NatHERS for existing homes Guidance Note

Nationwide House Energy Rating Scheme®
Requirements for NatHERS for existing homes assessments

Version: 20250611

Cataloguing data

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Acknowledgement of Country

We acknowledge the Traditional Owners of Country throughout Australia and recognise their continuing connection to land, waters and culture. We pay our respects to their Elders past and present.

About the Nationwide House Energy Rating Scheme (NatHERS)

NatHERS supports improvements to the energy efficiency and comfort of Australia's dwellings by standardising the approach and guidelines for NatHERS accredited software to assess dwellings across Australia.

The Australian Government administers NatHERS on behalf of the Commonwealth and state and territory governments.

For more information visit www.nathers.gov.au

Guidance Note Change Log

Version	Comments
20250520	Launch version – incorporating learnings from trial period and preliminary testing, and subject to updates based on future feedback and further testing. **Default values** specified for: floor height above ground; door sizes; garage door insulation R-value; floor insulation R-value; external window covering; skylight and roof window values; ceiling fan diameter; ceiling penetrations/insulation loss; battery size and chemistry; chimney with damper for non-permanent sealing devices; renewable energy generation values and evidence collection points. **Removed mandatory modelling requirements**: thermal bridging; wing walls; sealed recessed downlights and heater flue; ceiling penetrations/insulation loss. **Other key clarifications - model only**: one horizontal and one vertical shading device (the ones having the largest impact); the single dominant wall construction type in each wall. **Features no longer modelled**: pet doors; cast iron grate fireplaces. **New**: changed minimum age from 18 to 15 years for householder consent. Appendix 1 – Default insulation tables added. Addendum – Additional default inputs and settings for first generation software tools.
20250611	Year of construction – text update regarding determination of renovations/additions Subfloor examples – minor text change and image update Partially glazed doors – text correction regarding modelling of the window portion as casement Obscure glazing – instructions added Internal window coverings – minor text updates for clarity, instruction added to model metal plantation shutters as venetian blinds Shading – minor text update regarding shading from a 2nd-storey eave Pools – minor text update to stipulate only permanent pools should be modelled

Contents

1 Introduction

1.1 Purpose

This document expands on the NatHERS for existing homes Technical Note, providing additional guidance information for Assessors. Generally, its purpose is to be used as a 'ready reckoner' for Assessors whilst onsite to quickly identify required inputs based on the example images provided. It is recommended that Assessors save the document to their device for quick reference to reduce time on site and ensure accuracy of assessments.

When undertaking a NatHERS for existing homes assessment, Assessors must adhere to the requirements of the NatHERS for existing homes Technical Note. Wherever there is a perceived contradiction between the NatHERS for existing homes Technical Note and this Guidance Note, the Technical Note prevails.

For more detailed information on calculation methods, NatHERS ratings and the NatHERS for existing homes assessment process in general, Assessors should refer to the NatHERS Handbook and NatHERS Whole of Home Calculation Method.

1.2 Disclaimer

The material in this Guidance Note is for use when conducting NatHERS for existing homes assessments. This is made available for Assessors who use NatHERS accredited software tools only and on the understanding that the NatHERS Administrator, the state and territory governments, and the Commonwealth (the Participating Bodies) are not providing professional advice, nor indicating a commitment by the Participating Bodies to a particular course of action.

While reasonable efforts have been made to ensure the information in this Guidance Note is accurate, correct and reliable, the Participating Bodies, and all individuals acting for the Participating Bodies preparing this publication, accept no liability for the accuracy of, or inferences from, the material contained in this publication, and expressly disclaim liability for any individual's loss arising directly or indirectly from the use of, inferences drawn, deductions made, or acts done in reliance on this Guidance Note. The material in this Guidance Note may include the views or recommendations of third parties, which do not necessarily reflect the views of the Participating Bodies or indicate their commitment to a particular course of action.

2 Before you start

2.1 Privacy and consent

Assessors must have received written consent from the householder (who must be a responsible adult over the age of 15 years) in order to:

- Enter the home to undertake the assessment, acknowledging this will involve taking photographs that may contain private or sensitive information.
- Collect, use and store data and information, and to share that information with the NatHERS Administrator and other parties, as required for audit and assurance purposes, noting that data and information collected will be managed in accordance with the Australian Privacy Principles.
- Grant permission, or not, for follow-up contact from the NatHERS Administrator, or Assessor Accreditation Service Provider, or other third parties acting on behalf of the NatHERS Administrator, for quality assurance purposes.

If an occupant is or will be present for the assessment, Assessors must confirm that at least one person present is 15 years or older and has the capacity to consent. Assessors must not enter a

home or undertake any part of the assessment in circumstances where only a person under 15 years of age is present.

Assessors must declare any potential, actual or perceived conflict of interest to the householder, and obtain the householders written acknowledgement of the declaration.

2.1.1 Assessor safety and equipment

Assessors are responsible for conducting all aspects of the assessment in compliance with federal, state and territory health and safety requirements, including any relevant electrical safety requirements.

Important Note
States and territories may have specific safety requirements relating to roof or subfloor space access (including requirements that apply while remaining on a ladder at attic access hatches). Assessors must ensure they identify and comply with all applicable regulatory requirements in the state or territory in which the assessment is being conducted, and act within the scope of their skills and training when undertaking NatHERS for existing homes assessments.

Assessors must conduct a health and safety risk assessment at each site and ensure that appropriate controls are implemented to manage any identified hazards and risk.

Assessors are responsible for ensuring all equipment complies with relevant federal, state and territory health and safety requirements and standards and using Personal Protective Equipment (PPE) when required.

2.1.2 Conducting the assessment

NatHERS for existing homes software tools are used to assess an entire dwelling.

Assessors must provide photographic evidence and supporting documentation in line with the requirements set out in the Technical Note, tool provider requirements and for auditing and quality assurance purposes.

To effectively conduct a NatHERS for existing homes assessment, Assessors will require access to all rooms of the house, and if accessible and deemed safe, access to attic and sub-floor access hatches.

Where access to attic and sub-floor access hatches is unsafe, or when a particular piece of information or evidence about an appliance or element of the dwelling construction is not able to be determined, or is otherwise unsafe to collect, the assessor will need to apply the relevant default values specified in the Technical Note. Assessors must provide evidence, in the form of either written notes or photographs, to justify the use of defaults where applied. The reason for the use of defaults must be recorded in the Additional Information field of the rating file.

A NatHERS for existing homes assessment is an assessment of the thermal performance of the building, the energy-using fixed appliances and renewable energy produced and stored on-site – not the behaviour of the people who live in it. This allows the rating to be as independent as possible of variable occupancy behaviour and allows homes to be compared against each other.

The number of occupants is calculated based on floor area, not the actual number of people living in the home. This occupancy number is used to calculate several factors within the Assessment such as hot water usage.

Thermostat settings for heating and cooling are based on standard assumptions, not the actual settings that the occupants may use.

3 Data entry and evidence

The project details and modelling of the dwelling must be entered consistent with the information gathered on site.

If new information becomes available that changes the results shown on the Certificate, a new Certificate needs to be generated to accurately reflect the performance of the home.

Where information is ambiguous or inconsistent and it is unclear how to incorporate the information into the NatHERS for existing homes assessment, the Assessor should seek clarification from their AASP and document the response.

Information provided by a householder about aspects of the home that are not otherwise able to be determined by the Assessor, must be supported by third party documentation to be included in the assessment e.g. invoice for insulation installation indicating R-value.

Where information is not available relating to a specific aspect of the home, the assessment must be undertaken using the defaults as noted in the Technical Note. The Assessor must advise the householder where defaults have been made in lieu of actual gathered information, and that this may affect the outcome of the assessment. The reason for the use of defaults must be recorded in the Additional Information field of the rating file.

Should a motivated homeowner choose to commission more rigorous/invasive testing to establish the presence or otherwise of insulation in areas where it cannot be easily observed by an Assessor, the testing results must be documented in a form that can be verified by and is acceptable to the Assessor. Evidence of these documents must be collected by the Assessor.

Data collection type i.e. measured, documented or default value must be indicated by Assessors when inputting data into the software tool, so it is included on the Home Energy Rating Certificate.

Visual evidence overrides default assumptions in the Technical Note. For example, if it can be seen that a house has no ceiling insulation, this overrides any default assumptions that might be made about the dwelling based on its age.

Evidence gathering is a formal part of the NatHERS for existing homes assessment process. Refer to Section 19 for details of evidence collection requirements.

4 Climate, exposure, orientation and year of construction

4.1 Climate zone selection

In NatHERS software tools, each postcode is allocated a 'principal climate zone' and sometimes one or two alternative climate zones. Assessors are to use the principal climate zone in most cases. The following rules apply when selecting a climate zone:

Assessments must use the postcode in NatHERS software tools that corresponds to the location. If a newly developed suburb has not yet been allocated a postcode or the postcode is not available in NatHERS software tools, the postcode of the nearest existing suburb with similar climatic properties must be used. This must be detailed in the Additional Information section of the rating file.

If the principal climate zone is not considered representative of the climate on site (e.g. because of a change in altitude), the Assessor may choose to use one of the alternative climate zones allocated to the postcode in the NatHERS software tool or available on the NatHERS website. The Assessor must not use a climate zone other than those allocated to the postcode. Where the Assessor has chosen to use one of the alternative climate zones, a justification must be detailed in the Additional Information section of the rating file.

4.2 Exposure categories

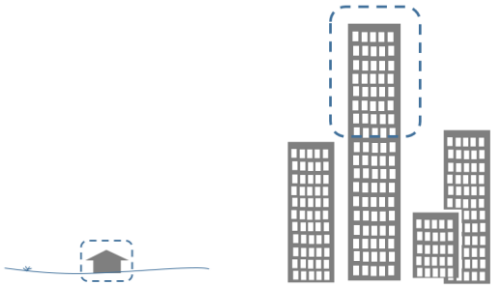
The exposure category best suited to the terrain surrounding the dwelling must be used. Exposure can vary for apartments in a single building, and this must be considered in assessments. Table 4.1 provides guidance on the indicative characteristics of exposure categories.

4.3 Orientation

Dwelling orientation must be based on the rotation of the dwelling with respect to true north, not magnetic north.

An Assessor can use a compass or Global Positioning System (GPS) on site or refer to online land information system from the relevant jurisdiction or a map app or website, or potentially all, to confirm true north. Note that map apps and websites use grid north and whilst this is not exactly the same as true North it is an acceptable approximation to true north for NatHERS for existing homes assessments.

Table 4.1 - Exposure category guidance

Category	Terrain and built environment characteristics	Examples
Exposed	Few or no obstructions 	Flat grazing land, lakeside or ocean frontage, desert, exposed high-rise unit (above 10 storeys) without obstructions at a similar height to the dwelling
Open	Few well scattered obstructions less than or equal to 10 m high relative to the dwelling 	Farmland with scattered sheds, lightly vegetated bush blocks, elevated apartment (4-10 storeys) with a few obstructions of similar height to the dwelling
Suburban	Numerous closely spaced obstructions less than or equal to 10 m high relative to the dwelling 	Suburban housing, heavily vegetated bushland areas, townhouses, low level apartments (G – 3 storeys)
Protected	Numerous closely spaced obstructions greater than 10 m high 	City and industrial areas, buildings with many obstructions over 10 m in height

4.4 Year of construction

As the year of construction is used to determine default values for insulation when they cannot be confirmed by the Assessor, if the year of construction is on/after the dates referred to in Table 4.2 and Table 4.3, Assessors must obtain documentary evidence to apply the specified date of construction. The onus is on the householder to provide such evidence, else the Assessor should enter the year as 'unknown' or an approximate year prior to these dates.

Table 4.2 - Class 1 year of construction start date for evidence requirements by state

State	Year
ACT	1993 onwards
NSW	2005 onwards
QLD	2003 onwards
SA	2003 onwards
TAS	2003 onwards
VIC	1991 onwards
WA	2003 onwards
NT	2003 onwards

Table 4.3 - Class 2 year of construction start date for evidence requirements by state

State	Year
ACT	1998 onwards
NSW	2005 onwards
QLD	2006 onwards
SA	2006 onwards
TAS	2006 onwards
VIC	1991 onwards
WA	2006 onwards
NT	2011 onwards

Where part of a house has been added or significantly altered (e.g. renovations that are likely to have triggered development consent and/or involve structural changes like removing walls, adding rooms or altering rooflines), the same requirements apply for determining the year of construction. When there are differing ages of construction for different parts of a house, use the original age of construction unless documentary evidence of the addition/renovation year of construction can be provided. If documentary evidence of the addition/renovation year of construction is provided, Assessors should enter the appropriate insulation values from the default insulation tables for the added/renovated zones.

5 Zoning

Assessors must model and assign a zone type for all parts of the dwelling that can be fully enclosed by the dwelling envelope (the physical separator between the dwelling being assessed and the outside environment or neighbour).

5.1 Zone types

A zone is defined as a room or group of rooms within a dwelling that have specific properties. Table 5.3 outlines NatHERS zoning types and definitions.

Each NatHERS zone type has different inbuilt assumptions and thermostat settings based on:

- the function of the room and
- how the different rooms within a dwelling are used throughout the day e.g. nighttime zones are heated and cooled to different temperatures at different times compared to living or daytime zones.

A 'NatHERS conditioned zone' is a room that is expected to be occupied throughout the day/night and as such may require artificial heating and/or cooling to maintain appropriate levels of thermal comfort for the occupants. A 'NatHERS unconditioned zone' is a room that is expected to be primarily unoccupied throughout the day/night and as such will not require artificial heating and/or cooling. There are some exceptions for specific room types, see Table 4 for more detailed information. Note that in some existing homes there may be zones that NatHERS considers as 'conditioned' that do not currently have artificial heating and/or cooling appliances installed – these must still be modelled as per the NatHERS determination for the specific zone type.

There are six types of conditioned zones:

- kitchen/living
- living
- daytime
- bedroom
- nighttime
- garage – conditioned

There are two types of unconditioned zones:

- unconditioned
- garage - unconditioned

Basement carparks and glazed common areas in apartment buildings are not modelled as separate zones (unlike NatHERS new homes assessments). Where apparent, Assessors must model the dwelling adjacency as subfloor enclosed for a basement carpark and neighbour for a glazed common area.

5.2 Minimum zoning requirements

All dwellings must:

- contain one main kitchen/living zone
- contain a minimum of three zones excluding the garage
- have walls, a floor and a ceiling and/or a roof for each zone.

Studios, bedsits and open-plan apartments must contain at least three zones (e.g. kitchen/living, bedroom and a bathroom zone) and

When there are no obvious features by which to zone the open plan studio or bedsit, then (for modelling purposes only):

- kitchen/living zone floor area(s) = minimum of 30%
- bedroom zone floor area = minimum of 20% and
- these two zones shall be separated by an artificial plasterboard-on-stud internal dividing wall(s) with a wall area of no less than 40% between zones.

5.3 Combining zones

Workshops, storerooms, water closets (WCs) and laundries may be included in the garage zone if they meet all of the following:

- are within the garage
- can only be accessed from the garage and/or by an external door and
- do not contain an internal door to the dwelling (other than the garage door).

5.4 Bathrooms, WCs and ensuites

Bathrooms, WCs and ensuites must be zoned as follows:

- Unconditioned if it can be accessed from the main dwelling, has external windows or doors, can be closed off from other zones and does not have in-floor heating
- Nighttime if it either:
    - is exclusively associated with a bedroom (i.e. no general access); or
    - has in-floor heating; either with or without external windows or doors
- Refer to the parent zone to determine the zone type if it does not have in-floor heating and either:
    - has no external windows or doors; or
    - cannot be closed off from other zones.

When referring to the parent zone, if the parent zone is a kitchen/living, living or daytime zone, then model as daytime. If the parent zone is bedroom or nighttime, model as nighttime. If the parent zone is unconditioned, model as unconditioned. If there are two parent zones (i.e. 2 entries to the bathroom), model according to the larger of the two parent zones.

5.5 Airlocks

An airlock is a small, relatively airtight space that can be modelled as an unconditioned zone if it:

- is located at a dwelling entrance
- has one or more external wall/s
- has one or more internal wall/s
- has an external door and
- has one or more internal doors, of which, only one opens to a conditioned zone.

5.6 Double height voids

Some software tools may allow modelling of double height voids (zones that extend across two levels of the dwelling with no floor construction between the entire upper zone and the zone below). If it is allowed by the software, Assessors must select the upper zone as a double height void zone and the software will combine it with the zone below. Where this functionality is not available, Assessors must model the two zones separately and insert a horizontal opening in the floor of the upper zone that extends over the entire floor area.

The double height void zone must only be selected where an upper floor zone has no floor construction between itself and the zone below. Where the opening does not extend over the entire floor area of the upper zone e.g. a staircase, this must be modelled as two separate zones with a horizontal opening in the floor of the upper zone to account for the staircase opening only.

5.7 Staircases

Depending on the location and configuration, staircases are either combined into the adjoining zone or modelled as a separate zone. If the staircase has internal walls on both sides extending to the upper floor i.e. enclosed staircase, it must be zoned separately.

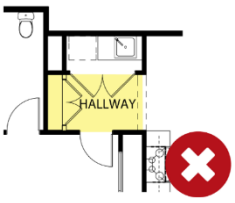
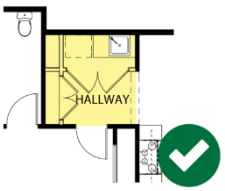
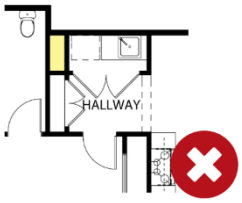
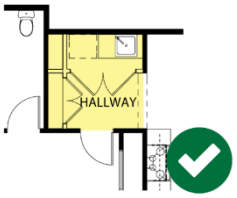
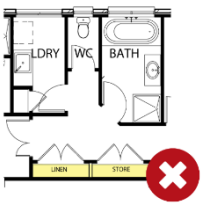
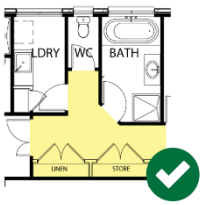
Table 5.1 - Examples of zoning staircases

Examples	How to model
	Open staircase - combine into the adjoining zone
	Enclosed staircase - model as a separate zone

5.8 Small spaces

Small non-habitable spaces, less than or equal to 700 mm in depth, (e.g. pantries, built-in robes, plumbing voids, wall voids and service ducts) must be included in the zone they are adjacent to or located in. Where a cupboard or other space is larger than this, it must be zoned as a separate zone with the exception of small storage spaces located under a staircase which can be included in the same zone as the staircase.

Table 5.2 - Examples of correct zoning of small spaces

Example	Incorrect	Correct
Walk-in cupboards and pantries are separate zones.		
Laundry cupboards are part of the adjacent zone.		
Service ducts are zoned with the adjacent zone.		
Cupboards are part of the adjacent zone.		

5.9 Determining zone type in uninhabited dwellings

Where a dwelling is uninhabited and without furniture, it may be more difficult for Assessors to determine the purpose of some zones, particularly when determining if a room is a bedroom or living/daytime zone. In this instance a bedroom is defined as a room that meets the following criteria:

- A private room with a single internal entrance from a hallway or other living space with a closable door, which may or may not also have an external door directly to the outside and may or may not also have access to an ensuite or walk-in robe. The room cannot be a through space to another bedroom or living room.
- Large enough to fit an adult sized single bed, plus space for a wardrobe (or have a built-in wardrobe), plus circulation space to access the bed, wardrobe and door (minimum size of 2.0m x 2.0m with a built-in wardrobe or 2.0 x 2.7m without a built-in wardrobe)
- Has a window or skylight

Situations may arise in unconventional dwelling designs where more than one zone option is possible. In these instances, Assessors should seek advice from their AASP and document the decision in the Additional Information section in the rating file.

Table 5.3 - NatHERS zoning types and definitions

Rooms/ spaces/ areas Ventilated: has a door and or an openable window on an external wall Unventilated: has neither an openable window nor door on an external wall	Zoning									
	Kitchen / living[1]	Living [2]	Daytime	Bedroom	Nighttime	Unconditioned	Refer to the parent zone to determine zone type[3]	Include in parent zone	Garage – unconditioned	Garage - conditioned
Airlock[4]			●			●				
Bathroom, unventilated[5] – see also ensuite					●		●			
Bathroom, ventilated[5] – see also ensuite					●	●				
Bathroom with in-floor heating ventilated or unventilated[5]					●					
Bedroom				●						
Cellar, conditioned			●							
Cellar, unconditioned						●				
Corridor within dwelling, fully enclosed by doors or open to other zones			●							
Dining room[2]		●	●							
Ensuite, ventilated or unventilated[5] – see also bathroom					●		●			
Family room[2]		●	●							
Garage, conditioned										●
Garage, unconditioned									●	
Gym			●							
Hallway, fully enclosed by doors or open to other zones, not solely associated with a bedroom[6]			●							
Hallway, solely associated with a bedroom that can be closed off from the main dwelling[6]					●					
Kitchen (main) with or without meals/lounge/living/dining	●									
Kitchen (second) /kitchenette		●								
Laundry, unventilated							●			
Laundry, ventilated with door to another zone						●				
Laundry, ventilated open to another zone							●			
Lift			●							
Living[2]		●	●							
Lounge[2]		●	●							
Media[2]		●	●							
Outdoor living area, capable of being fully enclosed and conditioned			●							
Pantry, not walk-in								●		
Pantry, walk-in			●							
Parents' retreat					●					
Pool room			●							

Rooms/ spaces/ areas Ventilated: has a door and or an openable window on an external wall Unventilated: has neither an openable window nor door on an external wall	Zoning									
	Kitchen / living[1]	Living [2]	Daytime	Bedroom	Nighttime	Unconditioned	Refer to the parent zone to determine zone type[3]	Include in parent zone	Garage – unconditioned	Garage - conditioned
Powder room, unventilated[5]					●		●			
Powder room, ventilated[5]					●	●				
Rumpus[2]		●	●							
Sauna			●							
Staircase[7]			●				●			
Storage							●			
Storage under staircase								●		
Study or office with either built-in wardrobe, walk in robe (WIR) or ensuite				●						
Study or office without either built-in wardrobe, WIR or ensuite			●							
Theatre, Library, prayer room[2]		●	●							
Voids e.g. wall, plumbing, service ducts								●		
Walk-in-robe (WIR)					●					
WC, unventilated[5]					●		●			
WC, ventilated[5]					●	●				

1. All dwellings must contain only one main kitchen/living zone. All additional smaller kitchens/kitchenettes within the dwelling must be zoned as “living”.
2. If there are more than two living areas (excluding kitchen/living), then:
   a. the two largest living areas are zoned as “living” and
   b. the other areas are zoned as “daytime”.
3. The parent zone is the larger zone that the smaller zone is accessed from. If the parent zone is a kitchen/living, living or daytime zone, then model the smaller zone as daytime; if the parent zone is bedroom or nighttime, model the smaller zone as nighttime; if the parent zone is unconditioned, model the smaller zone as unconditioned. If there are two parent zones (i.e. 2 entries), model the smaller zone according to the larger of the two parent zones.
4. If the airlock requirements are met, model as unconditioned, if not, model as daytime.
5. Refer to Bathrooms, WCs and ensuites zoning rules.
6. For example, a hallway connecting a bedroom with a walk-in robe and/or ensuite
7. If enclosed, zone as a separate zone, else incorporate into the zone it is accessed from.

6 Floors

Important Note
States and territories may have specific safety requirements relating to roof or subfloor space access (including requirements that apply while remaining on ladder at attic access hatches). Assessors must ensure they identify and comply with all applicable regulatory requirements in the state or territory in which the assessment is being conducted, and act within the scope of their skills and training when undertaking NatHERS for existing homes assessments.

6.1 Floor height above ground

Assessors must input the average height of the lowest level of the dwelling above the natural ground level. Where the exact measurement cannot be determined, Assessors should apply the appropriate default value indicated in Table 6.1.

Table 6.1 - Default lowest level floor heights above ground

Lowest level floor type	Default floor height above ground
Concrete slab or waffle pod slab on ground	300 mm
Suspended floor with subfloor (enclosed, open or very open)	500 mm
Suspended floor above open air (no subfloor)	2000 mm
Apartment in a multi-storey building (when not on ground level)	Calculate the height based on 3 m for the ground floor plus 2.7 m per additional storey e.g. 5th floor apartment would be entered as a floor height of 13.8 m

Where a dwelling has multiple storeys, the floor height of the additional storeys above the lowest level should be calculated and input accordingly.

6.2 Floor area

Assessors must input the floor area of each zone. Some software tools may automatically calculate this measurement.

6.3 Floor construction type

Assessors must input the floor construction type for each zone.

Concrete slabs on ground are assumed to be uninsulated unless documentary evidence is available indicating the R-value/type of insulation installed or the presence of a waffle pod.

Where documentary evidence indicates a waffle pod slab, Assessors must model as such.

Table 6.2 - Examples of floor type and construction

Type/construction	Images and Description	
Concrete slab/ waffle pod slab on ground		
	Concrete slab laid directly on compacted soil, sand or gravel with no airspace/subfloor below. Common in apartment buildings and homes post 1980.	
Subfloor enclosed		
	Completely enclosed subfloor with minimum subfloor ventilation only. Garages with no internal access and basement carparks are considered to be enclosed subfloor.	
Subfloor Open		
	Enclosed subfloor with additional ventilation openings beyond minimum requirements. (Left image: DEECA)	
Subfloor very open		
	Open subfloor space with average clearance height of less than 2 m	
Elevated/outdoor air		
	Dwelling above outdoor air or open subfloor space with average clearance height of more than 2 m. (Right image: DEECA)	
Concrete		

Type/construction	Images and Description	
Timber		

6.4 Floor adjacency

Assessors must assign an adjacency for each zone based on Table 6.3.

Table 6.3 - Assigning floor adjacency

Floor	Adjacency
Concrete slab or waffle pod slab on ground	Ground
Dwelling above another separate dwelling	Neighbour
Suspended floor above fully enclosed, non-habitable sub-floor	Subfloor - enclosed
Suspended floor above open or partially open subfloor with one or two sub-floor walls, and clearance height of less than 2 metres	Subfloor - open
Suspended floor above fully open space with average clearance height of less than 2 metres	Subfloor – very open
Suspended floor above fully open space with average clearance height of 2 metres or more	Elevated/Outdoor air
Suspended floor above a conditioned zone of the same dwelling	Conditioned
Suspended floor above an unconditioned zone of the same dwelling	Unconditioned
Apartment directly above a common underground car park that is fully enclosed apart from required mechanical ventilation.	Subfloor - enclosed
Apartment directly above an underground car park that is <50% open to the outdoor air and with >50% wall area adjacent to earth).	Subfloor - open
Apartment directly above a highly ventilated car park that is ≥50% open to the outdoor air (e.g. an open car park with minimal or no external walls)	Elevated/outdoor air
Apartment directly above commercial premises, or mostly enclosed common public areas.	Neighbour
Apartment directly above a highly ventilated common public area.	Elevated/outdoor air
Apartment directly above a fully enclosed garage for its exclusive use, where it is accessed from the dwelling and shares floors, walls or ceilings with the dwelling, and has a separate vehicular access door.	Garage (include the garage as a zone within the rating)
Apartment directly above a fully enclosed individual garage with no direct access to the dwelling.	Subfloor - enclosed

6.5 Floor insulation

Assessors are responsible for identifying and complying with all relevant state or territory health and safety requirements relating to subfloor access.

Where the subfloor is enclosed, assessment of the floor insulation is only required to be undertaken from the sub-floor access hatch.

If access to the subfloor access hatch is available and it is deemed safe to do so, inspect and estimate the value of floor insulation, if any. Table 6.4 provides examples of common insulation types for reference.

If under floor insulation is observed but the exact R-value cannot be determined, Assessors should apply the default value of R2.0 for batt type and R1.0 for board type insulation.

If access to the sub-floor is not available or deemed unsafe, Assessors must apply the default insulation based on the floor type, building class, age and location of the dwelling – see insulation tables in Appendix 1.

By design, the default assumptions are intended to be conservative. Should a motivated homeowner choose to commission more rigorous/invasive testing to establish the presence or otherwise of insulation in areas where it cannot be easily observed by an Assessor, the testing results must be documented in a form that can be verified by and is acceptable to the Assessor.

Table 6.4 - Common types of floor insulation

Type	Example	Description
Batt		Batts are typically polyester or glass fibre stapled or strapped to hold in place.
Board		Large rigid boards typically made of polystyrene wedged in between floor joists.
CAUTION: High-risk insulation. Do not assess insulation where asbestos is suspected		
Asbestos insulation	Asbestos was used as insulation in some Australian homes. It is typically grey, white or brown and fibrous and may look similar to cellulose fibre.	

6.6 Floor coverings

Input the floor coverings (e.g. vinyl, carpet, tile) above the floor structure identified in all zones. Where a zone contains more than one floor covering type enter the one with the largest area. Ignore removable coverings e.g. rugs or mats.

6.7 Floor openings between levels

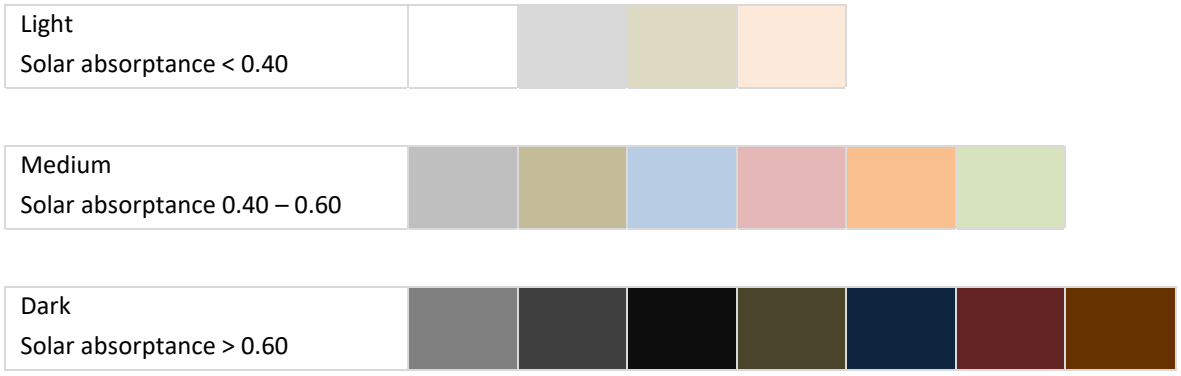
Assessors must model all horizontal openings between floors e.g. staircases.

7 Walls

7.1 External colour

Assessors must input the external wall colour or solar absorptance. Wall colours must be classified as light, medium or dark (Figure 7.1) and be based on the dominant wall colour where there are multiple colours.

Figure 7.1 - Colour estimation guide



7.2 Wall area

Assessors must input the area of each wall in a zone. Some software tools may automatically calculate this measurement.

7.3 Wall orientation

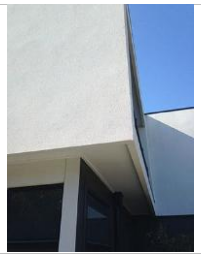
Assessors must input the orientation for each wall in a zone. Some software tools may automatically calculate this.

7.4 Wall construction type

Assessors must input the wall construction type for each wall in a zone. Where a wall has more than one construction type enter the dominant type (the one with the largest area). Where there is no dominant type, input the construction type that is closest to the zone's floor level. See Table 7.1 as a guide to determine the type.

Table 7.1 - Common wall construction types

Type	Example	Description
Brick veneer		Solid brick external, timber framed with plasterboard internal. Bricks may be rendered or bagged giving a smoother appearance. Knocking on the wall should give a more hollow sound than cavity/double brick.

Type	Example	Description
Fibre cement clad		Fibre cement sheet cladding attached to timber framed structure. Can be attached directly to the frame or battened out. Knocking on the wall should give a hollow sound (depending on insulation) and window depth will be narrow (timber wall frames are typically 70-90 mm).
Metal clad		Sheet steel cladding attached to timber framed structure. Typically, corrugated or flat profile. Can be attached directly to the frame or battened out. Knocking on the wall should give a hollow sound (depending on insulation) and window depth will be narrow (timber wall frames are typically 70-90 mm).
Timber clad		Timber weatherboard cladding attached to timber framed structure. Can be attached directly to the frame or battened out. Knocking on the wall should give a hollow sound (depending on insulation) and window depth will be narrow (timber wall frames are typically 70-90 mm).
Cavity/Double brick		Solid brick external and internal walls either separated by an air cavity or plaster between the two. Knocking on the internal wall should give a solid sound and the window depth will typically be deeper than brick veneer or timber framed.
Concrete block		Large grey blocks typically 400 x 200 mm and 200 mm thick which can be rendered or clad. Internal plasterboard may be direct fixed or battened out and can include insulation in between.
Concrete pre-cast panel		Large concrete panels which may be finished by sandblasting, exposed aggregate, cement-based renders or paint. Knocking on the internal wall may sound hollow if the internal wall has been battened out, or solid if the plaster has been fixed directly to the panels.
AAC (Autoclaved Aerated Concrete, Hebel)	Image coming soon	Large panels of aerated concrete with small voids/bubbles and typically an acrylic render. 75 mm thick with vertical joins.
Externally insulated façade		Made from expanded polystyrene (EPS) with a rendered finish which is typically cement. Lightweight panels approx. 100 mm thick. (Image: DEECA)

Type	Example	Description
Reverse brick veneer – fibre cement, timber or metal clad		Externally clad timber framed with bricks as the internal layer.
Straw bale – rendered		Walls are constructed of rendered bales of straw stacked on top of each other. Typically 450 mm thick. (Image: © Simone Cottrell via Your Home)

7.5 Wall insulation

Assessors must apply the default insulation based on the wall type, building class, age and location of the dwelling (see insulation tables in Appendix 1) or input as per documented evidence.

7.6 Wall adjacency

Assessors must enter the adjacency for each wall in a zone based on Table 7.2.

Table 7.2 - Internal wall adjacencies

Building Class	Wall adjacent to	Adjacency
Class 1 and Class 2	Another room in the same dwelling	Assign the zone(s) as known.
Class 1 and Class 2	Neighbouring dwelling	Neighbour
Class 1 and Class 2	Ground	Ground
Class 1 and Class 2	Roof space	Roof space
Class 2	Unconditioned common corridors with or without glazing	Neighbour
Class 2	Conditioned common corridors with or without glazing	Neighbour
Class 2	Lifts and enclosed stairwells	Neighbour
Class 2	Common corridors open to external air (i.e. corridors with permanent openings).	Model: - an external wall - an entrance door - any horizontal shading - any vertical shading

8 Windows and doors

8.1 Doors and permanent openings

For different types of doors and permanent openings, Assessors must model the below inputs:

- External solid doors - size, construction type and insulation where applicable
- External glazed doors - size, operating type, frame material, glazing type and glazing description. Externally glazed doors must be modelled as follows (Table 8.1)
    - Fully glazed doors are modelled as windows
    - Partially glazed doors are modelled as 50% fixed window for the glazed portion, and 50% solid door for the remaining component
    - If the glazing component is less than 25% of the door, it is modelled as a solid door. See Table 8.1.
- Internal doors – size only
- Permanent openings between internal zones – size only

Where the software tool does not automatically assign a size for a door or permanent opening, Assessors must either enter the size as measured or apply default values as listed in Table 8.2.

Assessors should input garage door insulation when applicable. Where there is evidence the garage door is insulated, but the R-value exact insulative value cannot be determined, Assessors should apply the default value of R1.1.

Table 8.1 - Modelling glazed and partially glazed doors

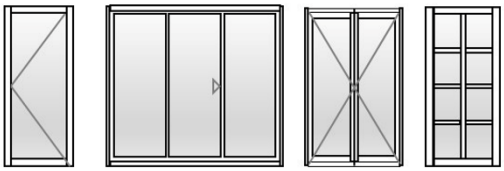
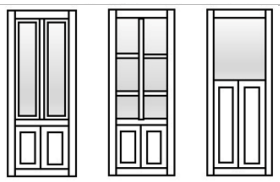
Glazing	Examples	How to model
Fully glazed		Model as a window with openability as per Table 8.6
Partially glazed (>25% to <75%)		Model as 50% casement window and 50% solid door
Minor (≤25%) or no glazing		Model as a solid door

Table 8.2 - Default door sizes

Door type	Default size
External access door	820 mm x 2100 mm
Single garage door (to accommodate car entry)	2400 mm x 2100 mm
Double garage door (to accommodate car entry)	4800 mm x 2100 mm
Internal single door or permanent opening	820 mm x 2040 mm
Internal double door or permanent opening	1640 mm x 2040 mm

8.2 Windows

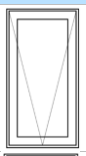
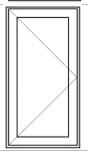
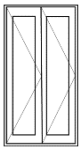
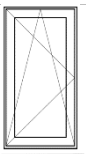
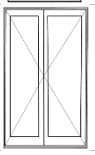
Assessors must input all windows, including the area, head height and offset in the wall and assign these to the appropriate walls in each zone. Some software tools may automatically calculate some of these values.

When inputting windows and glazed doors, Assessors must select the appropriate:

- operating type – Type A or Type B (see Table 8.3)
- frame material – aluminium, timber, uPVC, composite or thermally broken aluminium (see Table 8.4)
- glazing type – single, double air filled, or double argon filled (see Table 8.5)
- glazing description - clear, tinted, low-e clear or low-e tint

The software will automatically apply NatHERS default window performance values.

Table 8.3 - Window and glazed door operating types

Operating type	Window type	Image	Description
Type A Windows and doors with a larger frame fraction	Awning		Awning windows have one or more sashes that are hinged at the top and open outwards.
	Casement or hinged		Casement windows have one or more sashes that are hinged at the side and can open outwards or inwards.
	Bifold		Bifold windows have two or more sashes. The first sash is hinged to the window jamb and subsequent sashes are hinged to the preceding sash and open outwards.
	Tilt’n’turn		Tilt’n’turn windows have complex hinging which enables the casement sash to open inwards from the side or be tilted inwards from the bottom.
	French doors		French doors have two hinged door panels and open inwards or outwards.

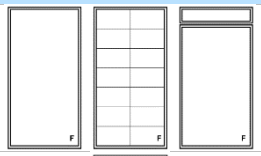
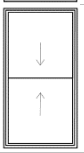
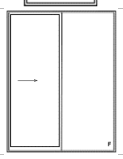
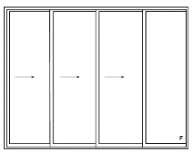
Operating type	Window type	Image	Description
Type B Windows and doors with a smaller frame fraction	Fixed		Fixed windows have no operable components and may be divided by mullions and transoms.
	Double hung		Double hung windows have two sashes that slide vertically. They can also be single hung, in which the top or bottom sash is fixed.
	Louvre		Louvre windows have multiple moveable glass panels or blades that pivot horizontally.
	Sliding		Sliding windows and doors have one or more horizontal sliding sashes.
	Stacker doors		Stacker doors have two or more sliding panels that, when fully open, cover the fixed panel, or the fixed panels are not visible because the doors slide into a wall cavity.

Table 8.4 - Window and glazed door frame materials

Frame material	Example	Description
Aluminium		Frames are commonly a light silver but can be anodised or painted various colours. Cold to touch and are hollow so might sound light.
Timber		Frames can be various thicknesses and might have a wood grain pattern but are often painted.
uPVC		Made from uPVC and sounds light like plastic when tapped. Frames are often white and thick.
Composite	Image coming soon	Composite frames have aluminium profiles externally with either timber or uPVC internally.

Frame material	Example	Description
Thermally broken aluminium	Image coming soon	Both internal and external profiles are aluminium and are connected by a structural insulator (typically a low-conductivity structural polymer) that 'breaks' the thermal connection of the frames to reduce heat flow.

Thermally broken aluminium frames must only be selected when documentary evidence can be provided.

Table 8.5 - Examples of glazing type

Frame material	Example	Description
Single		Only one piece of glass within the frame.
Double		Two separate pieces of glass with a gap between them which creates an insulating barrier. There is an obvious gap between the two panes at the edge of the window which is usually black.
Tinted (Toned, Opaque)		Either tinted, coloured or opaque i.e. NOT clear.

Obscure glass (e.g. in a bathroom or WC) must be modelled as either:

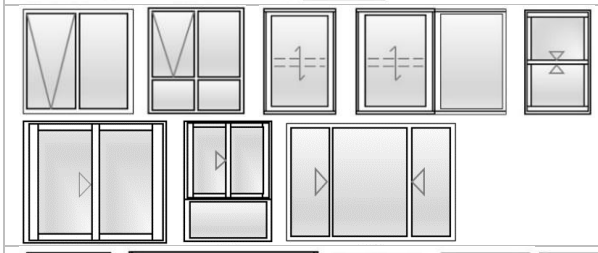
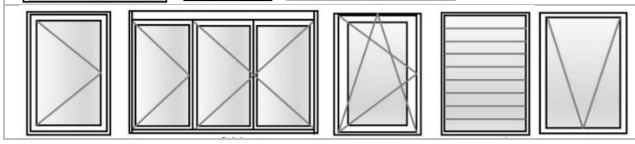
- clear - if the glass is clear patterned or
- tinted – if the glass has a tint or translucent laminate

Low-e glazing and argon filled double glazing must only be selected when documentary evidence can be provided.

8.3 Window openability

Where the NatHERS Software tool allows, the simplified openability of windows is to be entered as specified in Table 8.6 or alternatively a precise openability percentage may be entered.

Table 8.6 - Modelling window openability

Examples of windows	How to model
	Fixed
	Openable e.g. sliding, double hung and combination windows (i.e. part fixed and part operable).
	Highly openable e.g. awning, casement, louvre, tilt 'n' turn

8.4 Internal window coverings

Internal window coverings must be modelled where present. Assessors must only input window coverings that fully cover the window. Where there are multiple window coverings, only include those layers that fully cover the window.

There are two methods for window coverings to be entered into the software:

Method 1 – the Assessor enters only the type of window covering and conservative default window covering characteristic values are applied in the software based on the window covering type.

Method 2 – the Assessor enters the type of window covering and also enters the 4 window covering characteristics that allow a more accurate rating.

The window covering types available for selection are:

- holland blinds (roller)
- venetian blinds (includes metal plantation shutters)
- roman blinds
- vertical blinds
- honeycomb blinds (multiple layers separated by air and low through airflow fabric)
- plantation shutters (thick solid layers not made of metal – see also venetian blinds)
- open weave curtains
- close weave curtains
- heavy drapes (multiple layers separated by air and low through airflow lining)

Where pelmets or any other improved window covering features are present, these must be entered using Method 2.

The 4 window covering characteristics, for use under Method 2, are:

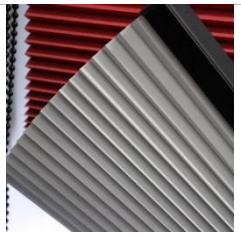
- outside appearance
- light transmittance through the window covering
- insulative value of the covering material
- fit of the window covering

8.4.1 Outside appearance of window coverings (colour)

When modelling windows using Method 2, Assessors must model the outward facing surface of the window covering in accordance with Table 8.7. Figure 8.1 provides examples of outside appearance for reference purposes.

Figure 8.1 - Examples of outside appearance

A roman blind lifted to show a light colour lining on the external side



A cellular shade lifted to show a dull metallic (medium colour) coating on the external side

A curtain lifted to show a separate light colour lining on the external side

When determining if a window covering is bright metallic Assessors should refer to the additional guidance in Table 8.12.

Table 8.7 - Classification of outside appearance of window coverings

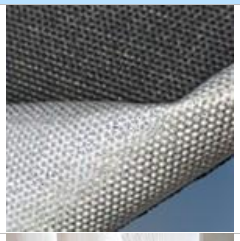
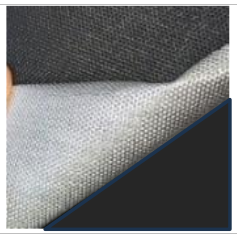
Classification	Example	Description
Bright metallic		Very bright, shiny metallic surface finish or coating on fabric similar in appearance to chrome or shiny kitchen foil. Metallic coatings which are dull silver or darker in colour should be classified as 'Medium'.
Light		Light coloured fabric, paint, coating, natural timber or timber finish. White, off-white to very pale pastel colours.
Medium		Medium coloured fabric, paint, coating, natural timber or timber finish. Note the 'medium' category for window coverings is still quite light in tone.
Dark		Darker coloured fabric, paint, coating, natural timber or timber finish.

Table 8.8 shows examples of window coverings from the 4 colour classification categories.

Table 8.8 - Examples of window covering colour classification

Bright Metallic		
		
Bright metallic coated fabric	Bright metallic fabric shown adjacent to dull metallic fabric for comparative purposes	
Light		
		
A white painted timber venetian blind	A fabric roller blind with a light colour blockout coating on the street side	An off-white roller blind with no street-side coating
Medium		
		
A venetian blind with a medium tone natural timber finish	A dull silver (dull metallic=medium colour) venetian blind	A patterned fabric, predominantly medium toned
Dark		
		
A venetian blind with a dark natural timber finish	A patterned fabric, predominantly dark toned	A dark toned fabric, partly transparent but with dark threads

8.4.2 Light transmittance

Assessors using Method 2 must estimate the amount of light passing through the window covering when it is fully closed in accordance with Table 8.9. When making this classification:

- do not consider light entering around the edges of the window covering and
- include all layers of the window covering together

Table 8.9 - Light transmittance through window coverings

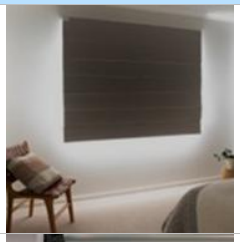
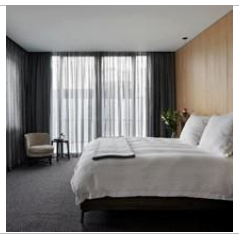
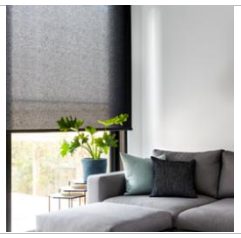
Classification	Example	Description when the covering is fully closed
Little to no light		A completely or almost totally dark room. It is not possible to see through the window covering. No light, tiny pinpricks of light or a very faint glow may be visible from bright outdoor light through the window covering.
Some light		A dim or shaded room but not totally dark. It may be possible to see a darkened view of the outside through the window covering, or it may be possible to see a soft glow from bright outdoor light through the window covering.
A lot of light		A brightly lit room. It may be possible to see a bright view of the outside through the window covering, or it may be possible to see a bright glow from outdoor light through the window covering.

Table 8.10 shows examples of window coverings from the 3 light transmittance classification categories.

Table 8.10 - Examples for light transmittance through window coverings

Little to no light		
		
Curtain with block-out lining	Plantation shutter	Panel glide shade with a dense weave

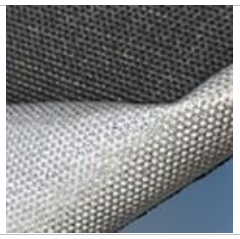
Some light		
		
Dark grey open weave fabric curtain. A darkened view outside is visible through the window covering.	Black translucent fabric roller blind. A soft glow from outdoor light. is visible.	Close-up of translucent fabric roller blind. A darkened view outside is visible through the window covering.
A lot of light		
		
Sheer roller blind. A bright glow from outside light is visible.	An example of a very sheer fabric that would let a lot of light pass through.	A sheer curtain allowing bright diffuse light into a room.

8.4.3 Insulative value of window coverings

Assessors using Method 2 must estimate the insulative value of window coverings (all layers together). There are two classifications:

- More insulating – must have either:
  - bright metallic outside appearance or
  - multiple layers separated by air and one layer being low through-airflow or
  - is a thick (>5 mm) solid non-metallic layer
- Less insulating – all other coverings

Table 8.11 – Examples of insulative value of 'more insulating'

			
Bright metallic street-side surface	Multiple layers separated by air, low through-airflow fabric	Multiple layers separated by air, low through-airflow lining	Thick solid layers not made of metal

To assist in determining the insulative value of window coverings, Assessors should refer to the guidance provided in Table 8.12.

Table 8.12 - Examples for determining insulative value of window coverings

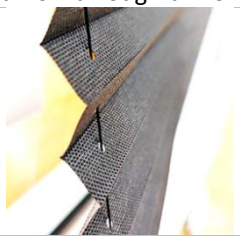
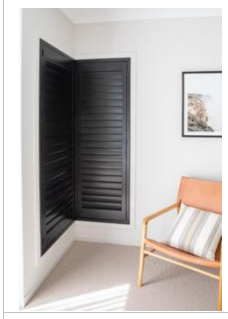
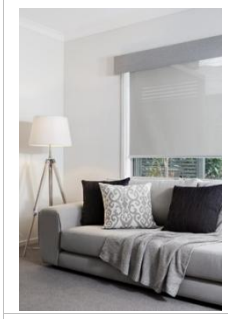
1. Examples of when window coverings can be categorised as 'More Insulating' based on bright metallic outside appearance		
		
YES: Bright metallic coated fabric	NO: brushed metallic venetian blind finish (categorise as 'Medium')	NO: Darker / Dull metallic coated fabric (categorise as 'Medium')
From a distance, the outside surface may appear dull grey due to the woven texture but close up the individual threads are very bright silver and reflective. Fabrics with this type of coating have a low infrared emissivity which contributes to the insulation level of the window covering		
2. Examples of when window coverings can be categorised as 'More Insulating' based on multiple layers separated by air AND at least one layer with low through-airflow		
		
YES: Cellular/honeycomb shade with enclosed air pockets and low through-airflow fabric	NO: Pleated shade with no enclosed air pockets	NO: Cellular/honeycomb shade with high through-airflow fabric
		
YES: Heavy curtain with a separate densely woven lining creating an enclosed air pocket	YES: Heavy curtain with a separate densely woven lining creating an enclosed air pocket	NO: Lined roman blind with no significant airgap between front and back fabrics
3. Examples of when a window covering can be categorised as 'More Insulating' based on a thick layer of material other than metal		
		
YES: Thick (> 5 mm), timber plantation shutter louvres	NO: Thin (< 5mm) timber venetian blind slats	NO: Thick metal plantation shutter louvres (showing end caps)
This feature is mainly found in plantation shutters. Plantation shutters have thick louvres with a rectangle or ellipse-shaped cross section mounted in a frame. To tell if the louvres are made of metal, look for end caps on the louvres and tap the louvre – metal makes a sharp noise, timber, composite and polymer louvres will make a dull noise.		

Table 8.13 shows 3 examples of how to classify internal window coverings.

Table 8.13 - Example internal window covering assessments

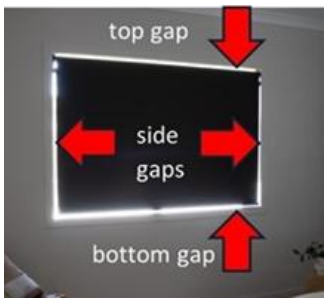
Example	Classification	Description
	Outside appearance: Dark	Black paint finish on louvres on both street-side and room side
	Light transmittance: Little to no light	Solid window covering totally blocks light
	Window covering fit: Medium	Largest gap is 2 mm side gaps to window frame Through air flow medium between louvres
	Insulative value: More insulating	Thick solid timber louvre blades
	Outside appearance: Medium	Light grey tone colour on both street-side and room side)
	Light transmittance: Some light	A moderate level of light passes through the fabric
	Window covering fit: Loose fitting	Largest gap is 15 mm side gaps to window reveal Through air flow medium
	Insulative value: Less insulating	Single layer of fabric
	Outside appearance: Light	White sheer curtain closest to window and white lining on outside of second layer
	Light transmittance: Little to no light	Block-out lining
	Window covering fit: Fully enclosed	Largest gap is <1 mm gaps – pelmet flush to wall, curtain flush to walls at side edges, curtain flush to floor at bottom edge Through air flow: low - block- out lining Note: Consider only the heavy curtain as the low through air flow fabric of the lined heavy curtain and small edge gaps for this covering will give a higher classification than the sheer curtain
	Insulative value: More insulating	Multiple layers of fabric – curtain and lining - with an air gap between

8.4.4 Window covering fit

Assessors using Method 2 must estimate the window covering fit (air flow through and around) based on:

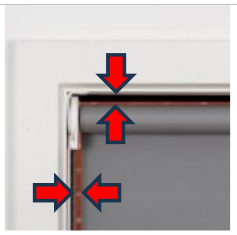
- gaps between the window covering and the nearest frame or wall surface at the top, sides and bottom (Figure 8.2)
- any air flow that can pass through the window covering itself

Figure 8.2 - Top, side and bottom edge gaps of window coverings



The location of the edge gaps depends on the type and mounting of the window covering, some gaps may be located behind the window covering.

Figure 8.3 - Examples of edge gaps on different window coverings



Reveal mounted - measure top and side gaps to frame/reveal. Top gap above top of covering

Face mounted or above window frame – measure top and side gaps to frame/wall. Top gap behind top of covering

Ceiling mounted – measure top gap to track, side gaps to frame/wall. Top gap is above top of covering

Window covering fit can be determined using Table 8.14 with additional reference to Table 8.15 and Table 8.16.

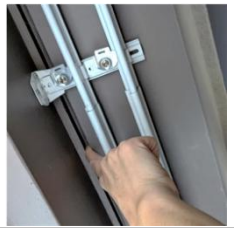
If there are multiple window coverings, only assess the one that gives the highest classification in this category (i.e. smallest gaps and/or lowest through-airflow) or if it is not clear which covering would give the higher classification, assess the covering closest to the window.

Table 8.14 - Classification of window covering fit

Classification	Largest measured gap size	Through air flow	Examples
Loose fitting	Not applicable	High flow	Venetian blinds, vertical blinds, mesh or lace curtains Cellular blind (low through-airflow) with large edge gaps Curtain on rod or rail not touching ceiling (top gap ≥ 20 mm) Curtain with pelmet: no top surface (top gap ≥ 20 mm)
	≥ 20 mm	Not applicable	
	< 20 mm	High / restricted / medium	
Medium fitting	< 20 mm	Low	Plantation shutters (medium through-airflow) with small (< 4 mm) edge gaps Curtains with a pelmet and small edge gaps without blockout/thermal lining or coating (medium through-airflow) Reveal-mounted roller blind with small top and edge gaps
	< 4 mm	Restricted / medium	
Close fitting	< 4 mm	Low	Reveal-mounted pleated or cellular blind (low through-airflow) with very small edge gaps (gaps <4 mm)
	< 1 mm	Restricted / medium	

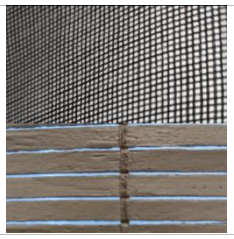
Classification	Largest measured gap size	Through air flow	Examples
Fully enclosed	< 1 mm	Low	Roller blinds (with blockout coating) with enclosed side channels Cellular blinds with enclosed side channels Curtains hanging to floor or sill with an enclosed pelmet and with blockout/thermal lining or coating (low through-airflow)

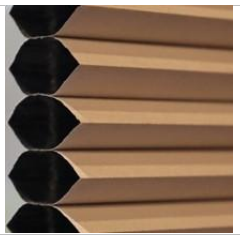
Table 8.15 - Examples for determining gap size classification

1. Examples illustrating top gaps		
		
Curtain hanging from a rail (> 20 mm top gap behind top of curtain to wall)	Cellular shade mounted in the window reveal (< 4 mm top gap above top of headrail to reveal)	Roman blind face-mounted flush to the wall above the window frame (< 1 mm top gap behind top rail to wall)
Pelmets are boxes which cover the top edge of a window covering. They can improve the thermal performance of the window covering by reducing the top gap size provided they are mounted flush to the wall or window reveal and are enclosed on the top, front and sides.		
		
A pelmet covering the top edge of a curtain and enclosed at the front and sides. Check from below/behind the curtain to see the top surface of the pelmet.	A view of a pelmet from below showing that the pelmet has a top surface and is mounted close to the wall (top gap < 1 mm)	A pelmet viewed from below showing that it is not flush to the wall (top gap between 4 and 20 mm)

2. Examples illustrating side gaps		
		
Roller blind mounted in the window reveal (side gap > 20 mm to reveal)	Face mounted curtain with edges not hanging flush to wall (side gap 4 - 20 mm to wall)	Reveal mounted plantation shutter (side gap < 1mm to reveal)
Side channels can be installed on roller blinds and cellular blinds which enclose the side edges of the window covering and effectively reduce the edge gaps to zero.		
		
A cellular blind with side channels that enclose the side edges of the window covering	A roller blind with side channels that enclose the edges of the window covering	
3. Examples illustrating bottom gaps		
		
Curtain hanging with a gap to floor (bottom gap between 4 mm and 20 mm)	Gap at lower edge of plantation shutter (< 4 mm bottom gap)	Curtain hanging flush to floor (< 1 mm bottom gap)

Table 8.16 - Examples for determining through air flow classification

1. High through air flow		
		
An open mesh fabric (above) A natural woven window covering with significant open area (below)	Vertical blinds	Venetian blinds

2. Medium through air flow		
		
Plantation shutters with louvres that close tightly (< 4 mm gaps between louvres)		
3. Low through air flow		
		
A roller blind with a blockout coating on the street side	A roman blind with a densely woven lining	A cellular/honeycomb blind with a dense non-woven fabric

8.5 External window coverings

Assessors must input all external window coverings when present. Where the exact shade factor cannot be determined Assessors should apply the default value of 70% (which is equivalent of selecting canvas blind or roller shutter in the software).

Figure 8.4 - Examples of external window coverings


Canvas blind


Roller shutters

8.6 Skylights and roof windows

In NatHERS for existing homes assessments skylights and roof windows are defined differently based on the ceiling/roof type they are built into.

- Skylights – model in zones with an attic roof space adjacent to the ceiling of the zone. Skylights typically have either plasterboard shaft walls or a reflective tube that funnels the light from the roof into the zone below.
- Roof windows – model in zones with a flat or raked roof. Roof windows do not have a shaft or tube and are installed directly in the ceiling/roof construction of the zone.

Assessors must input all skylights in each zone, including the area, type, openability, orientation and internal coverings if present. Where exact details cannot be determined for a specific input, Assessors should select the appropriate default value as per Table 8.17.

Assessors must input all roof windows in each zone, including the area, type, orientation, pitch and internal coverings if present. Where exact details cannot be determined for a specific input, Assessors should select the appropriate default value as per Table 8.17.

Table 8.17 - Skylight and roof window default values

Type	Details	Default values to apply
Skylight – standard	Azimuth	No default available, must be as per site details
	Pitch	No default available, must be as per site details
	Construction	Single glazed clear
	Outdoor shading	None
	Openability	0%
	Area	Standard size - 0.5 m^2 (select this option when both length and width are ≤1000 mm)
		Large size - 1.2 m^2 (select this option when either length or width are >1000mm but both length and width are ≤1200 mm)
		Very large size - no default available, must be measured as per site details (select this option when either length or width are >1200 mm)
	Shaft length	1000 mm
	Shaft reflectance	0.75
	Shaft insulation (R-value)	0
Skylight - tubular	Azimuth	0
	Pitch	No default available, must be as per site details
	Construction	Single glazed clear
	Outdoor shading	None
	Area	0.09 m2

Type	Details	Default values to apply
	Shaft length	1000 mm
	Shaft reflectance	0.9
	Shaft insulation (R-value)	0
Roof window	Azimuth	No default available, must be as per site details
	Pitch	No default available, must be as per site details
	Construction	Single glazed clear
	Outdoor shading	None
	Indoor shading	None
	Openability	0%
	Area	Standard size - 0.5m 2 (select this option when both length and width are ≤1000 mm)
		Large size - 1.2 m2 (select this option when either length or width are >1000 mm but both length and width are ≤1200 mm)
		Very large size - no default available, must be measured as per site details (select this option when either length or width are >1200 mm)

Orientation can be derived from satellite image or using a compass onsite. Pitch of the skylight is entered based on the pitch of the ceiling/roof in the zone into categories of:

- Flat - < 10 deg
- Moderate – 10deg to 35deg
- Steep - > 35deg

Figure 8.5 - Determining orientation of skylights/roof windows

Orientation from satellite image	Orientation from compass
	

9 Ceilings and Roofs

Important Note
States and territories may have specific safety requirements relating to roof or subfloor space access (including requirements that apply while remaining on ladder at attic access hatches). Assessors are responsible for identifying and complying with all applicable regulatory requirements in the state or territory in which the assessment is being conducted, and for acting within the scope of their skills and training when undertaking NatHERS for existing homes assessments.

9.1 Roof colour

Assessors must estimate the roof colour as either light, medium or dark as per the colour estimation chart Figure 7.1

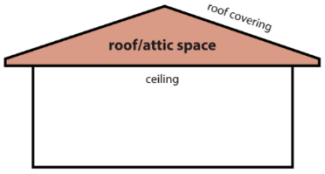
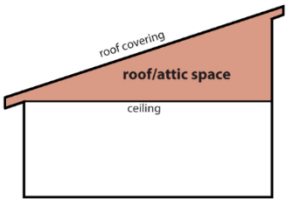
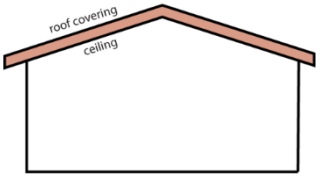
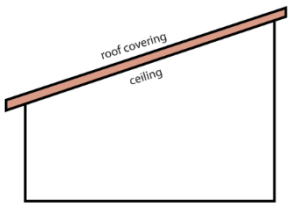
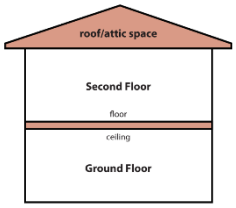
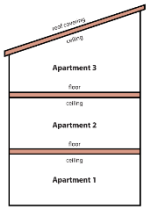
9.2 Ceiling/roof area

Assessors must input the area of the ceiling in each zone. Some software tools may automatically calculate this measurement.

9.3 Ceiling/roof construction

Assessors must input the ceiling/roof construction type in each zone – see Table 9.1.

Table 9.1 - Examples of ceiling/roof type and construction

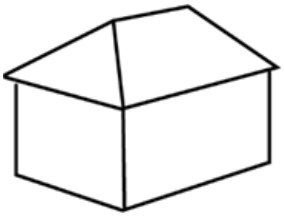
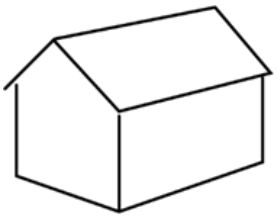
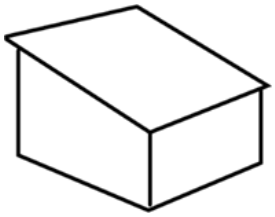
Type/construction	Images and Description
Attic	 
	The typical roof/ceiling construction has a separate roof space or attic space and may use roof trusses. The ceiling lining is generally horizontal (i.e. flat) or can be sloped/raked at a different angle to the roof pitch (but still creating a separate roof space). The roof/attic space needs the degree of ventilation to be nominated.
Raked/cathedral/flat	 
	Raked roofs/ceilings, also known as cathedral ceilings, typically have the ceiling lining parallel to the roof covering; there is no separate roof space. The roof/ceiling construction may be an insulated composite roof product (e.g. a solid product that includes ceiling lining, insulation and roof covering).
Ceiling	 
	The ceiling of the lower level zones is adjacent to the zones on the higher levels and is modelled as 'ceiling'. In Class 2 dwellings the adjacency would then be set to neighbour.

Type/construction	Images and Description	
Tile		
	Typically terracotta or concrete in a range of colours	
Metal		
	Typically corrugated sheet metal in a range of colours	
Concrete		
	Concrete ceilings are most common in apartments between floors, can have a popcorn appearance in older dwellings.	

9.4 Roof Shape

In the case of an attic roof, Assessors must input the shape of the roof i.e. hip, gable or single pitch - Table 9.2.

Table 9.2 - Roof shape classifications for attic roofs

Classification	Example	Description
Hip roof		All sections of the roof slope downwards to the walls. Hip roofs model minimal roof space volume.
Gable roof		Two roof sections slope in opposite directions with the highest horizontal edges forming the roof ridge; vertical roof sections are at each end.
Single pitch		Unlike a hip or gable roof, where each has at least two sloping sides, a skillion roof is single-pitched, with only one slope and no centre ridge.

9.5 Ceiling/roof adjacency

Assessors must assign the appropriate ceiling/roof adjacency as per Table 9.3.

Table 9.3 - Ceiling/roof adjacencies

Ceiling/roof adjacent to …	Adjacency
Roof space e.g. attic roof	Roof space
Neighbouring dwelling	Neighbour
An upper floor of the same dwelling	Internal

9.6 Roof space ventilation

Assessors must select the roof space ventilation category as per Table 9.4.

Table 9.4 - Roof space ventilation categories

Type	Description/Options	Specifications
Roof surface	Metal, tile or concrete roof with sarking	Continuous
	Tile roof without sarking	Discontinuous
Roof space ventilation	No dedicated roof space ventilator	Min
	- Wind-driven roof space ventilator (whirly bird) or - ridge caps or - eave vents or - tiled roof without sarking	Natural
	Eave vents and powered roof space ventilator	Mechanical

Figure 9.1 - Sarked and unsarked tile roof

Sarked roof	Unsarked roof
	

Figure 9.2 - Wind driven roof space ventilator

9.7 Ceiling /roof insulation R-value

Assessors are responsible for identifying and complying with any relevant state or territory health and safety requirements relating to roof space access.

Where documentation of ceiling/roof insulation is available (e.g. NatHERS New Home Certificate or product receipts) Assessors must input the R-value of the insulation indicated unless a visual inspection reveals the documentation to be incorrect in which case the visual inspection overrides the documentation.

If access to the attic roof space access hatch is available and it is deemed safe to do so, inspect and estimate the value of ceiling insulation based on type and thickness. Assessing the insulation in an attic roof space is only required to be undertaken from the attic access hatch whilst remaining on the ladder. Table 9.5 provides examples of common ceiling insulation types for reference.

If there is no roof cavity (e.g. raked/flat) or access to the attic roof space is not available or deemed unsafe, and no documentary evidence is available, Assessors must apply the default insulation based on the building class, age and location of the dwelling (see insulation tables in Appendix 1).

Table 9.5 – Common types of ceiling insulation

Type	Images and Description
Glass fibre (fibreglass, earth wool)	 
	The most common type of insulation. Typically batts or blankets but may also be blown in. Made from tiny glass fibres in a form like wool which is thick and fluffy. Yellow, pink, green or brown in colour. (Left image: DEECA)
Polyester	
	Available in batts, blankets or rolls. Made from polyester (synthetic material) it is soft to touch and light and fluffy. Typically white or sometimes green in colour.
Cellulose fibre	 
	The most common blow in insulation. Made from wood or paper it is dense and clumpy. Typically grey or brown if aged. Note: can be difficult to distinguish from loose-fill asbestos insulation – do not assess insulation where asbestos is suspected.

Type	Images and Description
Rockwool (mineral wool)	Image coming soon
	Less common, available in batts or blown in. Made from tiny fibres of rock (such as basalt) in a form like wool. Batts are dense and semi-rigid. Typically yellow-brown in colour.
CAUTION: High-risk insulation. Do not assess insulation where asbestos is suspected	
Asbestos insulation	Loose-fill asbestos was used as insulation in some Australian homes. It is typically grey, white or brown and fibrous and may look similar to cellulose fibre.

9.8 Ceiling insulation coverage

Assessors must input the appropriate category of ceiling insulation loss (e.g. gaps between insulation products due to poor installation or removal) as per the categories in Table 9.6. This estimate must exclude clearances around exhaust fans and other ceiling penetrations. If insulation is not observable, Assessors must select the default value of moderate gaps.

Table 9.6 - Categories of insulation loss

Category	Description
No gaps	0% missing
Minor	0% to < 2% missing
Moderate (default)	2% to < 4% missing
Significant	4% to < 8% missing
Very significant	≥ 8% missing

Assessors must also model insulation clearances around the ceiling penetrations listed in Table 9.7. Note that heating and cooling appliance duct outlets are not modelled as ceiling penetrations.

Table 9.7 -Default ceiling penetration sizing and insulation clearances

Type of ceiling penetration	Penetration size and insulation clearance
ceiling exhaust fan/rangehood/fan light heater	250mm diameter + 50mm clearance
ceiling vent/ceiling rose	250mm diameter + 50mm clearance
chimney/fireplace	500mm x 350mm + 50mm clearance
unsealed recessed downlight	90mm diameter + 50mm clearance

Rangehoods ducted to the outside through the wall are not modelled as ceiling penetrations and no gap in insulation is assumed.

9.9 Ceiling fans

Assessors must input all ceiling fans when present. Where an exact diameter cannot be determined, Assessors should apply the default value of 1200 mm.

10 Shading

Shading inputs in existing home assessments are simplified compared to new home assessments.

Vegetation, including protected trees, must not be modelled.

10.1 Horizontal shading

Assessors must input horizontal shading features that shade the walls and/or windows of each zone including eaves, pergolas, balconies from upper levels, window hoods etc. Figure 10.1 outlines the required measurements.

Where there are multiple horizontal shade features, Assessors are only required to model the single shade feature which the assessor determines to have the greatest influence on the walls/windows they are shading.

Assessors may ignore horizontal shading features if the depth of the overhang is less than the vertical offset (e.g. the shading impact of a 2nd-storey eave on a 1st-storey wall).

Where exact measurements of horizontal shading features cannot be determined, Assessors should select default values from the simplified categories in Table 10.1.

Figure 10.1 – Horizontal shading measurements

Measurement description	Example image
Projection of shade feature (overhang width) – measured from the face of the shaded external wall/window to the outer edge of the shading feature	
Vertical offset – measured from the top of the shaded wall to the underside of the shading feature (may be negative)	
Length – measured parallel to the shaded wall	
Horizontal offset - measured from the right end of the shading feature to the right end of the shaded wall (when looking out from inside the dwelling)	

Table 10.1 - Horizontal shading simplified method

Measurement	Simplification method
Projection of shade feature (overhang width)	Estimate and select appropriate category (300 mm increments)
Vertical offset	Estimate and select appropriate category
Length of the overhang	No input required Assumed to be equal to: the width of the wall plus 2 x the depth of the shading feature
Horizontal offset	No input required Assumed to be the same as the depth of the shading feature

10.2 Vertical shading

Assessors must model vertical shading features (obstructions parallel to dwelling) that shade the dwelling including neighbouring buildings, fences, opposite walls of the same dwelling (e.g. courtyards) etc.

Figure 10.2 outlines the required measurements.

Where there are multiple vertical shade features, Assessors are only required to model the single shade feature which is considered to have the greatest influence on the walls and/or windows they are shading.

Assessors may ignore vertical shading features:

- which are not directly opposite the centre of the shaded walls or windows (i.e. a line drawn perpendicular to the wall/windows, emerging from the wall's centre, would not pass through the shading feature)
- where there is no window in the external wall shaded by the feature in a particular zone
- located to the south of a dwelling being assessed (between the midpoints SSE and S, and S and SSW, i.e. within the range of 168°45' to 191°15'), except where the dwelling is located north of the Tropic of Capricorn where they must be modelled
- where the features is a fence more than 6 m away
- where the feature is a single storey neighbour more than 10 m away and
- where the feature is a double storey or more neighbour more than 20 m away.

Where exact measurements of vertical shading features cannot be determined, Assessors should select default values from the simplified categories as indicated in Table 10.2.

Figure 10.2 - Vertical shading measurements

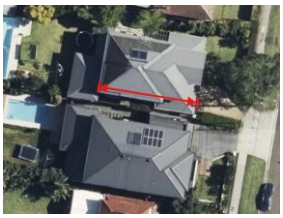
Measurement description	Example image
Height of shade feature – measured from the base height of the subject wall i.e. the wall the shade feature is being applied to	 Ground floor subject wall
Height of shade feature – measured from the base height of the subject wall i.e. the wall the shade feature is being applied to	 1st floor subject wall
Distance – as measured perpendicular from the middle of the subject wall to the shading feature	
Width of shade feature	
Horizontal offset – measured from the right end of the shading feature to the right end of the wall (when looking out from inside the dwelling)	

Table 10.2 - Vertical shading simplified method

Measurement	Simplified input
Height	Select appropriate height category in the software i.e. fence, single storey, 2 storey, 3 storey, 4-6 storeys, 7+ storeys. This height should be relative to the base height of the subject wall.
Distance	Select the appropriate distance category in the software i.e. <1 m, 1-2.5 m, 2.5-5 m, 5-10 m, 10 m+. This is from the subject wall.
Width of shade feature	No input required Calculation of width is determined automatically by the software based on the selected horizontal offset category with the following values applied: Shade feature predominantly to the right: assumed width = wall width + 5 m Shade feature predominantly to the left: assumed width = wall width + 5 m Shade feature approximately centred: width = wall width + 10 m
Horizontal offset	Select as appropriate: • Shade feature is predominantly to the right • Shade feature is approximately centred • Shade feature is predominantly to the left.

When measuring the height of a shading feature, Assessors must allow for any slope in the landscape e.g. if a neighbouring house is 3 m high, but the floor level of that house is 2 m above the house being assessed then the height of the shading feature is 5 m.

11 Airtightness

There are two options to measure air leakage in a NatHERS for existing homes assessment:

- a blower door test assessment, at the homeowner's cost or
- a visual airtightness assessment.

11.1 Blower door test

Blower door tests can identify the sources of air leakage in a dwelling and represent the best available and most accurate method for measuring a dwelling's airtightness.

A blower door test must be undertaken by a qualified and certified technician registered with the Airtightness Testing and Measurement Association (ATTMA) Australia.

Blower door test results are entered in terms of the air permeability of the building envelope in m3/hr.m2 i.e. the cubic meters per hour of air leakage for every square metre of building envelope (floor, ceiling, and walls).

11.2 Visual airtightness assessment

Where documentation from a blower door test is not available, Assessors must model all air leakage points as per Table 11.1 when present. Refer to Table 9.7 for default sizing to apply for ceiling penetrations.

Table 11.1 - Modelling air leakage

Air leakage points	Classification/Input	Description
Unsealed recessed downlights	Minimal	Thin ring downlight - some air leakage
	Moderate	Gimballed downlight – light can swivel within housing
	Large	Older style 'tin can' downlight – typically larger fitting with incandescent/compact fluorescent globes
Exhaust fans	Sealed	Sealed with self-closing mechanism
	Unsealed (default)	No sealing mechanism.
External Doors	Sealed	Door has weatherstripping at the base and no gaps anywhere around the frame or the door is sealed by the nature of its construction
	Unsealed (default)	Door has gaps anywhere around the frame
Windows	Sealed	Window has no gaps between the operable part and the window frame or is sealed by the nature of its construction (e.g. weather-stripped, fixed/non-operable)
	Unsealed (default)	Window has gaps anywhere between the operable part and the window frame

Air leakage points	Classification/Input	Description
Chimney/open fireplace (ignore if permanently blocked)	With damper	Damper can be opened or closed to prevent uncontrolled airflow when not in use. Select this option where other non-permanent sealing devices are installed e.g. tight-fitting foam or board insert.
	Without damper (default)	No damper/sealing mechanism
Ceiling vents/ceiling rose	Present/absent	Unsealed vents only. Ignore sealed vents. Vented ceiling roses should be modelled as an unsealed ceiling vent.
Wall vents	Present/absent	Unsealed vents only. Ignore sealed vents. (Default wall vent size 245 mm x 145 mm)
Floorboard gaps	Present/absent	Floorboard gaps are considered present when there is a gap > 2mm between the boards which creates an unbroken path to the subfloor/outside air. Only applies where > 20% of the floorboards in the zone are affected.
Skirting board gaps	Present/absent	Skirting board gaps are considered present when there is a gap > 2 mm which creates an unbroken path to the subfloor/outside air. Only applies where > 50% of the skirting boards in the zone are affected.
General construction gaps	Present/absent	There are 3 or more gaps in the zone that are more than 2 cm2.
Fixed open louvre windows and permanently open holes	Calculate and measure total area of hole	Holes in the building envelope (walls, floors, ceiling/roof) that are adjacent to outside air. These are entered in the software as permanent openings. Note that operable louvre windows are entered as windows.
Evaporative cooler duct outlets	Present/absent	Only enter unsealed outlets. Ignore units with a baffle inside, winter cover and/or duct outlet covers

Table 11.2 – Unsealed recessed downlight air leakage classification

Type and description	Example	Air leakage
Thin ring downlight - some air leakage		Minimal
Gimballed downlight – light can swivel within housing		Moderate
Older style 'tin can' downlight – typically larger fitting with incandescent/compact fluorescent globes		Large

Figure 11.1 - Examples of door and window sealing

Typical weather stripping to the side and top of a door frame

A cam activated door seal that is automatically pushed down as the door is closed.

Weatherstripping on a window
Image: DEECA

Table 11.3 - Examples of air leakage items to be modelled

Type	Images and Description	
Exhaust fans - unsealed		
	Use of a torch can help determine if unsealed	
Exhaust fans - sealed	Image coming soon	
		

<table>
<tr><th>Type</th><th colspan="2">Images and Description</th></tr>
<tr><td></td><td colspan="2">A number of sealing mechanisms are possible e.g. flaps open when in use and close when not, ‘draftstoppa’ damper installed in roof space, external damper or internal mecahanism in unit. Rangehoods are assumed to be sealed. (Image: Mistral via DEECA)</td></tr>
<tr><td>Wall and ceiling vents - unsealed</td><td>  </td><td>  </td></tr>
<tr><td>Wall and ceiling vents - sealed</td><td colspan="2">Image coming soon</td></tr>
<tr><td>Vented Ceiling rose</td><td colspan="2">Image coming soon</td></tr>
<tr><td rowspan="4">Evaporative cooler duct outlets</td><td colspan="2">  </td></tr>
<tr><td colspan="2">Duct outlets must be entered for each zone where they are present but can be ignored if the system has an internal damper, winter cover or duct outlet covers.</td></tr>
<tr><td>Image coming soon</td><td>Image coming soon</td></tr>
<tr><td>Winter cover</td><td>Duct outlet covers</td></tr>
<tr><td>Fireplace/chimney – no damper</td><td colspan="2">  </td></tr>
</table>

Type	Images and Description
Fireplace/chimney – with damper or sealed	  Left: Damper is typically a small flap inside the flue or at the top of the chimney which can be opened via a chain or lever when operating the fireplace and closed when not to block uncontrolled airflow. Right: Blocked chimney.
Fixed open louvre windows	

12 Heating and Cooling Systems

Important Note
States and territories may have specific safety requirements relating to roof or subfloor space access (including requirements that apply while remaining on ladder at attic access hatches). Assessors are responsible for ensuring that they identify and comply with all applicable regulatory requirements in the state or territory in which the assessment is being conducted, and are responsible for acting within the scope of their skills and training when undertaking NatHERS for existing homes assessments.

Assessors must model the fixed heating and cooling appliance types found in each NatHERS conditioned zone

Assessors must only include 'fixed' appliances i.e. it must be attached to or built into the home. Portable 'non-fixed' heaters and coolers are not included in the rating.

If no appliance is present in a particular space, Assessors must:

a. If there is a permanent opening to an adjoining zone, the Assessor must model the same heating/cooling device as in the adjoining zone.

b. If there is not a permanent opening to an adjoining zone or there is no heating/cooling device in that adjoining zone, the assessor must select the default option in the software.

Where more than one cooling appliance is present in a zone, Assessors must model the cooling appliance with the highest energy consumption.

Where more than one heating appliance is present in a zone, Assessors must model the heating appliance with the highest energy consumption with the following exceptions:

- where a wood heater (either open fireplace or slow combustion) is one of the heating appliances, Assessors must model the appliance with the highest energy consumption other than the wood heater
- where an open fireplace and a slow combustion wood heater are the only heaters in a zone, Assessors must model the slow combustion wood heater as the appliance in the zone
- where an artificial fireplace is one of the heating appliances, Assessors must model the appliance with the highest energy consumption other than the artificial fireplace

Cast iron grate fireplaces found in many older-style homes that were originally used to burn wood or coal should not be entered as a heating appliance. However they must still be entered in terms of air leakage as a chimney either with or without a damper. See Figure 12.1.

Figure 12.1 - Cast iron grate fireplace

In the case of a ducted system, Assessors must define all zones it services and enter the age of the ductwork. The age of the ductwork is assumed to be the same age as the heating and cooling system (cannot exceed 30 years).

Multi-split systems that service multiple zones, must be modelled as non-ducted heat pump units in each serviced zone using the rating of the external unit (compressor) for the efficiency rating.

For gas fueled appliances, Assessors must enter the type of gas i.e. natural or LPG.

If there is a centralised heating and/or cooling system in a Class 2 apartment building, Assessors must model the appropriate proxy system as indicated in Table 12.1.

Table 12.1 - Proxy systems for centralised heating and/or cooling in apartments

Site Details	Model as…
Unknown centralised system capable of heating and cooling or cooling only; or Known to be a ducted air conditioner	Ducted air conditioner ≥19 kW; fixed capacity. Input the building age to obtain efficiency
Unknown centralised system capable of heating only or Known to be a ducted gas system	Ducted gas (natural gas) Input the building age to obtain efficiency

12.1 Heating appliance types

The types of heating systems available for selection are listed in Table 12.2.

Table 12.2 - Heating appliance types

Category	Type
Air conditioner (heat pump)	Air conditioner – ducted
	Air conditioner - split system
	Heat pump hydronic – floor slab
	Heat pump hydronic – panel
Gas	Natural gas ducted
	Natural gas space – flued (standard or power flue)
	Natural gas space – unflued
	Natural gas hydronic - floor slab
	Natural gas hydronic - panel
	LPG gas ducted
	LPG gas space – flued (standard or power flue)
	LPG gas space – unflued
	LPG gas hydronic - floor slab
	LPG gas hydronic - panel
Wood heater	Wood heater - slow combustion
	Wood heater - slow combustion fan assisted
	Wood heater - ducted
	Wood heater - open fireplace
	Wood heater - open fireplace twin skin flue
Electric resistance	Electric panel heater
	Electric heat bank
	Electric floor slab heater
	Electric ducted heater
Default	Default heating device

Table 12.3 - Examples of heating appliance types

Type	Images and Description	
Air conditioner - ducted		
		
	External compressor unit, under floor or roof space ducting and duct outlets in rooms. Uses heat pump technology to heat and/or cool.	

Type	Images and Description	
Air conditioner - split system		
		
	External compressor unit and internal head unit/s mounted on a wall at head height, at floor level or as a cassette in the ceiling/bulkhead. Multi-split systems can have up to 8 internal head units and may have a double compressor. Uses heat pump technology to heat and/or cool.	
Heat pump hydronic – floor slab		
	External compressor unit, water storage tank and pump, internally pipes are laid in the concrete floor slab. Uses heat pump technology to heat water which is circulated through the pipes to heat the floor slab.	
Heat pump hydronic – panel		Image coming soon
	External compressor unit, water storage tank and pump, internal radiator panels. Uses heat pump technology to heat water which is circulated through pipes to in room radiator panels.	
Gas – ducted		
		

Type	Images and Description	
		
	Gas furnace box located outside or in roof space, under floor or roof space ducting, duct outlets in rooms and a large air intake grille typically in a hallway. (Images: DEECA)	
Gas – flued	Image coming soon	
	Gas room heater with flue venting to either the external wall or the ceiling/roof. (Image: DEECA)	
Gas – unflued ONLY INCLUDE IN RATING IF 'FIXED' TO THE DWELLING		
	Gas room heater no flue	
Gas hydronic – floor		
	External gas heater unit, internally pipes are laid in the concrete floor slab. Water is circulated through the pipes to heat the floor slab. (Left image: DEECA)	
Gas hydronic – panel		Image coming soon
	External gas heater unit, internal metal radiator panels. Water is circulated through the pipes to heat the radiator panels. (Image: DEECA	
Type of gas - Natural vs LPG		
	Natural gas or town gas is piped to the property and will have an external meter.	LPG (liquified petroleum gas) or bottled gas is stored in external tanks.

Type	Images and Description
Wood heater – slow combustion	 
	Wood fuelled firebox style with tempered glass door and handle to seal the fire. (Left image: DEECA)
Wood heater – slow combustion fan assisted	 
	Wood fuelled firebox style with tempered glass door and handle to seal the fire. Fan assisted versions have fan control knobs. Typically, cylindrical flue.
Wood heater - ducted	Image coming soon
	Wood heater with ducting, duct outlets in rooms and fans to distribute the heat.
Wood heater – open fireplace	 
	Open wood fireplace has a chimney to expel smoke. Chimney may have an operable damper.
Wood heater – open fireplace twin skin flue	Image coming soon
Electric panel heater	
	Resistance electric panel made of powder coated or ceramic coated steel or aluminium, fixed to the wall. (Image: DEECA)

Type	Images and Description
Electric heat bank (night storage heaters)	Image coming soon
	Electric heat bank heaters have a bank of bricks inside that are heated by electric resistance to very high temperatures (typically during off-peak times). This stored heat is then slowly released into the room via fans and saves on higher running costs during peak times.
Electric floor slab	 
	Floor slab is heated by electric resistance heating cable.
Electric ducted heater	Image coming soon
	Centralised resistance electric heater with ducting and duct outlets in rooms.

12.2 Cooling appliance types

The types of cooling systems available for selection are listed in Table 12.4.

Table 12.4 - Cooling appliance types

Category	Type
Air conditioner	Air conditioner – ducted
	Air conditioner - split system
Evaporative	Evaporative cooler - ducted
	Evaporative cooler – non-ducted
Default	Default cooling device

Table 12.5 - Examples of cooling appliance types

Type	Images and Description	
Air conditioner - ducted		
		
	External compressor unit, under floor or roof space ducting and duct outlets in rooms. Uses heat pump technology to heat and/or cool.	
Air conditioner - split system		
		
	External compressor unit and internal head unit/s mounted on a wall at head height, at floor level or as a cassette in the ceiling/bulkhead. Multi-split systems can have up to 8 internal head units and may have a double compressor. Uses heat pump technology to heat and/or cool.	
Evaporative cooler		
	Roof mounted box unit, ducting in roof space and duct outlets in rooms. Draws hot air though a series of wet filter pads extracting heat which is then blown into rooms.	

12.3 Heating and cooling appliance efficiency

Where access is available and it is deemed safe to do so, Assessors should obtain product information from the heating/cooling for use in determining appliance efficiency.

Assessors should utilise the following data sources to ascertain efficiency values. The data sources are listed in order of preference (a lower data source must not be used if a higher source is available and safe to access):

a. energy star rating label on the product [e.g. GEMS (Greenhouse & Energy Minimum Standards) or AGA (Australian Gas Association)] plus date of manufacture

b. product lookup (brand and model) in official registries and industry directories plus age of the appliance

c. performance data shown on compliance plate or other literature (e.g. user manual)

d. type and age of the appliance shown on compliance plate or other literature (e.g. purchase receipt)

e. appliance type and age of the dwelling or part thereof where the appliance is installed

f. when none of the above are available select the software default value

For some appliances the efficiency value is fixed in the software. Assessors do not need to obtain efficiency information for these listed appliances:

a. electric resistance panel heater

b. electric resistance heat bank

c. electric resistance floor slab heater

d. electric resistance ducted heater

e. heat pump hydronic floor slab heater

f. heat pump hydronic panel heater

g. gas hydronic floor slab heater

h. gas hydronic panel heater

i. evaporative coolers

12.3.1 Air conditioners (heating and cooling)

The required inputs Assessors must obtain and enter to determine energy efficiency of air conditioners are outlined in Table 12.6.

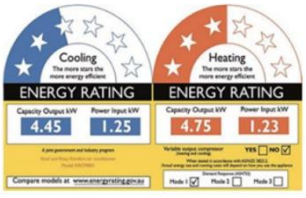
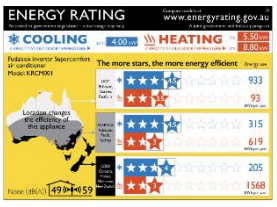
The GEMS database available at Energy Rating - Air Conditioners - AS/NZS 3823.2 is an extensive resource for obtaining information. For older models Assessors should ensure ‘expired products’ is selected in the search function.

Note that the Minimum Energy Performance Standards (MEPS) and rating scales for air conditioners have been updated over the years i.e. a 3-star rated product registered in the 1990s will have a different performance to a 3-star rated product registered in 2023. Hence, it is important that Assessors obtain accurate age of the appliance data if star ratings are used to indicate energy efficiency.

Table 12.6 - Methods for entering air conditioner energy efficiency

Method	Required inputs	Options for how to find
GEMS energy star rating	Star Rating	Star rating label
		Lookup brand/model number in GEMS database
	Year (age of the appliance)	Rating plate - date of manufacture
		Check with manufacturer based on serial number
		Lookup brand/model number in GEMS database and use the date of the earliest star rating e.g. 2010 star rating use 2010 as the year of manufacture
	Ducted or split system	Visual assessment
	Variable capacity (inverter driven) or fixed capacity. Not required for zoned energy ratings i.e. post 2019.	Lookup brand/model number in GEMS database
		Product information from manuals or manufacturer website or label on the product
Input and Output Ratings	Rated input power	Rating plate
		Lookup brand/model number in GEMS database
	Rated output power	Rating plate
		Lookup brand/model number in GEMS database
	Ducted or split system	Visual assessment
	Variable capacity (inverter driven) or fixed capacity. Not required for zoned energy ratings i.e. post 2019.	Lookup brand/model number in GEMS database
		Product information from manuals or manufacturer website or label on the product.
Type and Year (age of the appliance)	Select type (subcategory, capacity): • All non-ducted unitary (window wall) • Split Systems < 4kW • Split Systems ≥ 4kW • Small ducted Systems (< 19kW) • All systems ≥ 19kW • Sub-category unknown	Visual assessment + product information from manuals or manufacturer website or label on the product
	Year (age of the appliance)	Rating plate - date of manufacture
		Check with manufacturer based on serial number
		Assume system is the same age as the dwelling

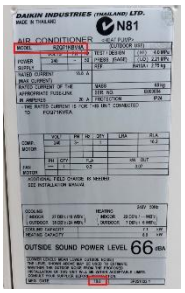
Figure 12.2 - Energy rating labels for air conditioners

Old energy rating label (ERL)	New zoned energy rating label (ZERL)
	

Note: The following air conditioners are not required to carry an Energy Rating Label.
- Evaporative air conditioners.
- Ducted air conditioners (but may have a voluntary label).
- Three phase air conditioners (but may have a voluntary label).
- Multi-split air conditioners (units with several separate indoor units each with a separate control).
- Air conditioners with a rated cooling capacity (or for a heating only product, a rated heating capacity) of more than 30 kilowatts.
- Water-to-air air conditioners

(Source: energyrating.gov.au)

Figure 12.3 - Examples of air conditioner rating plates

Rating plate location	Rating plate
	
	

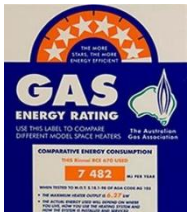
12.3.2 Gas heaters

The AGA Product Directory available at Certified Gas Appliances and Components - AGA Product Directory is an extensive resource for obtaining information on gas heating appliances. For older models Assessors should access previous versions of the directory.

As the rating scale for gas appliances has not changed, Assessors simply need to enter the star rating which can be found either on the product rating label or by looking up the brand/model number in the AGA Product Directory.

Should Assessors be unable to obtain rating data from the AGA Product Directory they should enter the type of heater and the software will apply an appropriate default star rating.

Figure 12.4 - Energy rating label for gas heaters



12.3.3 Wood heaters - slow combustion

Efficiency rating values for slow combustion wood heaters are available from the Australian Home Heating Association (AHHA) register at Certified Wood Heaters - Australian Home Heating Association. Assessors can look up efficiency rating based on brand on model number.

Testing and compliance with a minimum efficiency standard of 60% became mandatory after August 2019 for products certified by AHHA.

Almost all products installed post 2019 and most installed prior to this date will have a rating plate affixed to the unit that includes the combustion efficiency of the product (Figure 12.5).

Figure 12.5 - Example slow combustion wood heater rating plate

Where brand and model number are unavailable or the Assessor is unable to obtain a rating from the register, they should enter the year of manufacture of the heater into the software and an appropriate efficiency rating will be applied. If year of manufacture is unavailable, Assessors should enter the year of construction of the zone/room in the dwelling where the appliance is located.

12.3.4 Wood heater – open fireplaces

For open fireplaces, Assessors must select the type of flue:

- standard or
- twin-skin

and the software will apply appropriate efficiency values.

12.3.5 Resistance electric heaters

Assessors must only enter the type of resistance electric heater and the software will automatically apply appropriate efficiency values.

12.3.6 Hydronic heaters

Assessors must enter the type of hydronic heater and if gas fueled enter the type of gas and the software will automatically apply appropriate efficiency values.

12.3.7 Evaporative coolers

Assessors must only enter that the system is an evaporative cooler and the software will automatically apply an appropriate efficiency value.

13 Hot water systems

For a modelled hot water system, Assessors must enter the following inputs:

- hot water system type
- size (if applicable)
- year of manufacture (if applicable)
- type of gas (if applicable) and
- efficiency.

If there is more than one system, Assessors must input the water heater with the highest energy consumption.

If there is no hot water system or the dwelling is a Class 2 apartment building with a centralised hot water system, Assessors must model the appropriate default/proxy system as per Table 13.1.

Table 13.1 - Default/proxy hot water systems

Site details	Model as
There is a gas meter, gas heater and/or gas stove at the property or It is a centralised system that is known to be gas	Gas storage, with the following details: ● Natural gas (unless known to be LPG) ● Input efficiency based on either the age of the system (if obtainable) or the age of the building - Prior to 2013 - enter as 2-star - 2013 or later – enter as 4-star
There is NO gas meter, gas heater and/or gas stove at the property or It is a centralised system that is known to be electric	Electric storage – large Selectin the below efficiency category based on either the age of the system (if obtainable) or the age of the building - Prior to 1999 - 1999 or later
It is a centralised system that is known to be instantaneous gas	Instantaneous gas, with the following details: ● Natural gas (unless known to be LPG) ● Input efficiency based on either the age of the system (if obtainable) or the age of the building - Prior to 2013 - enter as 2-star - 2013 or later – enter as 4-star
It is a centralised system that is known to be heat pump	Heat pump, with the following details: Apply default STCs based on a system size of medium
It is a centralised system that is known to be solar with gas boost	Solar large – gas boost, with the following details: ● Natural gas (unless known to be LPG) ● Apply default STCs based on system size as per Table 13.5
It is a centralised system that is known to be solar with electric boost	Solar large – electric boost, with the following details: Apply default STCs based on system size as per Table 13.5

The types of hot water systems available for selection are listed in Table 13.2.

Table 13.2 - Hot water system types

Category	Type
Electric	Electric storage - large
	Electric storage – small
	Electric storage – very small
	Electric storage – low pressure (feed tank or no feed tank)
	Electric storage – heat exchange (feed tank or no feed tank)
	Electric Instantaneous
	Heat Pump
Gas	Natural Gas - storage
	Natural Gas - instantaneous
	LPG Gas - storage
	LPG Gas - instantaneous
Solar	Solar – electric boost
	Solar – gas boost (natural or LPG)
	PV diverter
Solid Fuel	Solid fuel
Default	Default hot water system

Table 13.3 - Examples of hot water systems

Type	Images and Description	
Electric Storage		
	These systems heat water with an electric element and store it in an insulated tank. They come in a range of sizes, largers ones are typically outside and off-peak, smaller ones are often under the kitchen sink or in the laundry and are common in apartments.	
Electric instantaneous (tankless, continuous flow)		
	Typically a compact internal box with water pipes feeding into it. An electric element heats the water 'instantly' as it passes via the heater to the outlets.	
Gas storage		
	A gas burner heats the water which is stored in an insulated tank. (Images: DEECA)	

Type	Images and Description	
Gas instantaneous (instant gas, continuous flow)		
	External box with a vent, gas and water pipes feeding into it. It can be recessed into the wall. A gas burner heats the water 'instantly' as it passes via the heater to the outlets.	
Type of gas - Natural vs LPG		
	Natural gas or town gas is piped to the property and will have an external meter.	LPG (liquified petroleum gas) or bottled gas is stored in external tanks.
Heat pump		
	External compressor unit and water storage tank which can be integrated into the one unit. Uses heat pump technology to heat water.	
Solar – flat plate collector		
		
	Roof mounted metal collector plate captures solar heat energy to heat water for storage in an insulated tank which can be located either on the roof (close coupled) or at ground level (split system). Can be electric boosted inside the tank or gas instantaneous boosted by a separate system adjacent to the tank.	
Solar – evacuated tube		

Type	Images and Description	
		
	Roof mounted evacuated tube collectors capture solar heat energy to heat water for storage in an insulated tank which can be located either on the roof (close coupled) or at ground level (split system). Can be electric boosted inside the tank or gas instantaneous boosted by a separate system adjacent to the tank.	
Solar PV diverter		
	Device that detects and diverts excess solar PV generated electricity to heat water in electric storage water heaters.	
Solid Fuel (Wood fired)		
	Burns solid fuels i.e. wood, coal or peat to heat water which is stored in an insulated tank.	
Electric Storage – low pressure	Image coming soon	Image coming soon
Electric Storage – heat exchange	Image coming soon	Image coming soon

13.1 Water heater appliance efficiency

Where access is available and it is deemed safe to do so, Assessors should obtain information to ascertain the efficiency of the hot water system from the energy rating label or compliance plate.

Assessors should utilise the following data sources to obtain efficiency information for hot water systems. The data sources are listed in order of preference (a lower data source must not be used if a higher source is available and safe to access):

a. energy rating label on the product (e.g. AGA)

b. product lookup (brand and model) in official registries and industry directories

c. performance data shown on compliance plate or other literature (e.g. user manual)

d. age of the appliance shown on compliance plate or other literature (e.g. purchase receipt)

e. age of the dwelling or part thereof where the appliance is installed or

f. when none of the above are available, select the appropriate default value.

13.1.1 Electric storage water heaters

Efficiency values for electric storage water heaters are based on type, size and year (age) which should be entered into the software. The following categories are available for selection:

Category	Efficiency category
Electric storage - Large	System age pre-1999
	System age post-1999
Electric storage - Small	System age pre-1999
	System age post-1999
Electric storage – Very Small	System age pre-2005
	System age post-2005
Electric storage – low pressure either with or without feed tank	System age pre-2005
	System age post-2005
Electric storage – heat exchange either with or without feed tank	System age pre-2005
	System age post-2005

13.1.2 Electric instantaneous

Efficiency values for electric instantaneous heaters are based on type only. Assessors need only input that the system is electric instantaneous.

13.1.3 Gas hot water heaters – instantaneous and storage

The AGA Product Directory available at Certified Gas Appliances and Components - AGA Product Directory is an extensive resource for obtaining information on gas water heating appliances. For older models Assessors should access previous versions of the directory.

As the rating scale for gas appliances has not changed, Assessors simply need to enter the star rating which can be found either on the product rating label or by looking up the brand/model number in the AGA Product Directory.

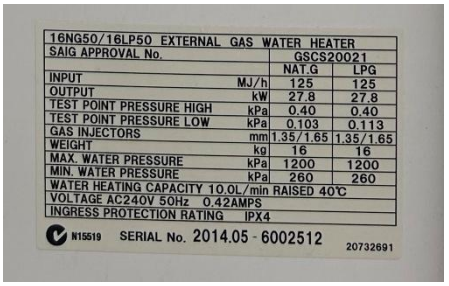
Gas hot water system star ratings should be rounded to the nearest half star (e.g. if 3.1 stars round down to 3-stars and if 3.3 stars round up to 3.5 stars).

Where the efficiency of a gas hot water system cannot be determined, Assessors should apply the default values in Table 13.4. Select the age based on the age of the system (date of manufacture or installation if obtainable) or the age of the building if the age of the system is not known.

Table 13.4 - Default efficiency values for gas hot water systems

Age	Default efficiency value
Before 2013	2.0 Stars
2013 or later	4.0 Stars

Figure 13.1 - Identifying efficiency information

Rating plate location	Rating plate
	
	 (Image: DEECA)

13.1.4 Heat pump and solar hot water systems

Small Technology Certificates (STCs) are used as a measure of efficiency in NatHERS for existing homes assessments for heat pumps and solar hot water systems.

The Clean Energy Regulator maintains a register of solar and heat pump water heaters that are eligible for STCs. See https://cer.gov.au/schemes/renewable-energy-target/small-scale-renewable-energy-scheme/small-scale-renewable-energy-systems/solar-water-heaters/register-solar-water-heaters/

Assessors must obtain the brand and model number of the system, if possible, and look up the relevant register to find STCs that apply for the model in the relevant zone. Note there are four zones in Australia for solar and five zones for heat pump models.

If Assessors cannot identify the model number:

- For solar hot water heaters they must enter the default number of STCs based on system size as per Table 13.5.
- For heat pump hot water heaters, Assessors must enter the default number of STCs as calculated in the software based on a default size of medium (250 L).

Table 13.5 - Default solar hot water system size

Type/description	Number	Model as
Flat plate collector	1 (default to apply if number unknown)	Small or collector area 2 m^2
	2	Medium or collector area 4 m^2
	3	Large or collector area 6 m^2
Evacuated tube	< 25 (default to apply if number unknown)	Small or tube number 24
	26 - 37	Medium or tube number 31
	≥ 38	Large or tube number 38

Figure 13.2 – Estimating solar system size – count the number of flat plate collectors

e.g. 2 x flat plate collectors

Figure 13.3 - Estimating solar system size – count the number evacuated tubes

e.g. 29 x evacuated tubes

13.1.5 Solar photovoltaic diverter (PV diverter) hot water systems

Assessors must only model a solar PV diverter hot water system if it is one of the 3 types indicated in Table 13.6, else Assessors must model the system as electric storage.

If information on type of system is not available or cannot be established by the Assessor, then the solar PV diverter must be ignored.

'Home-made' or products not-commercially available (either currently or previously) must be ignored.

Time clock systems (Type 1) must only be entered if evidence of the timer control and time settings can be presented to the Assessor, otherwise the system must be entered as electric storage.

Table 13.6 - Solar PV diverter hot water systems

PV diverter type	Details
Type 1: Simple timer	A standard electric storage hot water system with a timer installed so it heats water during the day rather than overnight
Type 2: Modulated input into an existing storage tank – add-on product	A system with a retrofitted external control added to an existing standard electric storage hot water system. The controller monitors the house load and PV generation and diverts any excess local PV generation to the water heater.
Type 3: Bespoke PV Diverter - dedicated product	A specifically designed system where the controller monitors the house load and local PV generation and diverts excess solar energy to the water heater.

14 Plug loads and cooking loads

Assessors are not required to enter any information about plug-loads. The software estimates the energy used by plug-in appliances based on floor area and assumed number of occupants.

Assessors must enter the energy source(s) of installed cooktops and ovens. Plug-in (e.g. bench-top) cooking appliances must not be included.

If gas fueled, Assessors must enter the type of gas i.e. natural gas or LPG.

The types of cooktops and ovens available for selection are listed in Table 14.1.

Table 14.1 - Cooktop and oven types

Category	Type
Cooktop	Electric
	Induction
	Gas (natural)
	Gas (LPG)
Oven	Electric
	Gas (natural)
	Gas (LPG)

Figure 14.1 - Examples of cooktop and oven types

Type	Images and Description	
Electric cooktop and oven		 
Induction cooktop electric oven (Note: often induction cooktops have cross symbols to indicate the elements)		
Gas cooktop and gas oven		

15 Lighting

Assessors must input the number of halogen lights in each zone (wattage is not required) regardless of whether they are ceiling mounted or recessed downlights.

There may be instances where halogen bulbs have been replaced by LED bulbs. These should not be counted as halogens but must still be entered in terms of air leakage and insulation clearance. Figure 15.1 provides guidance on how to identify a halogen bulb.

All other lighting is accounted for under the wattage per square metre input, which assumes a default value of 5 W/m2.

Figure 15.1 - Identifying halogen lights

Halogen fitting and bulb	LED replacement bulb
	
Halogens have a small cylindrical bulb deep in the centre of the fitting with a cone shaped reflector.	LED replacement bulbs typically have a pitted, dotty flat face with many smaller light emitting diodes rather than one light.

16 Pools and spas

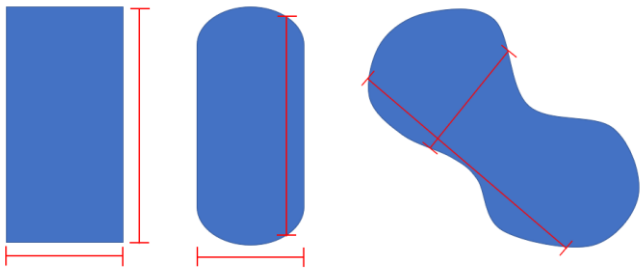
A pool (for the purposes of a NatHERS for existing homes assessment) is a permanent water-retaining structure designed for human use, which holds more than 680 litres of water and incorporates (or is connected to) equipment capable of filtering and/or heating the water. It includes any waterslide, wave pool, hydrotherapy pool or other similar structures. Spas (excluding bathtubs with jets) are currently modelled as pools.

If the pool enclosure area can be accessed and it is deemed safe to do, Assessors must input:

- pool area
- pump type

Pool area can be estimated by multiplying the average length x breadth of the pool.

Figure 16.1 - Estimating the area of a pool



The pump types available for selection are:

- Single speed
- Dual speed
- Multi-speed

Assessors should determine pump type based on product information from manuals or manufacturer website or label on the product. If this information is unavailable Assessors should select the default value of single speed.

Figure 16.2 - Pool pump and name plate

Pool pump	Name plate
	

17 Onsite renewable energy generation

Only solar photovoltaic (PV) renewable energy generation systems are included in existing homes calculations.

Assessors must enter:

- system/array capacity (size in kW)
- array orientation (azimuth)
- tilt of the array
- inverter kW capacity
- export limit, and
- age of the system

Where PV arrays are located on multiple orientations, each array must be entered separately. If entered separately, the capacity of individual arrays should be calculated based on their proportion of the total PV system e.g. Array 1 has 16 panels out of a total of 27 panels in an 8 kW system so Array 1 is entered as 4.8 kW.

Figure 17.1 – PV arrays on multiple locations are entered separately

NatHERS currently cannot include centralised PV systems for Class 2 buildings or Class 4 parts of a building. Where these are present Assessors should make a note in the additional note section of the certificate stating that these have not been included in the assessment.

Assessors should utilise the following data sources to obtain performance information when entering solar PV systems into the tool. The data sources are listed in order of preference (a lower data source must not be used if a higher source is available and safe to access): (in order of most to least reliable):

- documentation, e.g. system specifications or installation documentation
- connection agreement, or local distribution network service provider (DNSP)
- PV app
- building plans.

17.1 Estimate system capacity

Where the exact system capacity, orientation, tilt, inverter capacity or export limit cannot be determined from the above data sources, Assessors must estimate these values as per below.

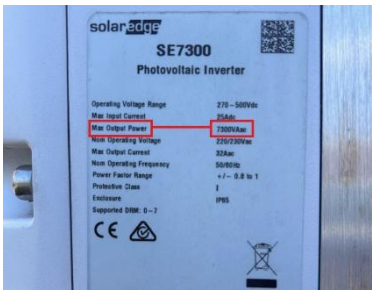
17.1.1 Method 1: PV system inverter capacity method

Where the inverter capacity (in kW) can be reliably determined (e.g. via the nameplate where it is accessible and it is deemed safe to do so), multiply this value by the oversize factor of 1.2 to estimate the system's kW.

The estimated PV system's rated capacity must not exceed the number of panels (which may be observable via satellite imagery) x 0.4 kW (i.e. 400 W per panel)

This method is not suitable where micro inverters are used.

Figure 17.2 - PV system inverter and name plate

PV system inverter	Inverter name plate
	

17.1.2 Method 2: Array square metre method:

Calculate the total array area in square metres (by measurement of building plans or satellite imagery – correcting for slope) and enter this and the year of installation into the software which will automatically calculate system capacity.

17.1.3 Method 3: Default method – year of installation or number of panels

If the preceding methods are not possible, select the greater value of either:

- the value as per Table 17.1 based on the year of installation, or
- number of panels (if observable) x 0.18 kW

Table 17.1 - Default system capcity by year of installation

Year of installation	System capacity (kW)
Unknown	1.3
2001 or earlier	1.3
2002	1.4
2003	1.5
2004	1.6
2005	1.6
2006	1.7
2007	1.7
2008	1.8
2009	2.0
2010	2.1
2011	2.3
2012	2.5

Year of installation	System capacity (kW)
2013	2.8
2014	3.0
2015	3.3
2016	3.6
2017	4.0
2018	4.3
2019	4.6
2020	4.8
2021 or later	5.0

Figure 17.3 – Estimating system capacity - count the number of panels from a satellite image

17.2 Estimate array orientation

Assessors can use the following data sources to estimate the orientation of an array:

- Compass reading taken onsite
- reference to satellite imagery
- reference to the Land Information System of the local jurisdiction

Where exact array orientation cannot be determined from the above data sources, Assessors should select from the options in the software to estimate the orientation (azimuth) of the array (Table 17.2).

Table 17.2 - Estimating orientation of PV arrays

Orientation range	Orientation to apply
337.5° to < 22.5°	N
22.5° to < 67.5°	NE
67.5° to < 112.5°	E
112.5° to < 157.5°	SE
157.5° to < 202.5°	S
202.5° to < 247.5°	SW
247.5° to < 292.5°	W
292.5° to < 337.5°	NW

Figure 17.4 - Estimating array orientation

17.3 Estimate array tilt

The tilt angle of an array may be estimated using the three categories in Table 17.3.If the tilt cannot be determined, select the default value of 'moderate'.

Table 17.3 - Estimating the tilt of a PV array

Category	Tilt angle range
Flat	< 10°
Moderate (default)	10° to 35°
Steep	> 35°

17.4 Estimate inverter capacity

Where the inverter rated capacity is not available (e.g. where micro inverters are used), apply a default value of 75% of the total rated capacity of the array(s).

17.5 Estimate PV export limit

Where the PV export limit cannot be determined, select the appropriate value for the type of supply as per Table 17.4.

Assessors can use the following methods to determine the type of supply:

- installation invoice showing system specifications
- documentation (e.g. from energy supplier) indicating type of supply
- counting the number of fuses/breakers/main switches in the dwelling's electrical meter box (if access is available and it is deemed safe to inspect) - one fuse/breaker/main switch indicates single-phase, three fuses/breakers/main switches indicates three-phase
- if the dwelling is at the end of a single wire earth return (SWER) line (more likely in rural areas)

If the type of supply cannot be determined, select the default value of single phase and then enter the corresponding default export limit of 3 kW.

Table 17.4 - Default PV export limit values

Type of supply	Default export limit
Single-phase (default)	3 kW
Three-phase	9 kW
Multi-phase	3 kW per phase
Single wire earth return	0 kW

Figure 17.5 - Types of supply – Three phase = 3 mains switches, Single phase = 1 main switch

17.6 Estimate PV system age

The PV system age is used to calculate the PV output degradation factor.

Where the PV system age cannot be determined, assessors should select from the appropriate age categories listed based on the year of construction of the dwelling (or in the case of a renovated dwelling, the year of construction of the part of the dwelling where the PV system is located)

- ≤ 12 months old
- > 12 months old but < 10 years old
- ≥ 10 years old but < 20 years old
- ≥ 20 years

If the year of construction of the dwelling is unknown, select a default value of ≥ 20 years.

18 Onsite energy storage

Where a battery is present and accessible and it is deemed safe to do so, Assessors must enter the rated storage capacity of the battery and the battery chemical type which can typically be found on the rating plate, in specification documentation or via signage in the switchboard.

Figure 18.1 - Battery storage

Where information on the battery capacity is unavailable, select the default value of 2 kWh.

Where battery chemistry cannot be determined, select the default value of lithium ion.

Figure 18.2 - Switchboard signage indicating battery chemistry

19 Evidence requirements

Evidence gathering is a formal part of the NatHERS for existing homes assessment process. Table 19.1 provides a list of the evidence collection requirements.

Table 19.1 - Evidence requirements

Category	Evidence Requirements
Default values	Assessors must provide evidence, either in the form of written notes or photographs, to justify the use of defaults where applied. Written evidence could include a note entered in the software explaining why obtaining the non-default value is impractical or unsafe. Photo evidence could show why access to obtain evidence is impractical or unsafe e.g. attic access hatch is inaccessible due to furniture.
Year of construction	For year of constructions dates on/after the dates referred to in Table 4.2 and Table 4.3, Assessors must provide documentation showing the year of construction (e.g. house plans, local government plans or register of title documents).
Zoning and floorplan	If data collection software was used, documentation showing the floorplan generated by the software. Otherwise, a photo of a hand-drawn floorplan, with measurements taken onsite. The floorplan must clearly show dimensions, all windows and doors, and each room must be clearly named. Where zoning decisions are made based on features within a room (e.g. a bed or wardrobe), photographic evidence must be provided.
Floors	- Photos to identify the floor type (i.e. photos of the building exterior, sub-floor vents, or underfloor spaces). - If claiming a waffle pod or floor insulation other than the default values based on the floor type, building class, age and location of the dwelling, provide photos showing the insulation or documentation showing the R-value of the insulation or the waffle pod's thickness (such as construction plans, product receipts and evidence of works, or past NatHERS Certificates). - Photos of the two most predominant floor covering types (those that cover the greatest area) in the dwelling.
Walls	- Photo of all external wall types, showing their cladding/construction and colour. - If claiming wall insulation other than the default values based on the wall type, building class, age and location of the dwelling, provide documentation showing the R-value of the insulation (such as construction plans, product receipts and evidence of works, or past NatHERS Certificates). - If there is an adjacent wall (e.g. adjacent to a neighbour/common area), photos demonstrating the adjacency of the wall (if accessible). Or an aerial photo showing wall adjacency.
Windows and doors	- Photo or documentation for each type of window and glazed door clearly showing frame material, glazing type and window tinting. - Documentary evidence (such as architectural specifications, invoices or new home NatHERS certificates) for all low-e glazing, argon filled double glazing and thermally broken aluminium frames. - Photos of each type of internal window covering. If modelled using Method 2, this must show the modelled characteristics (outside appearance, light transmittance, insulative value and window covering fit). - Photos of external window coverings. - Photo or documentation for each type of skylight and roof window.

Category	Evidence Requirements
Ceilings and roofs	- If the dwelling sits below another dwelling, a photo that shows the dwelling above. - If the dwelling has a roof, a photo (or similar image, such as satellite or aerial imagery) showing roof colour. - If claiming ceiling/roof insulation other than the defaults, photos showing the insulation or documentation showing the R-value of the insulation (such as construction plans, product receipts and evidence of works, or past NatHERS Certificates). - Photo of each ceiling fan.
Shading	- Documentation (such as construction plans or past NatHERS Certificate) or external photos of the house showing all modelled shading features of the dwelling (eaves, pergolas, louvres, awnings, vertical screens) in relation to the external wall. For eaves, photos must show the approximate projection (depth). - Photos or documentation (taken onsite or from relevant aerial/satellite imagery, map apps, or land information systems) showing the proximity and approximate size of any neighbouring buildings that shade the external walls and windows of the dwelling, showing the approximate slope of the surrounding land if relevant.
Air Leakage	- If a blower door test has been completed, documentation showing the results from the test, produced by a qualified and certified technician registered with the Airtightness Testing and Measurement Association Australia. - If a blower door test has not been completed, photos of the following when present: ○ fireplaces including any dampers or permanent blockages where modelled ○ an example of an exhaust fan – if modelling sealed exhaust fans the photo must show the sealing mechanism or there must be documentation showing that the fan is sealed ○ an example of ceiling vents ○ an example of wall vents ○ an example of a ceiling rose ○ an example of each modelled level of air leakage around recessed light downlights (minimal, moderate, large), and an example of any sealed recessed downlights ○ an example of sealing/weatherstripping around external windows ○ an example of the sealing/weatherstripping around external doors ○ an example of skirting board gaps ○ an example of general construction gaps, showing 3 or more gaps of more than 2 cm2 ○ an example of an evaporative cooling duct and duct outlet covers (or documentary evidence e.g. product receipt) if present — if a baffled evaporative cooling system is modelled, there must be documentation demonstrating the baffle (e.g. user manual) ○ an example of a fixed open louvre window ○ any permanently open holes
Heating and cooling	- Photos of all heating and cooling systems, showing the type of system and all information used to determine the inputs for the modelled system as per the Technical Note (for example, the manufacturer's compliance plate, year of manufacture, model number, and efficiency information such as star rating or seasonal performance factor). - If the photos of the system do not give all the required information, documentation (such as user manual or invoice) may be used to show the relevant information where permitted by the Technical Note.

Category	Evidence Requirements
Water heating	- Photos of all water heating systems, showing the type of system, all components (including both on-ground and on-roof (if safe to view)), and all information used to determine the modelled system (for example, the manufacturer's compliance plate, year of manufacture, model number, size, and efficiency information such as star rating or annual energy consumption). - If the photos of the system do not give all the required information, documentation (such as user manual or invoice) may be used to show the relevant information where permitted by the Technical Note.
Lighting	Photo of an example of a halogen light, if present.
Pools and spas	- Photos of each pool or spa showing relative size. - If claiming pool or spa pump efficiency other than the default, photos of the pump showing the manufacturer's compliance plate and model number, and photos or documentation (such as user manual) showing the information used to determine the efficiency (such as star rating or pump type).
Onsite renewable energy generation	- System/array capacity (kWp) may be evidenced with any of the following options depending on the method used to obtain the capacity: ○ installation invoice showing system specifications (exact method) ○ connection agreement document showing system capacity (exact method) ○ screenshot of PV app or portal showing system capacity (exact method) ○ photo of inverter name plate indicating inverter capacity (estimate based on inverter capacity method) ○ screenshot of measured area of array on satellite image or building plans (estimate based on array square metre method) ○ evidence to indicate the age of the system e.g. installation receipt (estimate based on year of installation method) ○ site photo or screenshot of satellite image or building plans showing number of panels (estimate based on number of panels method) - System/array orientation may be evidenced with: ○ screenshot of satellite image or building plans ○ screenshot of onsite compass reading - System/array tilt may be evidenced with: ○ installation invoice showing system specifications ○ site photo ○ screenshot of satellite image or building plans - Inverter capacity may be evidenced with: ○ installation invoice showing system specifications ○ a photo of the inverter name plate ○ no evidence required if default is selected - Export limit may be evidenced with: ○ installation invoice showing system specifications ○ documentation e.g. from energy supplier ○ a photo of the meter box showing number of fuses/breakers ○ no evidence required if default is selected - Age of the system may be evidenced with: ○ installation invoice showing system specifications ○ documentation showing the year of construction of the dwelling (e.g. house plans, local government plans or register of title documents) ○ no evidence required if default is selected

Category	Evidence Requirements
Onsite energy storage	- Photo of each modelled battery system, showing the system rating plate and model number, and demonstrating the system capacity and chemistry type. - If the system rating plate is not available or does not demonstrate the system capacity and chemistry type, documentation (such as installation documentation, user manual, existing connection agreement, switchboard signage, evidence from the distribution network service provider or battery manufacturer, or evidence from the system's app or online portal) may be used to show the capacity and chemistry.

20 Typical Assessment Procedure

This section outlines an example of a typical procedure undertaken by an Assessor when conducting a NatHERS for existing homes assessment.

20.1 Prior to the day of assessment

Listed below are activities to be undertaken prior to the day of assessment. To minimise Assessor time on site, wherever possible, Assessors should gather information from available online sources to allow pre-fill of inputs prior to the day of the assessment that can then be confirmed onsite.

Activity	Elements
Email to householder	Privacy and consent form - request this is reviewed, signed and returned prior to onsite assessment
	Explain the assessment process including that the Assessor will enter every room and that someone over the age of 15 must remain on site throughout the assessment
	Explain that the data collection tool does not record images and it is only collecting measurements/data points
	Ask the householder to identify any hazards to be aware of on the day e.g. aggressive dogs, construction works etc. and request that they minimise any risks
	Request that the householder has relevant evidence documents available on the day of the assessment or prior e.g. solar PV app or proof of purchase, hot water system details/manual, heating and cooling system details/ manual /proof of purchase, insulation details/proof of purchase, year of construction etc.
	Request that the householder opens all internal window coverings
	Request that the householder provides Blower door test results prior to assessment (if applicable)
Create the project in the software and enter all details that can be added prior to site visit	Client details
	Address
	Building class
	Exposure category
	Blower door test results
	Year of construction
	Any other additional information that may be obtained via an online search e.g. roof type, colour, wall construction type, neighbour shading, orientation, PV system size etc may be available via google earth/maps or real estate images which can then be confirmed onsite.

20.2 On the day of assessment

Listed below are activities to be undertaken on the day of assessment.

Activity	Elements
Arrival	Greet the householder, show ID
	Quick explanation of the process
	Site risk assessment
	If they have not already provided the signed privacy agreement obtain this
Collect external thermal inputs/ floor inputs	Roof construction - tile, metal, concrete
	Roof type – attic hip, attic gabled, raked, flat, neighbour
	Roof colour – dark, medium, light
	Roof space ventilation

Activity	Elements
	Height of the lowest level of the dwelling
	Floor construction – concrete slab, waffle pod, suspended timber, suspended slab
	Floor type – subfloor enclosed, subfloor open, subfloor very open, elevated/outdoor
	Under floor insulation (if observable) – type
	External wall construction type/s – e.g. brick veneer, FC clad
	External wall colour/s - dark, medium, light
	Horizontal shading - depth and vertical offset of all eaves, pergolas etc.
	Evidence collection: Take photos of each orientation of the home that capture: roof construction, type/s and colour; floor construction type/s, external wall construction type/s and colour; horizontal shading e.g. eaves, pergolas, balconies; external window coverings and neighbouring adjacencies.
Collect Whole of Home inputs (external and internal) includes evidence collection	Hot water system – type, size, age, model number
	Heating appliance/s - type, model number, size, age
	Cooling appliance/s - type, model number, size, age
	Cooktop and oven – type, fuel
	PV system – capacity, array orientation, array tilt, inverter capacity, age
	Battery – type, capacity
	Pool and/or spa – area, pump type or model number
Determine ceiling insulation (if observable)	Ceiling insulation R-value – type, thickness
	Ceiling insulation reduction factor – select category of insulation missing
	Sarking – yes/no
	Evidence collection ceiling insulation
Additional floor inputs (floor in this instance refers to the level of the dwelling e.g. ground floor, 1st floor)	Main window/glazing type – frame material, glazing type, glazing description
	Evidence collection window/glazing
	Main floor covering – carpet, tiles, timber etc.
	Main ceiling type - plasterboard, concrete etc.
	Main ceiling adjacency - attic, raked, flat
Zone inputs (where applicable)	Add zone and select zone type
	Input the zone geometry - some software tools may do this automatically via scan or laser measure – correct any issues and input missing measurements and features e.g. windows, doors
	Set orientation (first zone only)
	Update zone specific floor inputs where different e.g. different window/glazing type, floor covering, ceiling type, adjacency, heating and cooling type etc.
	Window openability – fixed, openable, highly openable per window
	Internal window coverings – type, outside appearance, light transmittance, window covering fit, insulation level per window
	Evidence collection - internal window covering
	External window coverings – yes/no
	External window covering evidence (see external inputs)
	Window air leakage – sealed or unsealed
	External door air leakage – sealed or unsealed
	Vertical shading – height, distance and horizontal offset (categories) of all shading features opposite windows
	Horizontal shading - depth and vertical offset of all pergolas, balconies from upper levels, window hoods etc (select from measurement categories)

Activity	Elements
	Skylight (attic roof) - size, type, orientation, shaft insulation (observed in attic roof space inspection), fixed, openable or vented
	Roof window (flat/raked roof) – size, type, indoor covering, orientation, tilt
	Ceiling fans – no. of, size
	Unsealed recessed downlights – type; no. of; minimal, moderate or large air leakage
	Exhaust fans - no. of; sealed or unsealed
	Wall vents - no. of
	Ceiling vents - no. of
	Evaporative cooler duct outlets – no. of
	Chimney – no damper or with damper
	Floorboard gaps – present/absent
	Skirting board gaps – present/absent
	General construction gaps - present/absent
	Fixed open louvre windows and permanently open holes – measure total area of hole
	Evidence collection air leakage
Final checks & upload	Check zone geometry for all zones
	Check all input fields
	Check all evidence requirements have been met
	Save/upload project

20.3 After the onsite assessment

Listed below are activities to be undertaken after the onsite assessment.

Activity	Elements
Export from UI to AccuRate Enterprise	-
Whole of Home input checks	Look up model numbers, star ratings, STCs etc to assign appropriate appliance efficiency values
	If documentary evidence or onsite methods of determining solar hot water system size is unavailable, measure area of the collector in google maps/earth etc
	If documentary evidence of PV system size is unavailable, measure area of the array in google maps/earth etc
	Determine PV array orientation in google maps/earth etc
	Determine PV system export network limit
Update AccuRate Enterprise rating file as needed	Refer to AccuRate Typical Assessment Procedure Document
Final checks	-
Analyse rating	-
Generate certificate	-
Provide certificate and upgrade advice to the householder	Supply the householder with the certificate
	Explain the contents of the certificate to the householder, particularly the key results and explanations behind those results
	Identify to the householder the main sources of energy consumption in the home and the main potential strategies for improvement, taking into account - improving home comfort - reducing energy costs - reducing greenhouse gas emissions and - any other specific needs.

Appendix 1 – Default insulation tables

Table 20.1 - Class 1 default insulation R-values

State	NCC climate zone	Year of construction	Roof / Ceiling	External wall	Suspended floor[1]
ACT	7	Pre 1993	1.0	None	None
		1993 - 2005	3.0	1.5	1.0
		2006 - 2009	3.5	2.0	1.5
		2010 – 2019	4.0	2.5	2.5
		2020-present	4.5	2.5	2.5
NSW	2	Pre 2005	None	None	None
		2005	2.0	1.0	1.0
		2006-2010	2.5	1.5	1.0
		2011-present	4.0	2.5	1.0
NSW	4	Pre 2005	None	None	None
		2005	2.5	1.5	1.0
		2006-2010	3.0	2.0	1.0
		2011-present	4.0	2.5	2.0
NSW	5	Pre 2005	1.0	None	None
		2005	2.5	1.0	1.0
		2006-2010	3.0	1.5	1.0
		2011-present	4.0	2.5	1.0
NSW	6	Pre 2005	1.0	None	None
		2005	3.0	1.5	1.0
		2006-2010	3.0	2.0	1.0
		2011-2019	4.0	2.5	2.0
		2020 present	4.5	2.5	2.0
NSW	7	Pre 2005	1.0	None	None
		2005	3.0	1.5	1.0
		2006-2010	3.5	2.0	1.5
		2011-2019	4.0	2.5	2.0
		2020-present	4.5	2.5	2.0
NSW	8	Pre 2005	1.0	None	None
		2005	3.5	2.5	2.0
		2006-2010	4.0	3.0	2.0
		2011-present	6.0	3.5	3.0
QLD	1	Pre 2003	None	None	None
		2003-2008	2.0	1.0	1.0
		2009	2.5	1.5	1.0
		2010-present	3.0	2.5	1.5
QLD	2	Pre 2003	None	None	None
		2003-2008	2.0	1.0	1.0
		2009	2.5	1.5	1.0
		2010-present	4.0	2.5	1.0
QLD	3	Pre 2003	None	None	None
		2003-2008	2.0	1.0	1.0
		2009	2.5	1.5	1.0

[1] See Table 20.2 for concrete slab/waffle pod on ground floors

State	NCC climate zone	Year of construction	Roof / Ceiling	External wall	Suspended floor[1]
		2010-present	4.0	2.5	1.5
QLD	5	Pre 2003	1.0	None	None
		2003-2008	2.5	1.0	1.0
		2009	3.0	1.5	1.0
		2010-present	4.0	2.5	1.0
SA	4	Pre 2003	None	None	None
		2003-2005	2.5	1.5	1.0
		2006-2009	3.0	1.5	1.0
		2010-present	4.0	2.5	2.0
SA	5	Pre 2003	1.0	None	None
		2003-2005	2.5	1.0	1.0
		2006-2009	3.0	1.5	1.0
		2010-present	4.0	2.5	1.0
SA	6	Pre 2003	1.0	None	None
		2003-2005	2.5	1.5	1.0
		2006-2009	3.0	1.5	1.0
		2010-2019	4.0	2.5	2.0
		2020-present	4.5	2.5	2.0
TAS	7	Pre 2003	1.0	None	None
		2003-2009	3.5	1.5	1.0
		2010-2013	4.0	2.0	1.5
		2014-2019	4.0	2.5	2.5
		2020-present	4.5	2.5	2.5
TAS	8	Pre 2003	1.0	None	None
		2003-2009	3.5	2.5	2.0
		2010-2013	4.0	3.0	2.0
		2014-present	6.0	3.5	3.0
VIC	4	Pre 1991	None	None	None
		1991- 2005	2.0	1.0	None
		2006-2010	3.0	1.5	1.0
		2011-present	4.0	2.5	2.0
VIC	6	Pre 1991	1.0	None	None
		1991- 2005	2.0	1.0	None
		2006-2010	3.0	1.5	1.0
		2011-2019	4.0	2.5	2.0
		2020-present	4.5	2.5	2.0
VIC	7	Pre 1991	1.0	None	None
		1991-2005	2.0	1.0	1.0
		2006-2010	4.0	2.0	1.5
		2011- 2019	4.0	2.5	2.5
		2020–present	4.5	2.5	2.5
VIC	8	Pre 1991	1.0	None	None
		1991- 2005	2.0	1.0	1.0
		2006-2010	3.5	2.5	2.0
		2011- 2019	4.0	3.0	2.0
		2020-present	6.0	3.5	3.0
WA	1	Pre 2003	None	None	None
		2003-2005	2.0	1.0	1.0
		2006-2010	2.0	1.5	1.0
		2011-present	3.0	2.5	1.5
WA	3	Pre 2003	None	None	None

State	NCC climate zone	Year of construction	Roof / Ceiling	External wall	Suspended floor[1]
		2003-2005	2.0	1.0	1.0
		2006-2010	2.5	1.5	1.0
		2011-present	4.0	2.5	1.5
WA	4	Pre 2003	None	None	None
		2003-2005	2.5	1.5	1.0
		2006-2010	3.0	2.0	1.0
		2011-present	4.0	2.5	2.0
WA	5	Pre 2003	1.0	None	None
		2003-2005	2.5	1.0	1.0
		2006-2010	3.0	1.5	1.0
		2011-present	4.0	2.5	1.0
WA	6	Pre 2003	1.0	None	None
		2003-2005	2.5	1.5	1.0
		2006-2010	3.0	2.0	1.0
		2011-2019	4.0	2.5	2.0
		2020-present	4.5	2.5	2.0
NT	1	Pre 2003	None	None	None
		2003-2005	2.0	1.0	1.0
		2006-2009	2.5	1.5	1.0
		2010-present	2.5	1.5	1.0
NT	3	Pre 2003	None	None	None
		2003-2005	2.0	1.0	1.0
		2006-2009	2.0	1.0	1.0
		2010-present	2.5	1.5	1.0

Table 20.2 - Class 1 default insulation R-values - concrete slab/waffle pod

Type	Insulation	Slab thickness	R-value
Waffle pod	175 mm waffle (Default)	85 mm (default)	0.56
Concrete slab on ground	None (Default)	100 mm (default)	0.0

Table 20.3 - Class 2 default insulation R-values (only applied where the adjacency is not neighbour)

State	NCC climate zone	Year of construction	Roof / Ceiling	External Wall				Floor				
				Framed	Masonry	Masonry w/ furring channel	Concrete w/ furring channel	CSOG	Susp. over unenclosed[2] subfloor with carpet	Susp. over unenclosed subfloor without carpet	Susp. over enclosed[3] subfloor with carpet	Susp. over enclosed subfloor without carpet
ACT	7	Pre 1998	1.0	0	0	0	0	0	0	0	0	0
		1998 - 2005	2.0	1.5	1.5	1.5	1.5	0	0	0	0	0
		2006 - 2010	3.5	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0
		2011 – 2023	3.5	2.5	2.5	1.0	1.0	0	1.0	1.5	1.0	1.5
		2024-present	2.5	2.0	2.0	2.0	2.0	0.64	2.0	2.0	2.0	2.0
	8	Pre 1998	1.0	0	0	0	0	0	0	0	0	0
		1998 - 2005	2.0	1.5	1.5	1.5	1.5	0	0	0	0	0
		2006 - 2010	4.0	2.5	1.0	1.0	1.0	0	1.5	2.0	0	0
		2011 – 2023	4.5	3.5	3.5	3.5	3.5	1.0	1.5	2.0	1.0	1.5
		2024-present	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
NSW	2	Pre 2005	0	0	0	0	0	0	0	0	0	0
		2005-2010	2.0	0	0	0	0	0	0	0	0	0
		2011-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0.5	1.0
		2024-present	4.0	1.5	1.5	1.5	1.5	0	2.0	2.0	0.5	0.5
NSW	4	Pre 2005	0	0	0	0	0	0	0	0	0	0
		2005-2010	2.5	1.5	0	0	0	0	0	0	0	0
		2011-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2024-present	2.5	2.0	2.0	2.0	2.0	0	1.5	1.5	1.0	1.0
NSW	5	Pre 2005	1.0	0	0	0	0	0	0	0	0	0
		2005-2010	2.5	1.0	0	0	0	0	0	0	0	0

[2] Unenclosed subfloor includes the NatHERS floor adjacency categories: Subfloor open, Subfloor very open and Outdoor Air.

[3] Enclosed subfloor refers to the NatHERS floor adjacency category: Subfloor enclosed

State	NCC climate zone	Year of construction	Roof / Ceiling	External Wall				Floor				
				Framed	Masonry	Masonry w/ furring channel	Concrete w/ furring channel	CSOG	Susp. over unenclosed[2] subfloor with carpet	Susp. over unenclosed subfloor without carpet	Susp. over enclosed[3] subfloor with carpet	Susp. over enclosed subfloor without carpet
		2011-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2024-present	4.0	1.5	1.5	1.5	1.5	0	2.0	2.0	1.0	1.0
NSW	6	Pre 2005	1.0	0	0	0	0	0	0	0	0	0
		2005-2010	3.0	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0
		2011-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0.5	0.5
		2024-present	3.5	1.5	1.5	1.5	1.5	0.64	2.0	2.0	1.5	1.5
NSW	7	Pre 2005	1.0	0	0	0	0	0	0	0	0	0
		2005-2010	3.5	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0
		2011-2023	3.5	2.5	2.5	1.0	1.0	0	1.0	1.5	1.0	1.5
		2024-present	2.5	2.0	2.0	2.0	2.0	0.64	2.0	2.0	2.0	2.0
NSW	8	Pre 2005	1.0	0	0	0	0	0	0	0	0	0
		2005-2010	4.0	2.5	1.0	1.0	1.0	0	1.5	2.0	0	0
		2011-2023	4.5	3.5	3.5	3.5	3.5	1.0	1.5	2.0	1.0	1.5
		2024-present	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
QLD	1	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2024	2.0	0	0	0	0	0	0	0	0	0
		2025 onward	3.0	1.5	1.5	1.5	1.5	0	0	0	0	0
QLD	2	Pre 2006	0	0	0	0	0	0	0	0	0	0
		2006-2024	2.0	0	0	0	0	0	0	0	0	0
		2025 onward	4.0	1.5	1.5	1.5	1.5	0	2.0	2.0	0.5	0.5
QLD	3	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2024	2.0	0	0	0	0	0	0	0	0	0
		2025 onward	4.5	1.5	1.5	1.5	1.5	0	1.5	1.5	0	0
QLD	5	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2024	2.5	1.0	0	0	0	0	0	0	0	0
		2025 onward	4.0	1.5	1.5	1.5	1.5	0	2.0	2.0	1.0	1.0

State	NCC climate zone	Year of construction	Roof / Ceiling	External Wall				Floor				
				Framed	Masonry	Masonry w/ furring channel	Concrete w/ furring channel	CSOG	Susp. over unenclosed[2] subfloor with carpet	Susp. over unenclosed subfloor without carpet	Susp. over enclosed[3] subfloor with carpet	Susp. over enclosed subfloor without carpet
SA	4	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2010	2.5	1.5	0	0	0	0	0	0	0	0
		2011-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2024-present	2.5	2.0	2.0	2.0	2.0	0	1.5	1.5	1.0	1.0
SA	5	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2010	2.5	1.0	0	0	0	0	0	0	0	0
		2011-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2024-present	4.0	1.5	1.5	1.5	1.5	0	2.0	2.0	1.0	1.0
SA	6	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2010	3.0	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0
		2011-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0.5	0.5
		2024-present	3.5	1.5	1.5	1.5	1.5	0.64	2.0	2.0	1.5	1.5
TAS	7	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2013	3.5	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0
		2014-present	3.5	2.5	2.5	1.0	1.0	0	1.0	1.5	1.0	1.5
TAS	8	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2013	4.0	2.5	1.0	1.0	1.0	0	1.5	2.0	0	0
		2014-present	4.5	3.5	3.5	3.5	3.5	1.0	1.5	2.0	1.0	1.5
VIC	4	Pre 1991	0	0	0	0	0	0	0	0	0	0
		1991- 2004	2.5	1.0	0	0	0	0	0	0	0	0
		2005-2011	2.5	1.5	0	0	0	0	0	0	0	0
		2012-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2024-present	2.5	2.0	2.0	2.0	2.0	0	1.5	1.5	1.0	1.0
VIC	6	Pre 1991	1.0	0	0	0	0	0	0	0	0	0
		1991- 2004	2.5	1.0	0	0	0	0	0	0	0	0
		2005-2011	3.0	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0

State	NCC climate zone	Year of construction	Roof / Ceiling	External Wall				Floor				
				Framed	Masonry	Masonry w/ furring channel	Concrete w/ furring channel	CSOG	Susp. over unenclosed[2] subfloor with carpet	Susp. over unenclosed subfloor without carpet	Susp. over enclosed[3] subfloor with carpet	Susp. over enclosed subfloor without carpet
		2012-2023	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0.5	0.5
		2024-present	3.5	1.5	1.5	1.5	1.5	0.64	2.0	2.0	1.5	1.5
VIC	7	Pre 1991	1.0	0	0	0	0	0	0	0	0	0
		1991- 2004	2.5	1.0	0	0	0	0	0	0	0	0
		2005-2011	3.5	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0
		2012-2023	3.5	2.5	2.5	1.0	1.0	0	1.0	1.5	1.0	1.5
		2024-present	2.5	2.0	2.0	2.0	2.0	0.64	2.0	2.0	2.0	2.0
VIC	8	Pre 1991	1.0	0	0	0	0	0	0	0	0	0
		1991- 2004	2.5	1.0	0	0	0	0	0	0	0	0
		2005-2011	4.0	2.5	1.0	1.0	1.0	0	1.5	2.0	0	0
		2012-2023	4.5	3.5	3.5	3.5	3.5	1.0	1.5	2.0	1.0	1.5
		2024-present	2.5	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0
WA	1	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2011	2.0	0	0	0	0	0	0	0	0	0
		2011-2025	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0.5	1.0
		2026-onward	3.0	1.5	1.5	1.5	1.5	0	0	0	0	0
WA	3	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2011	2.0	0	0	0	0	0	0	0	0	0
		2011-2025	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2026-onward	4.5	1.5	1.5	1.5	1.5	0	1.5	1.5	0	0
WA	4	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2011	2.5	1.5	0	0	0	0	0	0	0	0
		2011-2025	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2026-onward	2.5	2.0	2.0	2.0	2.0	0	1.5	1.5	1.0	1.0
WA	5	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2011	2.5	1.0	0	0	0	0	0	0	0	0

State	NCC climate zone	Year of construction	Roof / Ceiling	External Wall				Floor				
				Framed	Masonry	Masonry w/ furring channel	Concrete w/ furring channel	CSOG	Susp. over unenclosed[2] subfloor with carpet	Susp. over unenclosed subfloor without carpet	Susp. over enclosed[3] subfloor with carpet	Susp. over enclosed subfloor without carpet
		2011-2025	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0
		2026-onward	4.0	1.5	1.5	1.5	1.5	0	2.0	2.0	1.0	1.0
WA	6	Pre 2006	1.0	0	0	0	0	0	0	0	0	0
		2006-2011	3.0	1.5	1.0	1.0	1.0	0	0.5	1.0	0	0
		2011-2025	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0.5	0.5
		2026-onward	3.5	1.5	1.5	1.5	1.5	0.64	2.0	2.0	1.5	1.5
NT	1	Pre 2011	1.0	0	0	0	0	0	0	0	0	0
		2011-onward	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0.5	1.0
NT	3	Pre 2011	0	0	0	0	0	0	0	0	0	0
		2011-onward	3.0	1.5	1.0	1.0	1.0	0	1.0	1.5	0	0