Street Apartments
- Consultation Regulation Impact Statements:
 - Accessible adult change facilities in public buildings (comments close 13 April 2018), including a Cost Implications Report;
 - Fire Safety in Class 2 and Class 3 residential buildings (comments close 13 April 2018);
- Discussion Paper: The NCC and short-term accommodation in apartment buildings (comments close 8 April 2018);
- NCC Improved Readability Overview

(Note, references to applicable fire engineering documents have been made, as people with disabilities are often not provided for adequately in fire-engineered solutions).

Additionally, we understand that the ABCB has been talking to universities offering engineering, building surveying and architectural courses about the need to introduce students to the idea of a performance-based regulatory environment. By doing so, the ABCB aims to tap into the next generation of practitioners to ready the industry with an increased awareness and understanding.

KEY PROPOSED CHANGES TO NCC 2019

The following is a summary of the most significant proposed changes to the access provisions of the NCC:

- A revised Section to be consistent with other NCC documents, which introduces the term 'Governing Requirements'. The Governing Requirements include rules and instructions for:
 - Interpreting the NCC
 - Complying with the NCC
 - State or Territory compliance and application in conjunction with the NCC
 - Applying documents referenced in the NCC
 - Documenting evidence and suitability of materials for the purposes of the NCC
 - Classifying buildings by their intended use
- Alignment with other NCC documents and introduction of new accessibility Verification Methods (discussed below).
- Giving titles to all Performance Requirements, which now sees a reference to 'Evacuation Lifts' in DP7.
- Aged care buildings are now referred to as residential care buildings throughout the NCC.
- Verification Methods DV2 (Access to and within a building) and DV3 (Design for wheelchair) are included at the start of Section D.
- Table D2.13 (stair tread 'risers' and 'goings')

- is simplified.
- Dry and wet condition headings have been rationalised in Table D2.14.
 - Clause D2.21(a)(iii) has been added
 - Required exit doors need:
 - Power operated door controls no closer than 500mm from an internal corner and not more than 2m from any part of the door; and
 - Braille and tactile signage to identify the latch operating device.
 - Table D3.1 remains unchanged, other than moving the location of the text under Class 3 and Class 9c buildings, which outline the need for not more than 2 required accessible sole-occupancy units (SOUs) to be located adjacent to each other and to be representative of the range of rooms available. This is now at the end of the text, which might infer this is now only applicable when there are more than 500 SOUs.
 - Clause D3.5(d) has removed the reference to being 'designated' and now says "need not be identified with signage where there is a total of not more than 5 car parking spaces, so as to restrict the use of the car parking space only for people with a disability."
 - Clause D3.6(a) now clarifies where braille and tactile signage is not required in Class 1b and Class 3 buildings.
 - Clause D3.6(c) now includes signage requirements for the adult changing sanitary facilities required in Clause F2.4(j).
 - Clause D3.6(g) has been added to include the directional signage requirements for the adult changing sanitary facilities required in Clause F2.4(j).
 - Clause D3.8(c) clarifies where tactile domed buttons are required.
 - Clause D3.9(b) removes the requirement for the range of wheelchair seating spaces to be representative of the range of seats offered.
 - Clause D3.10(b) removes the maximum gradient of 1:14 for zero depth entry ramps into pools.
 - Specification D3.6 corrects the reference from sentence case to title case.
 - A complete revamp of Clause 3.6 and moving the requirements of Table E3.6a and Table E3.6b into the body of the Clause.
 - Verification Method FV2.1 (Sanitary facilities) is included at the start of Part F2, which provides a method of developing Performance Solutions to vary the number of toilets for building occupants based on 'waiting times'. However, no information on Verification Method FV2.1 has been released by the ABCB.
 - Clause F2.4(j) has been added, which states that in addition to those accessible facilities required by F2.4(a), one unisex accessible sanitary compartment complying with Specification F2.4 must be provided in an accessible part of any:
 - Class 6 shopping centre that has a design occupancy greater than 1400 people, determined in accordance with Table D1.13 for each part of the building that is used as a shop; and
 - Class 9b public building, other than one that is required to comply with H2.8, and in which at least one accessible unisex sanitary compartment is required by (a).
 - Specification F2.3 has been added and replaces Table F2.1 and F2.3.
 - Specification F2.4 has been added to outline the requirements for adult change facilities. The Scope states "This Specification contains the requirements for unisex accessible sanitary compartments that are required to include additional features to assist people who may be unable to use standard unisex accessible sanitary facilities independently." The design requirements are generally consistent with the Changing Places Technical Standard Option 1b, with additional circulation spaces, ceiling mounted hoist system, adult-sized change table, drop-down grabrails on each side of the toilet pan, a standard AS 1428.1 basin, other fixtures and fittings, door and door controls and signage (including the new Hoist and Table Symbol).
 - Clause H2.8(b) has been added to include the requirement for Specification F2.4 adult change facilities in public transport buildings.
- ACAA encourages all readers to visit the ABCB website to download, review and provide comment prior to 13th April 2018.