

Building (ACT Appendix to the Building Code—2010 edition) Determination 2010

Disallowable instrument DI2010—263

made under the

Building Act 2004, s 136 (2) (Building Code)

EXPLANATORY STATEMENT

Background—building code and its appendices

The *Building Act 2004* (“the Act”), section 136 (Building code), gives effect to the Building Code of Australia (the “building code” or “BCA”) and entitles the relevant Minister to make ACT appendices to the building code. The building code and its appendices form part of ACT law. Appendices can vary or add to the BCA insofar as the appendices apply in the jurisdiction that enacts its appendices.

The building code applies throughout Australia and is divided into 2 volumes. Volume 1 deals with class 2 to class 9 buildings, as classified under the code, which includes apartments, commercial residential buildings such as motels, and non-residential buildings. Volume 2 deals with class 1 and class 10 buildings, which include standard houses and non-habitable buildings such as garages, sheds, swimming pools and structures.

Each published volume of the code consists of a main text and a series of indicative appendices for each State and Territory. The building code, including indicative State and Territory appendices, is published annually by the Australian Building Codes Board (“the ABCB”). The ACT is represented on the ABCB along with representatives from other jurisdictions, including the Commonwealth Government and industry.

To provide a mechanism for the ACT to depart from, add to, or vary the building code from time to time, in addition to the yearly changes made to the code by the ABCB, the Act, s 136 (2) entitles the Minister to make ACT appendices to the building code. The appendices only apply to the ACT and Jervis Bay Territory, and can vary or add to the provisions of the building code.

The *Building (ACT Appendix to the Building Code—2010 edition) Determination 2010* (“the determination”) revokes relevant previous ACT appendices to the building code and makes new appendices for both volumes of the 2010 editions of the building code (BCA 2010).

BCA 2010 was published in early 2010 but commenced in law in the ACT on 1 May 2010.

Problems addressed by the determination

Increase stricture on house energy efficiency

As directed by the Council of Australian Governments, (COAG), BCA 2010 has greater stricture than BCA 2009 in respect of energy efficiency provisions. In particular, BCA 2010's vol 2 provisions about house energy efficiency include requirements to achieve the equivalent of notionally 6-star energy efficiency rated ("EER") construction, up 1 star from BCA 2009 for the ACT.

Canberra's extreme climate

Due to the diversity of Australia's climate, the building code has differing energy efficiency requirements for different climatic regions or zones. The ACT is mainly in zone 7 (typically very cold winter minimums and very high summer maximums), with some rural mountainous ACT areas in zone 8 (mainly the ACT's alpine areas subject to annual snow).

The move from 5-star EER notional equivalence to 6-star EER notional equivalence for BCA 2010 has significantly increased inter alia the required thermal performance of windows in zone 7. In particular, excessive areas of low performing windows in a house can contribute to significant loss of manufactured space heating in the ACT's cold seasons, and conversely contribute to excessive solar heat gain in the summer. Both are adverse outcomes on energy use, contributing to increased energy usage for space heating and cooling.

Conversely, well orientated and sized higher performing windows can contribute to beneficial solar heat gain in winter, as the ACT has abundant sunny days in winter, with enough potential solar heat gain to significantly offset some of the need for other forms of space heating during the sunny parts of winter days.

BCA not drafted to cater for house extensions or alterations but ACT law forces compliance nevertheless

The BCA is drafted to only apply to construction of whole new buildings. It does not have provisions that specifically cater for upgrading, altering or extending buildings.

Historically, the Act has required all building work (unless exempted) to be done in a way that is likely to produce a building (or part of a building) that complies with the building code, particularly under the Act's sections 42 (1) (a) and (b) and 49. That requirement applies to building new houses as well as extending or altering pre-existing houses. The Act also requires whole buildings to be brought into compliance with the building code when the buildings are substantially altered, as prescribed.

The *Building (General) Regulation 2008*, section 23, prescribes for the Act's section 29 (2) (a), circumstances where pre-existing buildings must be brought into BCA compliance when the building is substantially altered (for example by a large extension to it). The regulation also prescribes (at sections 24 to 29) that certain provisions of the code do not have to be met when bringing the unaltered part of the pre-existing buildings into code compliance, (because it is unlikely to be cost-effective or practical to do so).

Industry finds that house extensions are unable to comply

The *Building (General) Regulation 2008* also prescribed a transitional arrangement that allowed time to adjust to the increased stricture of BCA 2010. Access to the transition expired at the end of 30 June 2010. From that expiration date, some industry practitioners begun reporting to the ACT Planning and Land Authority that BCA 2010's increased stricture was problematic for making many house extensions comply where optimal window orientation was difficult to achieve. The problems were due to site and design constraints, or where glazing in the unaltered part of houses had a significantly detrimental effect on the overall performance of glazing in the extended house.

Window thermal performance critical

Industry reported that omitting all windows from certain house extensions, or using very high-thermal-performance windows did not always solve the problem. Discussion with energy efficiency experts from the Australian Building Codes Board ("ABCB") confirmed that for the ACT, glazing size and orientation is particularly critical and in most, if not all, circumstances house extension that cannot provide some northerly orientated windows are unable to comply with BCA 2010. That is because of the net solar heat gain needed by BCA 2010 for winter space heating.

BCA 2010's vol 2 "deemed-to-comply" include as one method of demonstrating compliance, a requirement that the thermal performance of glazed units (window units) must be assessed to estimate their solar heating and heat loss effects and for the result to be within prescribed limits. Those limits are more strict in BCA 2010 than for BCA 2009. The requirement applies to all glazing in each storey of a building to be considered, as the overall performance of a storey can be influenced by all glazing in the storey.

Site constraints preventing BCA compliance

Site constraints can prevent some house extension from being able to practically provide northerly orientate windows. For example, a pre-existing houses that has a northerly aspect and occupies all the available northerly frontage of the land only has its southerly aspect available to extend the ground storey of the house. Any opportunity to incorporate northerly windows in such a southerly extension is often overshadowed by the pre-existing part of the house, reducing or preventing solar penetration. Industry reports that some home-owners who become aware of not being able to cost-effectively extend such houses instead move to a new house, which foregoes the opportunity to, and provides disincentive to enhance the thermal performance of older building stocks.

Applying BCA to house extensions means pre-existing glazing must also comply

A significant portion of the ACT's housing stock was constructed prior to 1990, and was therefore not required to be energy efficient. Much of that stock has not had its energy efficiency measures upgraded. Extending such stock presents opportunity to improve and enhance the pre-existing house. However, pre-existing houses with poorly orientated widows that are poorly sized and of poor thermal performance can make it impossible for an extension to the house meet BCA 2010's energy efficiency provisions because it is

impractical for the extension to compensate for the poor performance of the pre-existing part of the house. That problem has been exacerbated by the increased stricture of BCA 2010's energy efficiency provisions.

Solutions developed using expert opinion

The determination's provisions were developed with the assistance of building construction and building energy efficiency experts from the ACT Planning and Land Authority, the ABCB secretariat, and the Commonwealth Scientific and Industrial Research Organisation (CSIRO), including people involved in developing software used to model house energy efficiency and window thermal performance.

Objects of provisions

A main objective of the determination is to assist to options for BCA compliance where the existing solutions provided under the BCA do not sufficiently cater for houses extensions. Other objectives include the following:

- The ACT's cold winters and hot summers can make it difficult to make extensions to older houses energy efficient, but the additional provisions will help make it easier and cheaper for windows and thermal insulation to comply with the BCA.
- The extra provisions will also help stop inefficient house extensions from reducing the overall energy efficiency of houses, thereby reducing construction costs, reducing ongoing heating and cooling cost, reducing emissions from energy production, and helping the ACT community improve and enhance existing housing stock.
- Protecting the level of energy efficiency that pre-existing houses already achieve so that, notionally, house extensions do not reduce the energy efficiency of the pre-existing part of the house to a level below the efficiency that the house was required to achieve when constructed, or below that which it currently achieves.
- Providing practical options to help make house extensions achieve or approach the energy efficiency requirements of new houses built under BCA 2010, despite some extensions opening onto pre-existing parts of houses of poor efficiency.
- Producing net benefits to society that outweigh the cost of compliance with the provisions.
- Ensuring that pre-existing glazing in the unaltered part of an extended house does not necessarily have to be replaced or upgraded in order to make an extension to the house comply with the BCA.
- Applying the BCA's concept of allowing whole houses to demonstrate compliance by an energy rating, to be adapted to certain house extensions.
- Rewarding investment in the substantial cost of providing high performance window treatments to pre-existing windows by allowing the thermal enhancement provided by the treatments to be taken account of, (similarly to how they can be taken account of in the energy rating software referenced in the BCA).

- Providing objective, quantified and measurable descriptions of relevant matters, such as the characteristics of window treatments, to assist designers and building certifiers apply and check for compliance with the provisions.
- Clarifying that certain provisions of the *Building (General) Regulation 2008* that make concessions on complying with the BCA are available for all sizes of house extensions, provided the concession's alternative compliance requirements are met.

Cost and other regulatory impacts

The ABCB has undertaken and published on its web site (www.abcb.gov.au) a comprehensive regulatory impact analysis and produced a regulatory impact statement ("RIS") for the increased regulatory stricture provided by BCA 2010. The determination is consistent with the concepts and matters covered by the RIS, and is intended to reduce compliance burdens (particularly costs) without substantive change to net regulatory outcomes of increased energy efficiency of buildings.

Provisions of the determination

Sections 1 to 4 of the determination provide the formal provisions that name and make the ACT appendices and to revoke previous appendices.

Section 4 is intended to codify the version of the 2010 ACT appendices to the building code that were published with the 2010 version of the code, but with an amendment to 1 of the appendices, as per schedule 1 to the determination.

Under the *Building Act 2004*, s 136 (1) the building code is the Building Code of Australia published by the ABCB. However, that Act's 136 (2) entitles the Minister to make ACT appendices to the code. The determination exercises that entitlement.

Section 5 is intended to disapply the requirement of the *Legislation Act 2001*, section 47 (5), so as the published version of the ACT appendices that accompany the published version of BCA 2010, and that are relied on by the determination, do not have to be notified on the ACT legislation register.

The building code is subject to copyright, making it inappropriate to notify on the legislation register. BCA 2010 including accompanying published State and Territory appendices are available on the ABCB web site at www.abcb.gov.au.

Section 6 is to make the community aware of how they can freely access the building code and its appendices, considering that access to the code is generally otherwise by paid purchase or subscription.

Schedule 1—the 1st item in the schedule substitutes the version of clause ACT 7 (Sustainability) published in BCA 2010 with a new clause ACT 7 (Sustainability). The unsubstituted clause merely contained a note, whereas the substitute new clause contains notes, explanatory information and substantive provisions, including:

Clause ACT 7.1.1 (Application of Part 3.12)
Clause ACT 7.1.2 (Heating and cooling loads)
Clause ACT 7.1.3 (Building fabric—application of Part 3.12.1)
Clause ACT 7.1.4 (External glazing—application of Part 3.12.2)
Figure ACT 7.1.1 (Examples of compliance with ACT 7.1.2 (a) (ii) and (b))
Table ACT 7.1.4.1 (Glazing unit U-Values).

The fact that the determination makes the ACT appendices to BCA 2010 inconsistent with the indicative ACT appendices published BCA 2010 does not affect the validity of the ACT appendices made under the determination.

Summary of substantive provisions of schedule 1.

ACT Part 7.1 is intended to help make designs for house extensions comply with the intent of the BCA's main energy efficiency provisions. It provides a range of extra options to achieve, compliance, in addition to the BCA's options. Some of the options cannot be used in combination with others, but other can be used in combination, as explained in the respective clauses. The options provide for:

- Allowing the extension to the house to be assessed using house energy rating software, rather than that software only being applicable to the whole of a house (see clause **ACT 7.1.2**).
- Allowing the house extension to meet the elemental provisions (insulation levels, window performance, sealing, etc) of the BCA's energy efficiency provisions, rather than the BCA's house energy rating requirements (see clause **ACT 7.1.3**).
- Allowing the effect of window treatments such as blinds, curtains and pelmets to be taken account of when assessing the thermal performance of pre-existing windows (see clause **ACT 7.1.4 (a)**).
- Excluding assessment of thermal performance of a pre-existing window if it is treated with a solar control film (see clause **ACT 7.1.4 (b)** and the dispensation under the ACT's *Building (General) Regulation 2008*, section 29 (1), which is about windows not having to comply with the BCA if they have the prescribed film applied).
- Excluding assessment of thermal performance of a pre-existing window if it is thermally isolated from windows that must be assessed (see clause **ACT 7.1.4 (b)** and the dispensation under the ACT's *Building (General) Regulation 2008*, section 29 (2), which is about isolated windows not having to comply with the BCA if they are separated from windows that have to be assessed by prescribed walls, floors, ceilings and doors).
- Allowing the use of the ABCB 2009 (or later) glazing calculator or later to determine window thermal performance compliance where northerly glazing is impractical to provide in a house extension (see clause **ACT 7.1.4 (c)**).

Detailed explanation of new clauses

New clause ACT 7 retains the title of the substituted clause—“Sustainability”.

The new note under the heading to new clause ACT 7 reiterates with enhanced wording the substituted note.

Clause ACT 7.1.1 (Application of Part 3.12) stipulates where BCA part 3.12 (which is about energy efficiency) must be applied to additions and extensions to buildings, and where it need not, and the alternative compliance requirements where BCA part 3.12 is not complied with. An intention is that BCA part 3.12 apply as far as practical and that where an aspect of BCA part 3.12 does not apply, clause ACT 7 provides alternative compliance requirements for the aspect that must be complied with.

Clause ACT 7.1.2 (Heating and cooling loads) permits the energy rating scheme and protocol mentioned in BCA clause 3.12.0.1 to apply to certain house extensions, or to part of a house that is less than the entire thermal envelope of the house. The BCA stipulates that the scheme and protocol mentioned in BCA clause 3.12.0.1 are intended to only apply to whole houses, not to only an addition or extension to a house, nor to part of a house that is less than the entire thermal envelope of the house. Clause ACT 7.1.2 overrides that restriction for house extensions.

The protocol and rating scheme are suitable to apply to attached houses to rate one or the other attached house separately. Thus, they can produce reasonably reliable information about an extension to a house if the extension is comparable to adding an additional house to the pre-existing house to form 2 attached houses.

If only an addition or extension to a house is rated, the rating is not necessarily a reflection of the house’s overall rating. Although area correction factors are included in relevant energy rating software, the accuracy of ratings can decrease with reduced size and number of rooms rated. Therefore, ACT 3.12.6.2 limits use of a rating to large additions or extensions, or smaller extensions that incorporate enough pre-existing floor areas to achieve at least a total of 100m² of floor area.

As the energy rating scheme mentioned in BCA clause 3.12.0.1 is intended to apply to a whole building, an assessment using the prescribed software in its regulatory mode must include a kitchen zone. In order to avoid the pretence of applying false heating and cooling loads to a zone, clause ACT 3.12.6.2 is limited to house additions or extensions containing a kitchen in the rated area. This can include a pre-existing or new kitchen area.

Clause ACT 3.12.6.2 permits small parts of a pre-existing house to be incorporated into the addition or extension, to take account of draft-proof barriers that are not located at the interface between the pre-existing building and the addition or extension. The clause stipulates that the construction details of any pre-existing part incorporated into an addition or extension for rating purposes must not be assessed as having the same relevant details as the remainder of the addition or extension unless they are actually the same in both. For example, if the pre-existing part is bounded by an internal wall with no bulk thermal insulation added, that wall must not be assessed as having the same properties as the remainder of the insulated bounding walls, unless they actually have the same properties, (see Figure ACT 7.1.1 in the determination).

Clause ACT 7.1.2 (d) is intended to act as a regulatory ratchet mechanism, preventing the energy efficiency of a house from being lowered beyond the prescribed minimum by the effects of a house extension or alteration.

Clause ACT 7.1.3 addresses the problem of applying the BCA's elemental provisions to a house extension that opens onto the unaltered part of a less energy efficient house. The BCA's elemental provisions are an alternative to demonstrating compliance with a house energy rating report, and include requirements to include stated minimum levels of thermal insulation in elements such as walls, roofs and floors, and to seal the building, and for windows to achieve a stated minimum level of thermal performance. Clause ACT 7.1.3 makes it clear that the BCA requirement to achieve a continuous thermal barrier does not apply to an open interface between the unaltered part of the building and the extension to the building.

Clause ACT 7.1.4 (a) enables the enhanced thermal performance of certain window treatments to be taken account of when assessing the thermal performance of certain pre-existing windows. The respective enhanced levels are stated in Table ACT 7.1.4.1. To use Table ACT 7.1.4.1, the total U-Value (thermal conductance) of the glazing unit, or its R Value (thermal insulation, which is the inverse of the total U-value) is selected from the left of the table. Higher performing windows have a lower total U-Value. The window treatment that the glazing unit has, or will have, is referenced across the top of the table, and under it corresponding to the glazing unit's total U-value (or its R value) appears the enhanced total U-value for the glazing unit with the window treatment. The notes to the table describe key characteristics of the stated window treatments (blinds, curtains, heavy drapes, and pelmets).

Clause ACT 7.1.4 (b) applies certain dispensations from the *Building (General) Regulation 2008* to certain pre-existing windows that must be assessed to determine BCA compliance. Those dispensations include the provisions of *Building (General) Regulation 2008*, section 29 (1), which are about windows not having to comply with the BCA if they have the prescribed solar control film applied, and section 29 (2), which is about isolated windows not having to comply with the BCA if they are thermally separated from windows that have to be assessed.

Clause ACT 7.1.4 (c) allows the use of the ABCB glazing calculator that was applicable immediately before or after commencement of BCA 2010, to determine window thermal performance compliance where northerly orientated glazing is impractical to provide in a house extension. The ABCB glazing calculators published for BCA 2010 is more strict on requiring northerly glazing than the previous calculator. To offset the lack of northerly glazing, and the use of a glazing calculator less strict than the one for BCA 2010, clause ACT 7.1.4 (c) (iv) requires thermal insulation has been added to the roof of the unaltered part of the building, as per BCA clause 3.12.1.2, as it applies to roofs with an upper surface solar absorptance value of not more than 0.4. The intention is that that absorptance factor can be used regardless of the actual absorptance factor, to reduce the potential cost and impracticalities of providing that insulation.

Industry has indicated that the effect of clause ACT 7.1.4 will be the most effective measure for resolving problems with making southerly orientated houses extensions comply with BCA 2010. Site constraints can force extensions to have a southerly orientation. For example, a pre-existing house that has a northerly aspect and occupies all the available northerly frontage of the land only has its southerly aspect available to extend the house at ground level, and any opportunity to incorporate northerly windows

in such a southerly extension are often overshadowed by the pre-existing part of the house, reducing or preventing, solar penetration.