

Residential sustainability measures

This updates the previous Practice Note 2008-55 issued May 2008

Reference to the **BCA in this Practice Note means Volume One and Two of the National Construction Code series.**

PART A GENERAL REQUIREMENTS AND NEW DWELLINGS

(1) SUMMARY

This Practice Note applies to Class 1 and 2 buildings and a Class 4 part of a building only. It provides advice about Victoria's 6 Star Standard, together with options for compliance.

(2) REQUIREMENTS

For Class 1 buildings, the BCA provides a number of options to demonstrate compliance with the performance requirements. Compliance with the performance requirement can only be achieved by complying with the Deemed to Satisfy (DTS) provisions or by formulating an Alternative Solution which complies with the performance requirements or is shown to be at least equivalent to the deemed to satisfy provisions.

(2.1) New Class 1 Buildings – options for compliance

i. DTS provisions

Under the DTS provisions of the BCA, new Class 1 buildings are required to comply with the acceptable construction practice or manuals in Part 3.12. There are two options for compliance:

1. 3.12.0.1 (i) - using House Energy Rating Software (HERS) and the relevant parts of 3.12
2. 3.12.0.1 (ii) – Elemental DTS parts 3.12.1 - 3.12.4 & relevant parts of 3.12.5

Refer to Appendix 2

ii. Using the Verification Method using a reference building Part V2.6.2.2

(2.2) Rainwater tanks and solar hot water heater systems

Both the DTS and the Verification Method require that new Class 1 buildings also require¹:

- i. A rainwater tank receiving rainfall from a minimum catchment area of 50 square metres and having a minimum capacity of 2000 litres connected to all toilets in the building for the purpose of sanitary flushing, or

¹Plumbing work must comply with the *Plumbing Regulations 2008* Technical information about these plumbing options can be found on the Plumbing Industry Commission's website <http://www.pic.vic.gov.au>

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ii. A solar water heater system.

In either case, documentation must be provided to the relevant building surveyor (RBS) to ensure compliance.

Where a solar water heater system is the chosen compliance option and a reticulated gas supply is available for connection to the building, the system must be a gas boosted solar water heater.

A list of solar water heater systems which meet the requirements is available on the Sustainability Victoria website.

<http://www.sustainability.vic.gov.au/www/html/2025-compliant-solar-hot-water-systems.asp>

(2.3) Class 2 and 4 parts of buildings

BCA section J0.2 requires that the sole-occupancy units (SOU's) of a Class 2 building must collectively achieve an average of not less than a 6 Star rating and each individual SOU is to achieve a rating of not less than 5 stars using a HERS that complies with the ABCB protocol.

BCA construction requirements for thermal breaks, insulation and building sealing for the SOU must also be complied with. The remainder of the building (common areas passageways, plant rooms etc) and services provisions must comply with the relevant provisions of Part J. Refer to Appendix 3.

A Class 4 part of a building must achieve a minimum star rating of 6 using a HERS that complies with the ABCB protocol.

There is no requirement to install a rainwater tank or solar water heater system in a Class 2 building or Class 4 part of a building.

(2.4) Detailed plans to be provided by building designers, architects, and draftspersons.

Regulation 302 of the Building Regulations 2006 (the Regulations) sets out the minimum information that applicants need to provide to the RBS when applying for the building permit. It specifies that any reports or computations that show compliance with the Building Act 1993 (the Act) or the Regulations must be provided.

Building designers must provide sufficient information on plans to enable the RBS to determine that the application complies with the Regulations.

This requires designers to provide detailed plans and specifications. For example, window schedules will require specific details. This will include glass type, frame type, U-values, SHGC values, orientation sector, and a copy of the glazing computations. If used, a copy of glazing calculator results must also be included. It is not the responsibility of the RBS to use the glazing calculator. This information must be provided by the building designer in the building permit application documentation.

Building designers should limit the use of general notes. A note such as "The builder is to ensure compliance with BCA Part 3.12" is not appropriate. The design and specifications must clearly demonstrate full compliance.

Ensuring the appropriate details are provided on the plans enables the RBS to ensure compliance is achieved in order to issue the building permit. This also ensures that the builder can construct the building in accordance with the approved building permit documentation.

(2.5) Relevant Building Surveyor role in assessing plans

The RBS has a responsibility to ensure that the building permit application contains sufficient information to determine compliance with the Act and the Regulations. Where the RBS is not satisfied that the appropriate information has been provided they must not issue the building permit and should request further information to be provided. It is not appropriate that the RBS "mark-up" plans or accept notes on plans that are too general.

The RBS should also limit the use of conditions on the building permit. Reliance on general conditions such as the example previously provided is a failure of the RBS to ensure that compliance with the Act and the Regulations has been achieved prior to issuing the building permit.

²The term "residential thermal performance assessor" is accepted nationally and used by the ABCB meaning a person assessing the thermal performance of a building.

(3) APPLYING THE ENERGY STANDARDS

(3.1) Building permit

As noted earlier, it is the applicant's responsibility to provide the RBS with evidence that the proposed building design will meet the DTS requirements of Part 3.12 or show compliance with the relevant performance requirements.

If an energy rating is provided then an accredited residential thermal performance assessor² must stamp the plans, recording the energy rating and their accreditation number, which are to be submitted with the application for a building permit.

For new Class 1 buildings, the applicant must separately provide details of any rainwater tank or solar water heater system, including size and location of rainwater tank and the type and size of solar water heater system to be installed. This will assist the RBS in checking compliance and ensuring that any possible effects on the structure have been considered.

(3.2) Averaging ratings for Class 2 buildings

The sole occupancy units (SOU) of a class 2 building must collectively achieve an average energy rating of not less than 6 Stars and individually achieve an energy rating of not less than 5 Stars.

(3.3) Ratings of dwellings adjacent to vacant allotments

House energy ratings must include details of existing adjacent buildings and structures on neighbouring allotments, which overshadow windows of the building being rated. However, trees, shrubs and other landscaping are not required to be considered.

(3.4) Occupancy permit

During the building process, the RBS may choose to carry out additional inspections to ensure that the dwelling is constructed in accordance with the requirements of the approved HERS report or BCA Part 3.12 where used.

The RBS may, if necessary, request that the builder provide a statement of compliance regarding sustainability matters.

Where an application for an occupancy permit has been submitted to the RBS and the only matters not complying relate to energy efficiency, then the RBS has two options:

- Refuse to issue an occupancy permit
- Issue an occupancy with conditions, **or**
- Issue an occupancy permit concurrently with a building notice or order.

Where a rainwater tank or a solar water heater system is installed, the RBS must see a copy of the plumber's compliance certificate issued under section 221ZH of the Act before an occupancy permit can be issued.

The RBS should site all plumbing compliance certificates before an occupancy permit is issued.

(4) COMPLIANCE OPTIONS

(4.1) Performance-based BCA

The 6 Star Standard is implemented through the BCA. The BCA is a performance based building code. Compliance with the BCA can be achieved by complying with the prescriptive requirements of the DTS or by developing an Alternative Solution, using the verification method which demonstrates that the proposal meets the relevant performance requirement/s.

Building practitioners choosing to develop an Alternative Solution should ensure an appropriate Assessment Method is used.

(4.2) Building Appeals Board

The Building Appeals Board (BAB) is an independent statutory body established under the Act. The BAB hears appeals and disputes in relation to building control matters and can waive, modify or vary the provisions of the Regulations and the BCA based upon the particular case. The BAB can consider provisions relating to the residential sustainability measures in the BCA. Further information on the BAB is contained in Practice Note 2011-39.

(5) SOFTWARE

(5.1) Approved software

Under the BCA Volume One for Class 2 (SOU), Class 4 part of a building and BCA Volume Two for Class 1 energy rating must be determined using a thermal calculation method that complies with the ABCB Protocol for House Energy Rating Software Version 2006.1. A thermal calculation method is defined as a calculation method that identifies-

- i. a heating load, or
- ii. a cooling load, or
- iii. a heating and cooling load (annual energy load),

based on the sum of hourly loads or an equivalent approach.

For information about the house energy rating software and current versions of the software that meet the ABCB protocol refer to the following websites.

- www.hearne.com.au for AccuRate
- www.sustainability.vic.gov.au/FR5 for FirstRate5
- www.solarlogic.com.au for BERS Pro.

The use of other software may be accepted by the RBS as meeting the relevant performance requirement. The protocols require that a training program must be available for users. The training program must be applicable to the current version and any new version of the software as well as an understanding of the basic principles of residential building thermal performance. Evidence of training must state the software name and version.

(5.2) Using rating tools

The standard input assumptions made when rating the energy performance of a house are:

- That all windows have an internal covering installed which provides equivalent performance to a Holland (roller) blind.
- Where software requires the input of the size of gaps around window and door frames, these are assumed to be 'small'.
- That all floors are carpeted, except where alternative floor coverings are specified.

For users of FirstRate, ratings in 'Regulation Mode' will automatically input the first two assumptions. However, areas of carpet and hard floor surface must be entered manually.

(5.3) Limitations of energy rating software

It is not possible to take into account every feature of dwelling design with the currently approved software, although over 99 per cent of all dwellings currently constructed can be rated in this way. The following design features cannot be rated with the currently approved software:

- earth bermed walls
- trombe walls (utilising masonry or water tanks for storing radiant heat gains)
- solar heated rock storage
- insulating shutters on windows.

In cases where dwellings contain such features an Alternative Solution will need to be provided.

(5.4) Accreditation of residential thermal performance assessors

HERs must be prepared by persons accredited in the use of the rating tool. Residential thermal performance assessors require separate accreditation for each rating tool they use.

Currently organisations such as Association of Building Sustainability Assessors (ABSA) and Building Designers Association Victoria (BDAV) provide the accreditation. A list of accredited assessors and the specific energy rating tools they are accredited to use is listed on their websites.

- www.absa.net.au
- www.bdav.org.au

The list is also available on Sustainability Victoria's website along with information on how to become a Thermal Performance Assessor.

- www.sustainability.vic.gov.au

The assessor will need to provide a report and stamp the plans accordingly. In the event that the design does not meet the required minimum standard, the assessor may suggest alternatives to improve building performance. Any alterations or changes made to plans will need to be re assessed and approved by the assessor.

(5.5) Victorian climate zones

The energy rating tools include 11 climate zones for Victoria, Melbourne is divided into 3 climate zones: Tullamarine (climate 60), Melbourne RO (climate 21) and Moorabbin Airport (climate 62).

To assist builders who construct homes across metropolitan Melbourne, residential thermal performance assessors and the RBS are advised that, when using the energy rating tools, there are two options for the houses to be constructed in climate zones 62 (Moorabbin Airport) and 21 (Melbourne RO):

- either choose the correct climate zone for the postcode in which the dwelling will be constructed, or
- alternatively the 'Tullamarine' climate zone (climate 60) can be chosen as the default climate zone for houses constructed in the Melbourne metropolitan region.

(6) ALTERNATIVES TO RAINWATER TANKS

As an alternative to the installation of rainwater tanks an RBS may consider the use of Grey water treatment systems or Dual water reticulation and water recycling systems connected to toilet flushing systems as an approach to approve a 6 Star rated house design.

There are no DTS provisions for the design of Greywater treatment systems that can be connected and used for toilet flushing or Dual water reticulation and water recycling systems. Therefore compliance can only be achieved by formulating an Alternative Solution that complies with the performance requirement of the BCA and submitting to the RBS for consideration.

To assist in formulating an Alternative Solution, refer to *Technical Solution 91.02 Grey or recycled water (Non-drinking water supply)* available on the Plumbing Industry Commission website.

(6.1) Dual water reticulation and water recycling systems

Dual water reticulation and water recycling systems provide a source of recycled water and include a recycled water main, as well as a drinking water main. This is often referred to as a 'dual supply' system or previously as a 'third pipe' system.

Typically, the water will come from one of Melbourne's major sewerage treatment plants, but supply is also possible from smaller localised treatment plants. The recycled water must be supplied by the Responsible Water Authority and must only be used for approved purposes, including toilet flushing and garden watering. Contact your Relevant Water Authority for a confirmation of their approved purposes.

Some new housing estates are currently incorporating this type of system.

Analysis by Sustainability Victoria confirms that a dual water reticulation system will provide equivalent or better performance than a rainwater tank, in terms of water conservation, when the systems are connected to domestic sanitary flushing systems. Dual water reticulation systems conserve drinking water more effectively than rainwater tanks, as they are more reliable, regardless of rainfall and are also available for garden use.

³Note the use of greywater in a clothes washing machine may require the relevant Water Authorities approval.

In some housing sub-divisions, it is proposed that rainwater is collected from the roof of each home and piped via a holding basin to a treatment plant operated by the water authority. The treated rainwater is then piped back through the mains drinking water system to each home.

(6.2) Greywater treatment systems

Greywater is the waste water from your washing machine, laundry trough, shower, hand basin, and bath - excluding the waste water from your kitchen and toilet.

Note: Untreated grey water must not be stored for more than 24 hours.

There are two main options for greywater re-use, installing a domestic greywater treatment system or direct diversion to the garden.

(6.2.1) Domestic grey water system

A domestic grey water system is a system that collects, stores and then treats greywater to a water quality which allows the treated water to be used for toilet flushing and in clothes washing machines³.

(6.2.2) Greywater - Direct diversion

This system is when grey water is diverted directly to a garden. This is the cheaper option, but it restricts use. Diverted grey water cannot be stored for more than 24 hours, must not be connected to sanitary flushing systems and can only be diverted through subsoil absorption system. This system cannot be used as an Alternative Solution.

The design and installation of Dual water reticulation and water recycling systems and grey water systems must comply with the *Plumbing Regulations 2008*.

7. GENERAL INFORMATION ON INSULATION

(7.1) Reflective foil insulation products

Reflective foil only provides an insulating effect when it faces an air space, because it works by reducing radiant heat flow across this air space. If reflective foil does not face an air space it does not have an R value.

Reflective foil must be used in conjunction with an air space and air must not be allowed to leak from one side of the foil to another. Particular care must be taken during construction, to ensure that all penetrations through the foil and joins are effectively sealed by taping around the joins and penetrations.

Reflective foil product tests often show the R value of the whole building element, whereas bulk insulation tests usually show the R value of the insulation alone.

(7.2) Bulk insulation products

Loose fill products will typically settle after a few years to provide a lower depth than originally installed,

Batt and blanket products can suffer significant degradation of their R-value through poor installation. To maintain the effectiveness of the insulation products builders must ensure that:

- Insulation fits snugly against all framing members and that where gaps exist, off-cuts of batts are used to fill these gaps;

- Bulk insulation is not compressed. Note: It is important that the width of insulation provided in a wall frame matches the width of the stud; and
- Insulation placed near lamps, luminaires and associated transformers is installed in accordance with the electrical safety alert, Installation of bulk thermal insulation around electrical equipment and accessories, published by Energy Safe Victoria
- Insulation must comply with AS/NZS 4859.1.

(7.3) Sealing of gaps and cracks

Gaps and cracks in buildings can contribute significantly to the inefficient use of heating and cooling systems therefore it is important that they are adequately sealed.

In addition to using the the House Energy Rating software the following BCA provisions [Part 3.12.3] must be met.

Seals are to be provided to:

- chimney and flues
- roof lights
- around external doors and windows and
- exhaust fans.

Sealing can also be achieved by providing close fitting internal lining systems at the ceiling, wall and floor junctions or by caulking, skirting architraves and cornices or the like.

(8) GENERAL INFORMATION ABOUT ARTIFICIAL LIGHTING

(8.1) Artificial lighting

The BCA 2011 incorporates provisions to address artificial lighting. It provides for the maximum power that will be consumed by the lights in a space including any lamps, ballasts current regulators and control device in (W/m^2). BCA Part 3.12.5.5 sets out the requirements for artificial lighting.

3.12.5.5 requires the lamp power density or illumination power density of artificial lighting not to exceed

- in a class 1 building , $5 W/m^2$
- on a verandah or balcony attached to the class 1, $4 W/m^2$
- in a class 10 building $3 W/m^2$.

It will be important that designers provided the RBS sufficient details of electrical layout and fittings so that the RBS can ensure that Performance Requirement P2.6.2 is complied with.

When using a HER tool the provisions of 3.12.5.5 must still be addressed as they are not assessed by the rating tools.

Refer to Volume One BCA J6.2 for similar provisions for Class 2 (SOU) and class 4 parts of a building.

PART B

APPLYING RESIDENTIAL SUSTAINABILITY MEASURES TO ALTERATIONS AND RELOCATION OF DWELLINGS

(9) SPECIFIC REQUIREMENTS FOR ALTERATIONS TO DWELLINGS

(9.1) Summary

Alterations to Class 1 buildings and Class10a buildings with a conditioned space constructed in accordance with the Victorian energy efficiency measures prior to the 5 Star Standard, i.e. pre 1 July 2004, are required to comply with the Performance Requirements P2.6.1 and P2.6.2 of the BCA Volume Two.

From 1 May 2011, this can include the use of the Deemed to Satisfy (DTS) requirements of Part 3.12, or using an Alternative Solution. The Verification Method V2.6.2.2 or other Assessment Methods may be used to assess the Alternative Solution.

The Deemed to Satisfy (DTS) provisions of BCA Part 3.12 include:

- 3.12.0.1 (i) - using House Energy Rating Software (HERS) and the relevant parts of 3.12
- 3.12.0.1 (ii) – Elemental DTS parts 3.12.1 - 3.12.4 & relevant parts of 3.12.5

Refer to Appendix 2.

Installation of a rainwater tank or solar water heater system is not required when undertaking an alteration to an existing dwelling.

Class 1 buildings constructed to the 5 or 6 Star Standard i.e. post 1 July 2004.

Alterations to a building assessed under the 6 Star Standard must ensure that the existing 4, 5 or 6 star House Energy Rating (HER) of the existing building is maintained.

It is not appropriate to use a HER to determine the rating of the home and then assess an extension using the DTS provisions. An alteration or addition must be assessed using the particular tool (HER software or DTS) for which the building was assessed prior to when the building was first constructed.

Similarly, an alteration to an existing building previously assessed under the DTS provisions of Part 3.12 should be assessed by the same method.

(9.2) Regulation 608 and partial compliance

Regulation 608 of the *Building Regulations 2006* (the Regulations) applies to alterations to an existing building and requires that building work to alter an existing building must comply with the Regulations.

Regulation 608 also requires an entire building to comply with the Regulations where the volume of the proposed alterations, together with any other alterations completed or permitted within the previous 3 years represents more than 50 per cent of the original volume of the building.

Regulation 608 also provides that the RBS has discretionary power to consent to partial compliance with the Regulations in certain circumstances. This does not mean that the RBS can allow non compliance. When considering partial compliance the RBS must take the following into account:

- i. the structural adequacy of the building, and
- ii. the requirements necessary to make reasonable provision for-
 - a. the amenity of the building and the safety and health of people using the building, and
 - b. avoiding the spread of fire to or from any adjoining building.

The circumstances where the relevant building surveyor can accept partial compliance are:

- Any part of the building work to alter an existing building is an extension that is not greater than the lesser of:
 - a. 25% of the floor area of the existing building, or
 - b. 1000m².
- Any alteration that represents more than 50% of the original volume of the building, including any alterations carried out in the previous 3 years. The discretion to allow partial compliance applies to both the building work associated with the alteration and the requirement to bring the remainder of the building into full compliance.

There is no discretion to allow partial compliance where the alteration is an extension to an existing building and the floor area of the extension is greater than a) and b) above. The requirement for full compliance only applies to the extension and has no impact on the existing building unless the volume of the alteration exceeds 50 per cent of the volume of the original building.

A summary of the requirements of Regulation 608 and where the RBS has discretion to allow partial compliance is included in Appendix 1.

Section 28 of the Act and regulations 502, 503, 609 and 1011 provide the RBS with other discretionary powers related to partial compliance.

Where alterations constructed using concrete panels, cavity brick, earthwall construction, and ashlar stone or other masonry walls including any cavity, the RBS will need to be provided with sufficient information to determine the R-value of the wall system.

Calculation of Volume and Floor Area

When calculating volume for the purposes of Regulation 608, the volume of the building includes the space above the sub-floor defined by:

- External walls
- Roof space and roof structure
- Verandas and other roofed structures.

Sub-floor below floor framing areas are not included except for rooms, garages etc that are enclosed by walls, floor and roof/ceiling.

BCA Volume Two includes a definition of floor area. Part 1.1 defines floor area as the area measured within the finished surfaces of the walls and includes the area occupied by any cupboard or other built-in furniture, fixture or fitting.

Satellite Habitable Buildings

Buildings such as a sleepout, bungalow or dependable persons unit are assessed as an alteration to the existing dwelling. There is currently no requirement to install solar water heater systems or rainwater tanks to these structures.

(9.3) Regulation 608 – What is reasonable?

When deciding whether to permit partial compliance under regulation 608, the RBS should consider how reasonable full compliance would be in a particular instance, along with the likely cost and benefit.

The Macquarie Dictionary defines “reasonable” as “agreeable to reason or sound judgment”. The RBS should apply their own judgement (using their qualifications and experience) to the specific matters being assessed. In some instances the RBS will need to seek the advice of other suitably qualified practitioners or industry experts in determining the acceptability or otherwise of a specific building, element of construction or use⁴.

The energy efficiency provisions have been developed on a basis of saving energy and long-term cost effectiveness for the building owner. On the same basis, when determining whether a dispensation from the energy efficiency provisions should be granted, it may be reasonable to ask “Is it cost effective?”

(9.3.1) Applying Part 3.12 Deemed to Satisfy Elemental provisions

Building fabric

Where a building is being extended, the fabric of the extension should fully comply with the BCA fabric provisions. Partial compliance may be considered where the extension is relatively small (i.e. less than 25 per cent or 1000m² whichever is the lesser).

Where the new work includes replacement of existing elements, such as roof cladding, wall cladding or wall lining, compliance with the BCA fabric provisions should be achieved. However, if the roof cladding, wall cladding or wall lining is only being repaired, then it may be unreasonable to require this to be removed, solely to install new insulation.

Fully compliant ceiling insulation should be installed wherever there is access to the roof space.

External glazing

Where an existing building is being extended, the glazing in the extension should comply with the BCA glazing provisions [Part 3.12.2].

⁴In addition, Minister’s Guideline MG/05 states “Municipal building surveyors and private building surveyors must only accept appointment as relevant building surveyors in the area of their own competence.”

However, this is complicated by the fact that the glazing provisions are determined on the basis of the whole storey.

This means that the existing glazing also needs to be considered. In some cases, it may be unreasonable for new glazing in an extension to compensate for the poor performance of existing glazing. In this instance, it would be reasonable to determine compliance by applying the performance of the new glazing uniformly to the whole storey but only require the complying glazing to the extension.

If all the existing glazing in a building is being replaced, then the new glazing should comply with the current BCA glazing provisions.

Shading is integral to glazing performance. However, there may be site constraints or planning requirements that prevent external shading being added to an existing building. In such instances, higher performance glazing elements may need to be used but may be more costly. It would therefore be "reasonable" to allow a reduced level of glazing performance, where such constraints on shading exist. This only applies to the existing building not the extension.

Building sealing

An extension should be sealed in accordance with the BCA sealing provisions [Part 3.12.3]. If an existing room is being extended, the need for sealing may depend upon its condition. Sealing of an existing room is an all-or-nothing matter. If the existing part is not sealed – having large areas of unsealed louvred glazing, for example – then there may be little benefit in sealing the new part. In the case of a new extension to an existing unsealed building, a practical approach may be to accommodate the different amounts of sealing in the new and existing parts of the building by installing sealed doors between the two parts. The final decision should be based on the relative size of the extension and the extent to which the existing part is unsealed. However if sealing is practical and achievable it should be undertaken.

Air movement

The BCA air movement provisions [Part 3.12.4] generally require two openings in a room, or a breeze path through to another room. In the case of some extensions, it may not be possible to comply with these requirements – for example, where there is insufficient room for the two openings to be installed in the external wall and the existing building does not have complying breeze paths.

Services

New building work must comply with Performance Requirement P2.6.2. for Services.

Victoria does not call up Part 3.12.5.0 of the BCA. Plumbing work must comply with the *Plumbing Regulations 2008* Technical information about these provisions can be found on the Plumbing Industry Commission's website www.pic.vic.gov.au.

Parts 3.12.5.1 to 3.12.5.3 set out the requirements for the insulation of services, central heating water piping and heating and cooling ductwork. Whether using HER software or applying other parts of 3.12.5, insulation for service piping and ductwork must be provided.

It is important the designers provide the RBS sufficient details of piping and ductwork insulation so that the RBS can ensure that Performance Requirement P2.6.2 is complied with.

Artificial lighting

The alteration or extension should comply with the BCA artificial lighting provisions. It would be unreasonable to change existing light fittings unless the alterations include the complete re wiring of the building. Part 3.12.5.5 sets out the requirements for artificial lighting.

It will be important that designers provided the RBS sufficient details of electrical layout and fittings so that the RBS can ensure that Performance Requirement P2.6.2 is complied with.

(9.3.2) Using HER software

Where an alteration (including an addition) is being proposed to an existing building and it is intended to use HER software for assessing the alteration, it may be necessary to submit two HERs to the RBS.

Where alterations are proposed, the dwelling must be assessed as a whole but the current star rating requirements will only need to apply to the new building work subject to regulation 608.

Unless documentary evidence of a current HER of the existing house can be provided, an initial HER will need to be obtained for the existing building as constructed and a second HER for the whole building design incorporating the proposed building work. The need for two HERs is explained further below.

It would not be necessary to submit two HERs if it was intended to upgrade the entire building to the current requirement. In that case only the assessment of the proposed design would be necessary.

Existing houses with no previous HER rating

In cases where the existing dwelling does not have a HER it would usually be more practical to use the DTS elemental provisions than HER software.

However, if using HER software to assess an alteration or addition to an existing dwelling that has not previously been assessed using HER software it will be necessary to provide two HERs to the RBS.

The first HER would assess the existing building as constructed to determine what star rating it currently meets and the second HER would use this first star rating and the required star rating for the new building work to determine the proposed star rating for the whole building design incorporating the proposed building work using the approach set out below.

Existing dwelling previously assessed using HER software

A simple formula can be used to determine that alterations and additions achieve the required star rating.

It is based on the assumption that the star rating and the volume of the building are linearly related.

For an addition/extension, the formula is:

$$\frac{(V_e \times S_{Re}) + (V_n \times S_{Rn})}{(V_e + V_n)} = S_{Rr}$$

where,

V_e = Existing dwelling volume,
 V_n = New work volume

S_{Re} = Existing house Star rating

S_{Rn} = new house star rating

S_{Rr} = star rating required

For example, if

$$V_e = 360 \text{ m}^3$$

$$V_n = 96 \text{ m}^3$$

$$S_{Re} = 5.0 \text{ stars}$$

$$S_{Rn} = 6.0 \text{ stars}$$

The required overall star rating,

S_{Rr}

$$= \frac{(360 \times 5.0) + (96 \times 6.0)}{(360 + 96)} = 5.21$$

For alterations to an existing dwelling including an addition, the formula becomes:

$$\frac{[(V_e - V_{ni}) \times S_{Re}] + (V_n + V_{ni}) \times S_{Rn}}{(V_e + V_n)} = S_{Rr}$$

including the additional factor,

V_{ni} = Volume of new internal work

Note: 'Volume of new internal work' is the volume of the spaces where the proposed works are to be undertaken. For example, installing an en-suite to the master bedroom, including re-lining internal walls and new windows throughout - the volume would include the en-suite and master bedroom spaces, and the volume of internal walls being re lined and the volume of all external walls.

(10) ALTERNATIVE SOLUTIONS FOR ALTERATIONS INSTALLING RAINWATER TANKS OR SOLAR HOT WATER SYSTEMS

The BCA only requires the installation of rainwater tank for toilet flushing or a solar hot water system to be installed in a new Class 1 building.

Where an alteration is proposed to an existing building and the RBS is considering compliance under regulation 608, the RBS may consider the installation of either a rain water tank or the solar hot water system as an Alternative Solution to achieve compliance if they are satisfied that the proposal satisfies the requirement of the Performance Requirement P2.6.1 or P2.6.2.

Example: if the cost to adequately seal around all the existing windows and doors outweighs the benefits for the proposed energy savings, the RBS could consider an Alternative Solution for the installation of a solar hot water system provided it can be justified a saving can be achieved and the system meets the requirements of BCA 3.12.5.6.

However, the use of a rainwater tank cannot be used as an Alternative Solution to justify an energy efficiency savings requirement.

(11) RELOCATED AND PREFABRICATED HOMES

(11.1) Relocated homes

The definition of 'alteration' in the Regulations means "construction in relation to an existing building" includes building work to an existing building. An existing dwelling moved from one allotment to another or relocated on the same allotment is considered an alteration to the dwelling exceeding the 50% volume trigger. This means that the RBS has discretion to allow partial compliance under regulation 608. It is recognised that there are sometimes limited opportunities to improve the thermal performance of an existing building where it is being relocated in its original condition.

However, wherever possible, compliance with the DTS provisions should be achieved. As a minimum, required levels of insulation should be installed in ceilings, walls and floor if there is access to do this. Sealing of windows and doors should be undertaken and if windows are to be replaced, then thermally efficient windows should be provided.

This does not prevent the owner of the property using best practice principals. Section 8 of this Practice Note outlines some basic requirements when altering a home. These principals should be applied to a home that is re-erected.

(11.2) Prefabricated kit homes

Homes that are prefabricated in a factory, whether they are fully assembled or delivered to site as "flat pack" kits are required to comply with the Regulations as they are new dwellings. This means that the design will either have been assessed using either HER software or the elemental DTS provisions to achieve a 6star rating, or sufficient evidence provided that the design will meet the performance requirements of the BCA. (i.e. verification method) These homes will also require the installation of either a solar hot water system or rainwater tank.

(12) NON-REGULATORY MATTERS

Designers, builders and to some extent building surveyors are in a position to encourage greater sustainability measures than those required by the Regulations in their capacity to influence consumers. Although the Regulations do not require the installation of rainwater tanks or solar hot water systems, where alterations are proposed, owners should be encouraged to consider installing these items and potentially take advantage of rebate systems that apply.

Where major plumbing work is proposed and which includes a new hot water service installation, the owner should also be encouraged to consider installing a solar hot water system.

Where new stormwater plumbing work is proposed, such as new spouting and/or downpipes, an owner should again be encouraged to install a rainwater tank at the same time. The rainwater tank should comply with the minimum plumbing requirements for new dwellings and be connected to any new sanitary flushing systems.

(13) PHASING OUT GREENHOUSE-INTENSIVE HOT WATER SYSTEMS

The Australian Government and state and territory governments are working together to phase out greenhouse-intensive hot water systems, starting in 2010. The phase-out will apply in all states and territories except Tasmania.

Conventional residential electric hot water systems produce about four tonnes of carbon dioxide per year, up to three times that of more efficient technologies. By phasing out greenhouse-intensive water heaters, greenhouse gas emissions can be reduced by about 51 million tonnes in the period from 2010 to 2020. This is equivalent to taking 1.4 million cars off the road for 10 years. It may also help householders save money on their electricity bills.

Stage 1

The phase-out of greenhouse-intensive electric hot water systems is being implemented on a state-by-state basis for new and existing homes where such requirements do not currently exist. The BCA requires that in all new homes a water heater in a hot water supply system must be provided and comply with part 3.12.5.6.

Installations of hot water systems in new and existing homes will be regulated through the *Plumbing Regulations 2008* and Volume 3 of the National Construction Code series, the Plumbing Code of Australia.

(14) USEFUL CONTACTS AND REFERENCES

For further information on the 6 Star Standard, plumbing standards, or energy efficient design in general, please contact the following organisations:

Websites

- Building Commission
www.buildingcommission.com.au
- Plumbing Industry Commission
www.pic.vic.gov.au
- Sustainability Victoria
www.sustainability.vic.gov.au
- Energy Safe Victoria
www.esv.vic.gov.au
- Your Home
www.greenhouse.gov.au/yourhome

The Sustainability Victoria site also has details on:

- FirstRate training institutions,
- FirstRate software — cost, suppliers and obtaining a demo version,
- Compliant Solar Water Heaters.



If you have a technical enquiry please email technicalenquiry@buildingcommission.com.au or phone 1300 815 127

**Building Commission
733 Bourke Street
Docklands VIC 3008**

APPENDIX 1

Regulation 608 application to alterations and additions

Type of work	Compliance Required	Entire building to comply?	RBS discretion
Building alteration work including extensions less than (the lesser of) 1000m ² or 25 per cent of existing floor area	Y	N*	Y
Building alteration work that exceeds the 50 per cent volume rule (including the re-erection of an existing building)	Y	Y	Y [^] (discretion applies to compliance of both the alteration work and the remainder of the building)
Building alteration work that is an extension of floor area greater than the lesser of 25 per cent of floor area of the existing building or 1,000 m ²	Y	N*	N

* Subject to the alteration not triggering the 50 per cent rule

[^] If the alteration includes an extension that exceeds the size described in the row below, the discretion only applies to the requirement to bring the remainder of the building into compliance.

APPENDIX 2

ENERGY EFFICIENCY FOR NEW CLASS 1 DWELLINGS

Victoria, Climate Zones 4, 6, 7 and 8

How will you meet P2.6.1 and P2.6.2?

Option 1

Using a software rating tool

Comply with:

- 6 Star rating minimum
- 3.12.1.1 Insulation installation requirements
- 3.12.1.2(c) Thermal breaks for a steel roof cladding to steel roof framing
- 3.12.1.4(b) Thermal breaks for lightweight cladding to steel wall framing
- 3.12.1.2(e) Compensating for ceiling insulation loss around exhaust fans, recessed downlights and flues
- 3.12.1.5(c) Concrete slab on ground insulation required in climate zone 8 and for in-slab heating or cooling
- 3.12.1.5(d) Concrete slab on ground insulation specifications
- 3.12.3 Building sealing and penetration sealing
- 3.12.5 Services excluding hot water heaters, includes:
 - » insulation of services,
 - » central heating water piping,
 - » heating and cooling ductwork,
 - » electrical resistance space heating,
 - » artificial lighting,
 - » heating and pumping of a swimming pool or spa pool

Option 2

Using DTS elemental provisions

Comply with:

- 3.12.1 Building Fabric
- 3.12.2 External Glazing
- 3.12.3 Building Sealing
- 3.12.4 Air Movement
- 3.12.5 Services (excluding hot water heaters)

Comply with Victorian Plumbing Regulation provisions:

Solar hot water service

or

Rainwater tank connected to all sanitary closet plans

Achieve compliance with Section 3.12 of the BCA

APPENDIX 3

ENERGY EFFICIENCY FOR NEW CLASS 2 DWELLINGS

Victoria, Climate Zones 4, 6, 7 and 8

How will you meet JP1, JP2 and JP3?

Within sole occupancy unit, Class 2 or Class 4 using a software rating tool

Comply with:

- Average energy rating for all sole occupancy units within the building of not less than 6 Stars
- Each sole occupancy unit must achieve a minimum energy rating of not less than 5 Stars
- J1.2 Insulation installation requirements
- J1.3(d) Thermal breaks for a steel roof cladding to steel roof framing
- J1.5(c) Thermal breaks for lightweight cladding to steel wall framing
- J1.3(c) Compensating for ceiling insulation loss around exhaust fans, recessed downlights and flues
- J1.6(c) Concrete slab on ground insulation required in climate zone 8 and for in-slab heating or cooling
- J1.6(d) Concrete slab on ground insulation specifications
- J3 Building sealing and penetration sealing.

Remainder of building not within a sole occupancy unit

Comply with Parts:

- J1 Building fabric
- J2 Glazing
- J3 Building sealing
- J5 Air-conditioning and ventilation systems
- J6 Artificial lighting and power
- J7 Hot water supply and swimming pool and spa pool plant
- J8 Access for maintenance and facilities for monitoring.

Achieve compliance with Section J of the BCA