

Energy Efficiency EE 03| Energy efficiency requirements for new residential buildings

Audience

The audience/s for this Practice Note include/s:

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| <input checked="" type="checkbox"/> Architects/ Designers | <input checked="" type="checkbox"/> Owner Builders |
| <input checked="" type="checkbox"/> Builders | <input type="checkbox"/> Plumbers |
| <input checked="" type="checkbox"/> Building Surveyors/ Inspectors | <input type="checkbox"/> Real estate management agents |
| <input type="checkbox"/> Engineers | <input type="checkbox"/> Trades and Maintenance (inc. Electricians) |
| <input checked="" type="checkbox"/> Home Owners / Residential Tenants | |

Purpose

This Practice Note provides guidance on the energy efficiency requirements for new residential buildings and compliance with the Building Act 1993, the Building Regulations 2018 and the National Construction Code 2022.



This Practice Note applies only to the NCC 2022 requirements. For Practitioners following the requirements of NCC 2019, please refer to Practice Note EE-03-2019.

For further information about transitional requirements please refer PN EE-05 Transitional Energy Efficiency Arrangements.

The content below provides guidance on:

- Class 1 building compliance requirements
- Deemed-to-Satisfy provisions for Class 1 buildings
- Performance solutions for Class 1 buildings
- Compliance requirements for Class 2 Sole Occupancy Units and Class 4 part of a building
- Nationwide House Energy Rating Scheme (NatHERS) compliance pathway
- Thermal Performance Assessors (TPAs)
- Domestic services
- Building permit application requirements
- Construction requirements
- Occupancy Permit



For information on the energy efficiency requirements for additions and alterations to existing Class 1 buildings, please refer to Building Practice Note EE-04: Applying energy efficiency measures to Alterations to existing residential buildings.



Abbreviations & Definitions

The abbreviations and definitions set out below are for guidance only. They are not intended to vary those set out in the Building Act 1993, the Building Regulations 2018 or the National Construction Code.

- **AAO** – Assessor Accrediting Organisation
- **ABCB** – Australian Building Codes Board
- **Act** – Building Act 1993
- **BAB** – Building Appeals Board
- **Domestic Services** – Includes the space heating and cooling equipment, water heaters, artificial lighting, swimming pool and spa pumps and on-site renewable energy systems (such as rooftop solar PV).
- **DtS** – Deemed-to-Satisfy
- **Energy Value** – The net cost to society including, but not limited to, costs to the building user, the environment and energy networks.
- **GHG** – Greenhouse gas
- **ICANZ** – Insulation Council of Australia and New Zealand
- **NatHERS** – Nationwide House Energy Rating Scheme
- **NCC** – National Construction Code
- **RBS** – Relevant Building Surveyor
- **Regulations** – Building Regulations 2018
- **SOU** – Sole-Occupancy Unit
- **VURB** – Verification Using a Reference Building

Background

Energy efficiency requirements for new homes, home renovations, alterations and additions are set out in the NCC. The aim of the energy efficiency requirements is to:

- reduce energy consumption and energy peak demand; and
- reduce greenhouse gas emissions; and
- improve occupant health and amenity.

The energy efficiency requirements achieve this by ensuring that buildings facilitate the efficient use of energy for artificial heating, cooling, lighting and other domestic services without compromising the quality of life, productivity and health.

Using good design principles can reduce GHG emissions, save energy, water and money, while creating more enjoyable and comfortable homes.



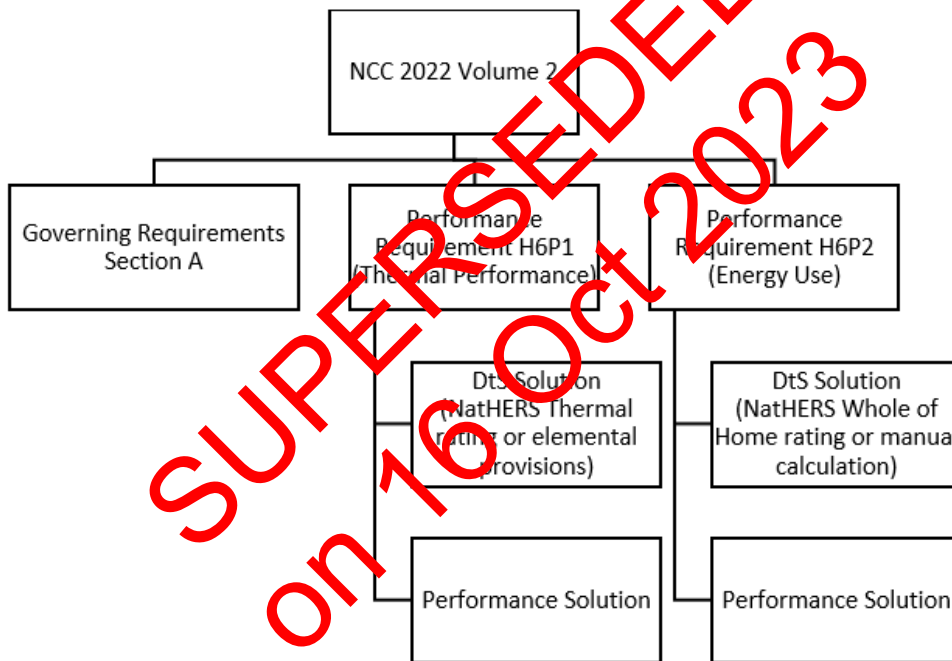
Class 1 building compliance requirements

Compliance with the NCC 2022 volume two energy efficiency provisions for Class 1 buildings is achieved by satisfying the Governing Requirements and performance requirements. The relevant performance requirements are H6P1 for thermal performance and H6P2 for energy usage, and can be satisfied through either:

- a DtS solution,
- a performance solution, or
- a combination of performance solution and DtS solution.

Both of the performance requirements (H6P1 and H6P2) need to be satisfied in order to achieve a compliant NCC outcome. It is not appropriate to combine both performance requirements into a single outcome. For example, using services or renewable energy (H6P2) to offset a building fabric (H6P1) requirement does not satisfy each performance requirement.

An overview of NCC 2022 compliance structure for energy efficiency is shown in Figure 1.



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Figure 1: Overview of NCC 2022 compliance for energy efficiency requirement in class 1 buildings

Performance requirement - H6P1 Thermal Performance

Performance requirement H6P1 requires that the habitable rooms and conditioned spaces of a building use less energy than the calculated heating load, cooling load and total thermal energy load. The intent is to enhance the building’s fabric in a way that minimises the need for additional heating and cooling inputs, which consequently reduces the amount of energy required to maintain a comfortable internal environment.

There is a significant change in NCC 2022 compared to previous NCC editions, with the introduction of quantified values for H6P1 performance requirement. This means there are now specific values for heating, cooling, and total energy load limits which can be calculated as set out in Specification 44.



Note that calculation using Specification 44 is not required in all situations, as the NCC creates a level of consistency between the quantified performance requirement, verification method, and DtS pathways. Therefore, a DtS solution that complies with the Governing Requirements of A2G3 does not require the calculation of Specification 44.

An example of where a calculation is needed is a performance solution under A2G2(1)(a) that demonstrates compliance directly with H6P1. In this case, the heating, cooling, and total energy load limits must be calculated in accordance with Specification 44 to quantify the value in which the performance solution needs to comply with.



Specification 44 of the NCC 2022 is only applicable when using certain performance solution pathways for compliance and is not required to be completed for a DtS solution.

Performance requirement - H6P2 Energy Usage

Performance requirement H6P2 sets the energy value requirement for of a building's domestic services, which includes heating and cooling systems, water heating, renewable energy equipment, lighting, and pool and spa pumps (where applicable). This places a cap on the building's annual energy use budget based on a societal cost of energy use.

The performance requirement includes consideration of the efficiency of domestic services, as well as the provision of onsite renewable energy equipment. This allows for outcomes that incorporate a tailored mix of efficient domestic services, with the provision of on-site renewable energy (such as rooftop solar PV) that can offset the overall energy value.



Calculation of the energy value of a domestic service under H6P2 is only applicable when using certain performance solution pathways for compliance and is not required to be completed for a DtS solution.

Deemed-to-Satisfy Provisions for Class 1 buildings

Clause A2G3 (1) of the Governing Requirements state that a DtS solution that satisfies the DtS provisions is deemed to have met the performance requirements. The DtS Provisions are specified under H6D1 and refer to clause H6D2 'application of Part H6' which provides the concise detail of what must be complied with in order to have a compliant DtS solution to satisfy performance requirements H6P1 and H6P2.

DtS Compliance - H6P1 Thermal Performance

Compliance with performance requirement H6P1 is satisfied by complying with H6D2(1) for a DtS solution. There are two options within H6D2(1) to select from, which include:

- House energy rating software (H6D2(1)(a)); or
- ABCB Housing Provisions (H6D2(1)(b)).

Only one of the pathways above needs to be complied with for a DtS solution.

House energy rating software:

This option involves using house energy rating software accredited under NatHERS as set out in specification 42, to achieve an energy rating greater than or equal to 7 Stars.

Under clause S42C4(1) of Specification 42, there are additional requirements linking to Section 13 of the ABCB Housing Provisions. This includes requirements associated with thermal insulation, thermal breaks, ceiling penetrations, floor edge insulation, and building sealing.



ABCB Housing Provisions:

This option is often referred to as the elemental provisions and require compliance with the ABCB Housing Provisions Parts 13.2, 13.3 and 13.4 in full.

Compliance with Part 13.5 'ceiling fans' is not applicable within Victorian climate zones, when using H6D2(1)(b) pathway for DtS compliance.

DtS Compliance - H6P2 Energy Usage

Compliance with performance requirement H6P2 is satisfied by complying H6D2(2) for a DtS solution. There are two options within H6D2(2) to select from, which include:

- House energy rating software (H6D2(2)(a)); or
- ABCB Housing Provisions (H6D2(2)(b)).

Only one of the pathways above needs to be complied with for a DtS solution.

House energy rating software:

This option involves using house energy rating software accredited under NatHERS as set out in specification 42, using the accredited whole-of-home tool. Clause S.42C3 specifies that a building must achieve a rating of not less than 60.

In addition to the house energy rating software, compliance with clause S.42C4(1) of Specification 42 is required. This references Part 13.7 'services' of the ABCB Housing Provisions.



NatHERS-accredited whole-of-home tools suitable for demonstrating compliance with H6P2 will be released in 2023. Prior to release, practitioners are encouraged to familiarise themselves with new requirements by testing NatHERS endorsed tools. For more information go to [Software updates in 2022 | Nationwide House Energy Rating Scheme \(NatHERS\)](#).

ABCB Housing Provisions:

This option uses the elemental provisions set out in the ABCB Housing Provisions and requires compliance with Parts 13.6 'Whole-of-home energy usage' and 13.7 'Services'. Calculating the whole-of-home energy usage can be completed manually using the methodology under Part 13.6 and the efficiency factors set out in the ABCB Standard for Whole-of-Home Efficiency Factors.

The ABCB whole of home calculator may assist the calculation process, and is available on the ABCB website (Calculators and Maps | ABCB).

There is a limitation in the use of the clause in that the pathway cannot be used for a building with a total floor area greater than 500m². This limitation only applies to H6D2(2)(b), and alternatives to overcome this may include the energy software approach or a performance solution.

Performance solutions for Class 1 Buildings

A performance solution may be used to demonstrate compliance with the energy efficiency provisions of NCC 2022 Volume Two. Under A2G2(1) the performance requirement is achieved by demonstrating that a performance solution is either:

- Compliant with the relevant performance requirements; or
- The solution is at least equivalent to the DtS Provisions.



Given that performance requirements H6P1 and H6P2 are now quantified in NCC 2022, the performance solution pathway is more definitive than in previous NCC additions. For example, a performance solution that directly assesses compliance with H6P1 requires the calculation of heating, cooling and total energy loads under Specification 44.

The quantification may also assist industry to identify performance solutions that may be used to demonstrate compliance for buildings where a DtS solution is not the preferred option. In theory, the calculated performance requirement values should be relatively consistent with any value contained in the DtS provisions.

Example 1: Performance solution with anomaly values for total thermal energy loads

A performance solution is prepared based on equivalence to DtS elemental provisions and uses a NatHERS rating as the assessment tool. The total thermal energy loads for the performance solution exceed the NatHERS limits that would otherwise be compliant via a DtS solution. The RBS raises concern as there is a lack of consistency between values in the performance solution and other documented NCC values.

The RBS requests either an independent peer review by an accredited NatHERS assessor or a determination by the BAB before making a decision on the performance solution. Further analysis of the calculation data is required to satisfy the RBS that the claim of being DtS equivalence is supported.

The RBS may consider a performance solution complies with H6P1 and/or H6P2 if provided with appropriately documented supporting evidence required under the NCC Governing Requirements. This includes the requirements set out under clause A2G2, with the performance-based design brief and report prepared under A2G2(4).

An RBS can only decide on a performance solution if there is sufficient information presented that demonstrates compliance with the NCC, Act and Regulations. It is important that the performance solution is appropriately documented to enable a decision by the RBS.



For further information on Performance Solutions, refer to Building Practice Note PS-01: Documentation and Assessment of Performance Solution.

Considering their role in determining the star rating of a home, it would be appropriate to consider NatHERS Accredited Assessors' expertise when developing performance solutions in order to comply with residential energy efficiency requirements in the NCC.

It should also be noted that any performance solution must address each performance requirement (H6P1 and H6P2) independently without combining the separate requirements. For example, services such as solar photovoltaic systems that align with H6P2 are not considered to be a suitable means of offsetting the thermal performance of the building fabric under H6P1.

Example 2: Meeting both H6P1 and H6P2

A builder wants to save money by reducing glazing requirements needed to meet the performance requirement H6P1. The builder suggests using solar PV to offset the additional GHG emissions that will be produced by the domestic services to heat and cool the building. The RBS rejects this suggestion as the requirements of H6P1 cannot be offset against H6P2.



Verification Method H6V2 – Verification using a reference building (VURB)

The VURB set out in Verification Method H6V2 is a performance solution that can be used to achieve compliance with performance requirement H6P1. As a performance solution, the VURB requires the full process outlined under Section A Governing Requirements, particularly clause A2G2.

The VURB requires use of thermal software that complies with ANSI/ASHRAE Standard 140. The use of NatHERS accredited software is not permitted under the VURB.

The VURB compares the proposed building design against the heating and cooling loads of a DtS compliant reference building. This relies upon using the same characteristics between the proposed and reference buildings listed under H6V2(3).

The reference building's annual heating and cooling and total energy loads are determined and compared to the proposed building. If the proposed building is either equal to or below the energy loads of the reference building, it is deemed to comply with H6P1.



House energy rating software accredited or previously accredited under the NatHERS, including the additional functionality provided in non-regulatory mode, are not permitted to be used as the calculation method for Verification Method H6V2.

Compliance requirements for Class 2 SOU and Class 4 part of a building

Compliance for Class 2 SOUs and Class 4 parts of buildings have many similarities to those for Class 1 building, including the objectives and functional statements, Governing Requirements, and compliance options to satisfy the performance requirements. The practice note addresses the key differences only.

Assessment of Class 2 SOUs and Class 4 parts of buildings is through NCC 2022 Volume One, with performance requirements J1P2 and J1P3 being the compliance level that must be satisfied. Note that common areas of class 2 buildings and any other part of the building that is not a class 2 SOU or Class 4 requires compliance with different performance requirements. Refer to EE-01-2022 for further guidance.

Performance requirement – J1P2 Building fabric of sole-occupancy units of a Class 2 building or Class 4 part

Performance requirement J1P2 sets out the thermal performance requirements by providing a maximum energy load for a SOU class 2 building or a part 4 class part of a building. The values are quantified and can be calculated using Specification 44 in NCC Volume One when being used as part of a performance solution.

Satisfying J1P2 can be achieved by complying with the DtS Provisions set out in J2D1. Within these provisions, J2D2 specifically provides for two DtS pathways:

- House energy rating software (J2D2(2)(a)); or
- Elemental Provisions (J2D2(2)(b)).



House energy rating software option

House energy rating software accredited under NatHERS is detailed within the associated clause J3D3 and is a DtS option for compliance. This requires the heating and cooling load limits of SOUs of a Class 2 building or Class 4 part of a building to:

- collectively achieve an average NatHERS rating of not less than 7 stars, including the separate heating and cooling load limits specified in the ABCB Standard for NatHERS Heating and Cooling Load Limits; and
- individually achieve an energy rating of not less than 6 stars, including the separate heating and cooling load limits.

Compliance with J3D3 is not limited to an energy rating only, with some elemental provisions referenced through the clause that must also be complied with. These include thermal breaks, compensating for loss of ceiling insulation, general thermal construction, floor edge insulation, and building sealing.

Elemental provisions option:

An elemental DtS approach now exists in NCC 2022 Volume One as an additional option for DtS compliance, without the need to undertake an energy rating. The requirements are intended to improve the thermal performance of the building fabric to reduce the heating, cooling and total thermal energy loads. The particular requirements are specified under J2D2(2) (b) and include compliance with relevant parts of J3, J4 and J5.

A performance solution can also be used to satisfy J1P3. The performance requirements are now quantified and in many instances, a calculation is required under Specification 44 in order to demonstrate compliance. The VURB Verification Method under J1P5 is available for assessing class 2 SOUs under a performance solution.

Performance requirement – J1P3 Energy usage of a SOU of a Class 2 building or class 4 part

Performance requirement J1P3 sets the energy value requirement for of a building's domestic services and essentially places a cap on the building's annual energy use budget based on a societal cost of energy use.

DtS Provisions J2D1 provide the DtS mechanism for satisfying J1P3. There are two compliance options under J2D2(3) that may be used:

- Net equivalent energy usage calculation under J3D14; or
- House energy rating software under J3D15, with a rating not less than 50.

Regardless of what option is chosen to satisfy the DtS net equivalent energy use, additional compliance is required with parts J6 for air conditioning and ventilation, and J7 for artificial lighting and power.


A performance solution may also be utilised to confirm compliance with J1P3. As the performance requirements are now quantified, the performance solution would also require quantification either directly against the performance requirement or demonstrate at least equivalence with the DtS Provisions.

Nationwide House Energy Rating Scheme (NatHERS) Compliance Pathway

NatHERS accredited software provides the tools to assess the energy efficiency of a dwelling, by determining the building envelope's thermal performance through a star rating and compliance with heating, cooling, and total thermal load limits, as well as a rating of energy usage by building services. This can form part of a DtS approach under both Volumes One and Two of the NCC 2022.

The DtS provisions reference 'house energy rating software' which is a defined term under Schedule 3 of the NCC and means software that is accredited by NatHERS. Software that is not accredited by NatHERS may not be used for a DtS solution.

The NatHERS assessment is very specific to the building design and location. This requires a separate rating to be completed for any change to a dwelling design (e.g. new orientation or layout), or when the same designs are used on multiple sites.



House energy rating software accredited or previously accredited under the NatHERS, including the additional functionality provided in non-regulatory mode, are not permitted to be used as the calculation method for Verification Method H6V2.

NatHERS Certificates

A NatHERS certificate can demonstrate that the building meets the minimum required energy rating and the energy usage requirements under NCC 2022 Volumes One (for Class 2 SOUs and class 4 parts) and Two (for Class 1 buildings). When relying on a NatHERS pathway for DtS compliance, clause A5G9 of the Governing Requirements states that evidence of suitability for DtS compliance must be in the form of a NatHERS certificate issued in accordance with the NatHERS scheme.

NatHERS certificates are generated through accredited NatHERS software. An example of a complete NatHERS certificate and the information it presents is shown on the [NatHERS website](#), with an excerpt for a Class 1 building certificate shown in Figure 2.

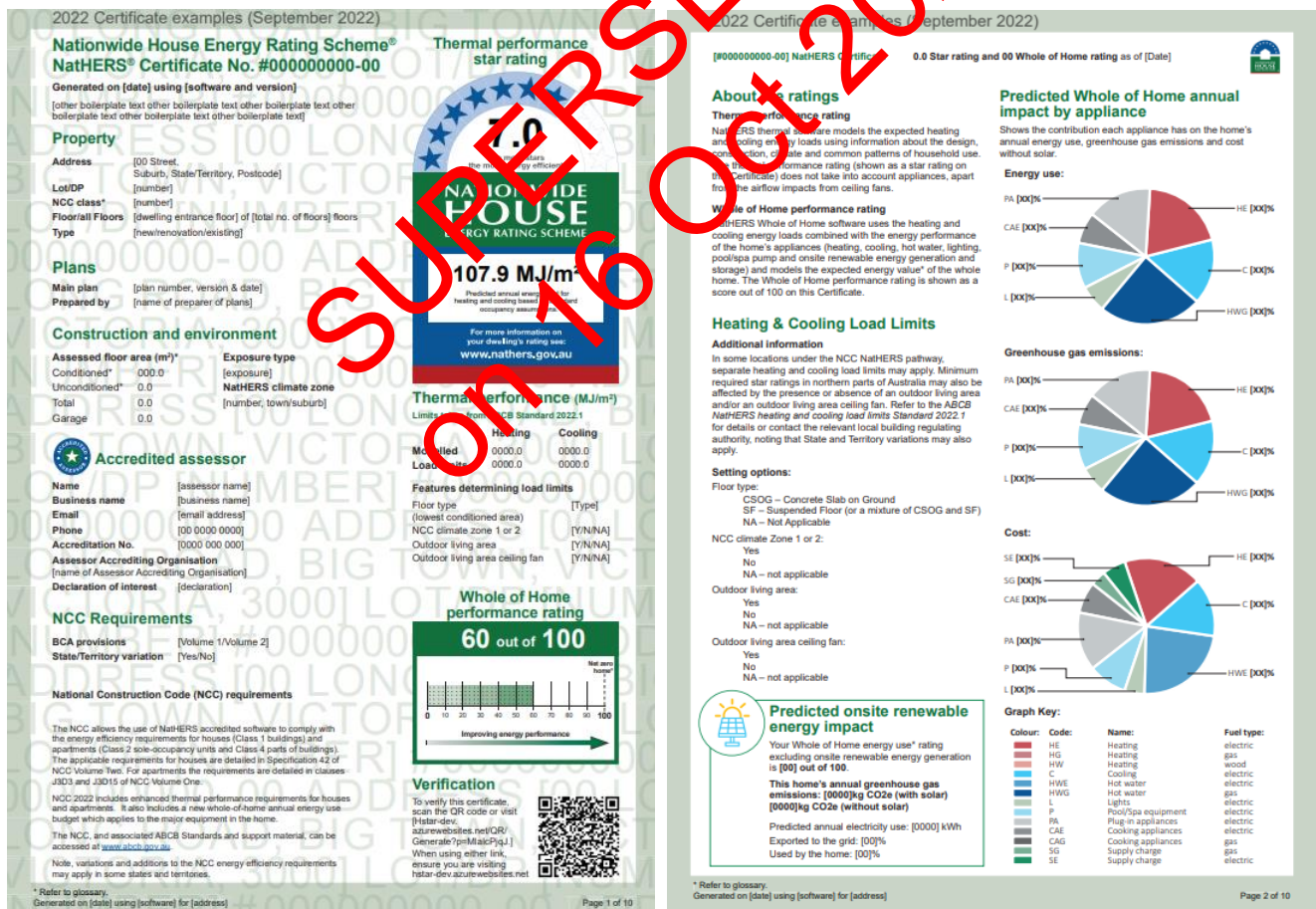


Figure 2: Example of the first and second pages of the NatHERS certificate (Source: NatHERS)



A set of stamped drawings must accompany the NatHERS certificate, including at a minimum:

- architectural drawings including site plan, floor plan, elevations, and sections,
- electrical or lighting layout (including location and number of downlights and ceiling penetrations),
- any on-site renewable energy and appliances to be included,
- window schedule or information detailing window performance (u-value), size, glazing and frame type or opening style, and
- specifications including material schedules and insulation R-Values.

The proposed design documentation must have a NatHERS certificate stamp on every page related to the assessment (i.e. all drawings, calculations and specifications). As a minimum, the stamp on the documents must include:

- certification number,
- assessor's name and, unless the rating is completed by a non-accredited assessor, the assessor's accreditation number,
- property address, and
- QR code for accessing the certificate online.

All documentation, including the NatHERS certificate and stamped plans, must be identical to all other documentation used in the building design or building permit application. For example, if there is an inconsistency in insulation R-value between the working drawings and the NatHERS certificate, then an amendment to either the drawings or NatHERS certificate is required to ensure consistency and clearly show NCC compliance.

Any design changes are likely to trigger the need to review the NatHERS rating to ensure the building remains compliant. This may result from seemingly small changes such as increased ceiling penetrations from the installation of additional downlight or exhaust fans.

Energy ratings for individual SOUs of Class 2 buildings should be shown on the working drawings, and include the star rating and the heating and cooling loads of each SOU. These rating results should be displayed on the specifications page.

NatHERS Assessors

NatHERS energy rating assessments need to be conducted by people who are appropriately trained in the use of NatHERS accredited software.

Accredited assessors

An accredited assessor is formally recognised by the Australian Building Sustainability Association, Design Matters National or the House Energy Rating Association as a NatHERS assessor. Using an accredited assessor provides industry with additional levels of quality assurance, given the rigour behind the accreditation process.

Assessors may be accredited only for thermal performance assessments (i.e. determining the star rating of a home) or for both thermal performance and Whole-of-Home assessments.

Full colour NatHERS certificates with the NatHERS rating logo and stamp can only be issued by a NatHERS accredited assessor. This provides a level of additional assurance that the assessor has the required level of competency to conduct the energy rating assessment.

Non-accredited assessors

Non-accredited assessors can only produce a black and white NatHERS non-accredited report. This report does not feature the NatHERS logo and includes a warning that the report is not accredited as compliant with NatHERS and reliance on the report is at users' own risk.



Where an assessment is provided by a non-accredited assessor, the RBS must be satisfied the assessment complies with the NCC and in particular that the report is in accordance with the NatHERS scheme. If presented with a non-accredited assessor's report, the RBS should seek written confirmation from the assessor on the following points:

- evidence that the report was issued in accordance with the NatHERS scheme in accordance with clause A5G9 of NCC 2022, including the use of current approved software to perform the energy rating.
- suitable qualifications and experience in the use of the NatHERS software,
- reasoning for not being accredited (e.g. not been subject to disciplinary action resulting in removal of their accreditation),
- quality assurance process – how is the work monitored or checked to minimise errors.

NatHERS Whole-of-Home energy usage assessments

NatHERS has been expanded to provide a DtS approach to address performance requirements J1P3 of NCC Volume One and H6P2 of NCC Volume Two.

The minimum whole-of-home ratings for DtS compliance using NatHERS-accredited house energy rating software are:

- Not less than 50 for NCC Volume One (for any individual Class 2 SOU or class 4 part)
- Not less than 60 for NCC Volume Two (Class 1)

The rating assesses the efficiency of the buildings' domestic services including main space conditioning, main water heater, swimming pool and spa pump, and allows an offset through the use of renewable energy (such as solar PV). This also takes into account the thermal performance of the building, however it should be noted that this is a consideration for accurate calculation only, and does not otherwise contribute towards compliance with thermal performance assessment of performance requirements H6P1 or J1P2.

The relevant DtS provisions that link to the rating values for the whole-of-home include:

- J2D2(3) and J3D15 for NCC Volume One (Class 2 SOU or class 4 part)
- H6D2(2) and S42C3 for NCC Volume Two (Class 1)

In addition to the whole-of-home assessment, the NCC specifies that a building must also comply with Parts J6 and J7 for NCC Volume One, and Part 13.7 of the ABCB Housing Provisions for NCC Volume Two

Alternative compliance pathways are available for both NCC Volumes One and Two, if a NatHERS whole-of-home assessment is not the preferred option. A direct calculation assessment is available through both editions of the NCC, with the ABCB publishing a whole-of-home calculator. Note that this pathway is limited to a maximum floor area of 500m².



The ABCB has developed lighting calculators that can be used to assessing artificial lighting compliance with NCC 2022 Volume Two 13.7.6 and NCC 2022 Volume One Part J7D3. Lighting calculators are available on the ABCB website www.abcb.gov.au



Other considerations

Compliance with the NCC requires a holistic approach, therefore other factors need to be considered as part of the overall compliance picture. The NCC performance requirements are not mutually exclusive, and each needs to be compliant. Matters to consider may include:

- *structural requirements* for additional actions, such as the weight of insulation, photovoltaic cells, etc,
- *fire resistance* of products included within a system, such as insulation contained within a building element required to have an FRL,
- *condensation management* for vapour permeable membranes in external walls and additional ventilation requirements.

A proposed building must demonstrate compliance with energy efficiency and the remainder of the NCC. If there are inconsistencies within a design, the design must be modified to remove the inconsistency to clearly demonstrate compliance.

Building permit application requirements

Documentation required

Regulation 24(4) states that an application must contain sufficient information to show compliance with the Act and Regulations. As the NCC forms part of the Regulations, an applicant must therefore show compliance with the energy efficiency provisions of the NCC.

While regulation 25 of the Regulations details the minimum information the applicant needed for a building permit, it remains the applicant's responsibility to provide the RBS with sufficient evidence that the proposed building design meets the requirements of the NCC 2022. This may include providing additional detailed plans and specifications showing how the energy efficiency construction requirements are incorporated in the design. Examples of these include:

- window schedules, which show specific details including glass type, frame type, U-values, SHGC values, orientation vector, and, if used, a copy of glazing calculator results,
- insulation details, including R values,
- orientation and layout of the home,
- NatHERS rating or documentation to demonstrate compliance with the requirements of the NCC 2022,
- lighting and details of other electrical services.

Detailed documentation must be provided to enable the RBS to assess compliance and to ensure the builder has sufficient information to construct the building in accordance with the approved building permit documentation.

The applicant should limit the use of general notes. A note such as "The builder is to ensure compliance with NCC 2022 Volume Two Part H6 or Volume One Section J" is not appropriate. The design and specifications must clearly demonstrate full compliance.

The role of the RBS in assessing the application

The RBS has a responsibility to ensure the building permit application contains enough information to determine compliance with the Act and the Regulations. Where the RBS is not satisfied with the information provided, they must not issue the building permit.



Schedule 2 of the Act allows the RBS to require the applicant to provide further information as it is not appropriate for the RBS to engage in further design work by marking-up plans or to accept notes on plans that are too general.

The RBS should limit the use of conditions on the building permit and instead give attention to ensuring that the application is compliant with the Act, Regulations, and NCC prior to issuing the building permit.

Construction requirements

Building work must be carried out in accordance with the approved building permit documentation, including plans approved as part of the energy efficiency rating. Any departures from the approved documents can result in non-compliance, which may include undocumented changes to the floor plan, glazing or material substitution during construction.

It is important that the approved building permit contains sufficient information to facilitate a compliant build, and to allow for a thorough building inspection. The RBS may choose to carry out additional inspections during construction to ensure the specified energy efficiency features have been installed. This may include checking that:

- the insulation was installed correctly in the walls and in the roof space,
- the correct appliances have been installed to verify compliance to the whole of home requirements,
- the appropriate glazing has been installed, and
- the number of downlights and other ceiling penetrations is consistent with the approved building permit documentation

If the 'as constructed' differs from the building permit documentation, the RBS must ensure that compliance has been achieved, which includes issuing a direction to fix. This may require the builder to provide revised documentation to demonstrate that compliance with NCC 2022 has been met.

The RBS may request that the builder provides a written declaration to confirm that each building element has been installed in accordance with the approved building permit documentation and that compliance with energy efficiency requirements of the NCC 2022 is achieved.

Insulation

Compliance with ABCB Housing Provisions Part 13.2.2, 13.2.3, 13.7.2 to 13.7.4 and NCC 2022 Volume One J4D3 is required for a DtS solution regardless of whether a house energy rating software or elemental provisions approach is used.

Builders must ensure insulation is installed correctly in accordance with the building permit to maintain its effectiveness and to avoid decreased thermal performance. Poor installation or damage caused during construction may adversely affect a building's performance.

Site inspections conducted by the VBA have shown that some of these requirements are regularly missed during installation. It is not unusual for trades to remove insulation for access reasons and not reinstate it. It is important to ensure that once the work is completed, the insulation:

- forms a consistent and continuous thermal barrier other than at supporting members. This is important as any gaps in the barrier are likely to reduce the thermal performance of the building,
- has the correct R-value, as a lower R-value will reduce the thermal performance of the building and result in non-compliance,



- is not compressed – fitting a wide batt in a small space will reduce the R-value of the product,
- is safely placed near lamps, luminaires and associated transformers – this should be in accordance with manufacturer's specifications and AS3000 – 2018: Wiring rules,
- does not consist of more than three pieces of insulation within a section of a building element such as a space between studs and noggings,
- is installed in gaps between window and door jambs, heads and sills, and the adjoining wall framing to form a continuous barrier, unless a gap is otherwise required – this may need to be compressible to allow for movement between members,
- complies with AS/NZS4859.1 Thermal insulation materials for buildings.

The thermal performance of reflective insulation is achieved by its ability to reflect heat at one surface and not transmit it at another. The reflective part of the foil needs to face an air space in order to achieve the design R-value. The reflective insulation requirements include:

- the insulation must face the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding,
- the reflective insulation must be closely fitted against any penetration, door or window opening,
- if installed in the walls, the reflective insulation used must be vapour permeable,
- the reflective insulation must be adequately supported by framing members, and
- each adjoining sheet of roll membrane must be overlapped not less than 50mm (Volume One), not less than 150 mm (Volume Two) or taped together. Where reflective insulation also acts as a waterproof barrier or sarking both the minimum overlap and taping may be necessary.

It should be noted that some reflective insulation products are not vapour permeable and, if installed in walls, may lead to condensation problems. Note that both volumes of the NCC contain specific provisions for condensation management under the health and amenity sections.



For further information and guidance regarding insulation installation, refer to the Insulation Council of Australia and New Zealand (ICANZ) website, www.icanz.org.au.

Building sealing requirements

The requirement is met by compliance with the DtS provisions in the ABCB Housing Provisions Part 13.4 are met and NCC 2022 Volume One Part J5. Proper building sealing reduces the pathways for unseen and unintended leakage of air that has been heated or cooled for the comfort of occupants, which in turn reduces the energy required for artificial heating and cooling in buildings.

Under the DtS provisions set out in the ABCB Housing Provisions Part 13.4 and NCC 2022 Volume One Part J5, sealing must be provided to:

- chimneys and flues of an open solid-fuel burning appliance by providing a damper or flap that can be closed to seal the chimney or flue,
- roof lights serving a conditioned space or a habitable room, by providing an imperforate ceiling diffuser or the like, a weatherproof seal or a shutter system,
- doors, openable windows or the like, as set out in J3.4 of NCC 2022 Volume One and 3.12.3 and 3.12.3.3 of NCC 2022 Volume Two, by providing seals to restrict air infiltration. These seals must be a draft protection device to the bottom edge of a door and may be a foam, rubber compression strip, fibrous seal or the like to the other edges of a door or the edges of an openable window,



- exhaust fans serving a conditioned space or a habitable room, by fitting a sealing device such as a self-closing damper, filter or the like,
- evaporative coolers serving a heated space, by a self-closing damper or the like,
- the external fabric of a conditioned space or a habitable room of a building, ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage at the junctions of each element and around openings, such as between a window or door frame and a wall lining. This can be achieved by ensuring external fabric is enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed at junctions, and
- penetrations (windows, doors, roof lights, flues, exhaust fans, ductwork, etc.) with either a close-fitting architrave, skirting or cornice; or expanding foam, rubber compressive strip, caulking or the like. Where architraves, skirtings or cornices are not being used, it is necessary to seal any gaps with caulking or other flexible sealant, such as expanded foam or other gap filling material.

The verification methods under H6V3 of NCC 2022 Volume Two and J1V4 of NCC 2022 Volume One are relevant to performance solutions only and are not required for Dts compliance. These verification methods require the envelope of the building to have an air permeability of not more than 10 m³/hr.m² at 50 Pa reference pressure when tested in accordance with AS/NZS ISO 9972 Method 1. There are also limits on air tightness in NCC 2022 Volume 2 H6V3 sets a limit of no less than 5 air changes per hour at 50 Pa without the inclusion of a mechanical ventilation system. Air-tightness testing is not required by the NCC for a Dts solution.

Occupancy Permit

Where an application for an occupancy permit has been submitted and the only outstanding non-complying matters relate to energy efficiency, the RBS may:

- refuse to issue an occupancy permit,
- issue an occupancy permit with conditions, or
- issue an occupancy permit concurrently with a building notice or building order if it is clear that a direction to fix will not be complied with or it is not possible or not appropriate to issue a direction to fix.

The decision on an occupancy permit is additional to the RBS's obligation to issue a direction to fix building work for any identified non-compliances.

Related Documentation

- Building Act 1993
- Building Regulations 2018
- Plumbing Regulations 2018
- National Construction Code 2022
- Building Practice Note EE-04-2022: Alterations to existing Class 1 buildings
- AS 3999 Bulk thermal insulation – Installation
- AS/NZS 4859.1 Thermal insulation materials for buildings
- ABCB Handbook: Condensation in Buildings
- ABCB Handbook: Energy Efficiency NCC Volume Two
- ABCB Handbook: Energy Efficiency NCC Volume One



List of Amendments

- Updated to NCC 2022 requirements
- Update format and content review

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SUPERSEDED
16 Oct 2023