



# Nationwide House Energy Rating Scheme

## Software Accreditation Protocol - Thermal 2022

Version 20220901

## Disclaimer

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Enquiries about the protocol and the accreditation process can be directed to:

NatHERS Administrator

Email: [admin@nathers.gov.au](mailto:admin@nathers.gov.au)

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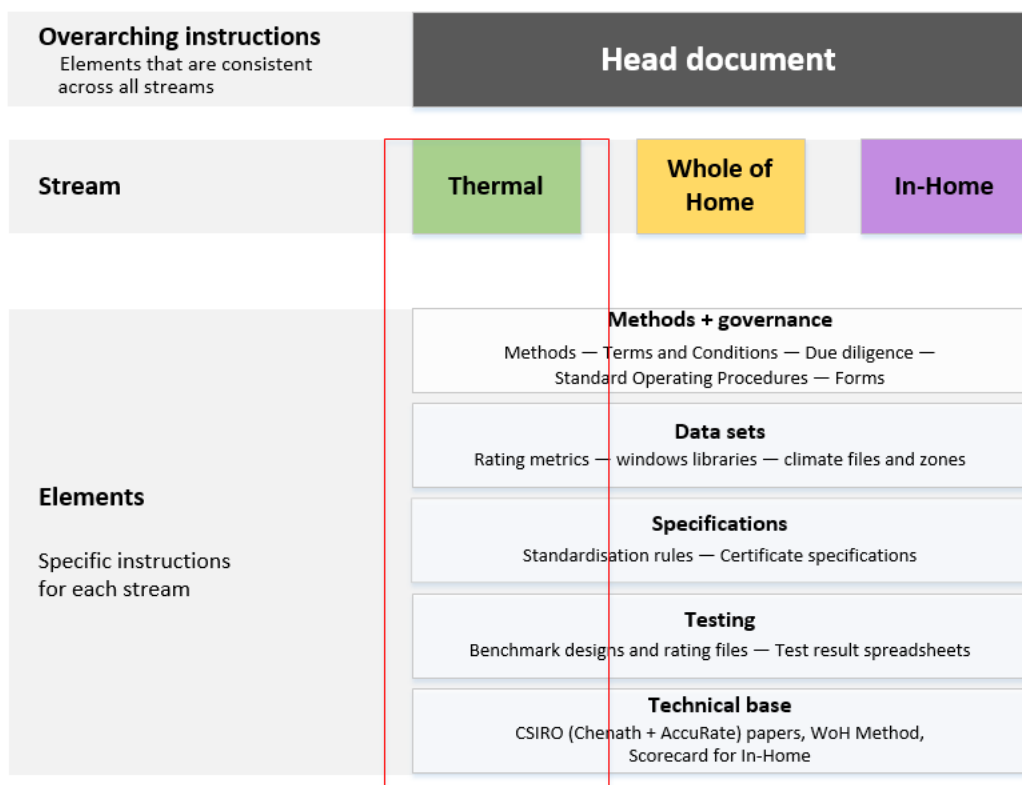
# 1. Introduction

The Nationwide House Energy Rating Scheme (NatHERS) Software Accreditation Protocol (SAP) is a series of documents which provide the necessary requirements for software tools to model energy ratings and obtain accreditation under NatHERS. Software (or Tool) Providers must comply with these to become accredited.

There are three SAP streams (Figure 1) and Software Providers may seek accreditation in one or more of these:

- **Thermal** (this document) — focusses on the software tool requirements to generate an energy rating based on the shell of a dwelling and the estimated energy use for heating and cooling.
- **Whole of Home** ([www.nathers.gov.au/WholeofHome](http://www.nathers.gov.au/WholeofHome)) (WoH) — builds on the Thermal SAP and focusses on the software tool requirements to generate an energy rating for the home’s appliances (heating and cooling appliances, hot water systems, lighting, pool/spa pumps, on-site energy generation and cooking and plug-in appliances) combined with the thermal shell.
- **In Home** ([www.nathers.gov.au/InHome](http://www.nathers.gov.au/InHome)) — builds on the Thermal and Whole of Home SAP as well as the Residential Efficiency Scorecard, and details the requirements to generate an energy rating using an in home assessment process for existing homes where house plans may or may not exist. This consists of an assessment of the thermal shell and whole of home performance.

Figure 1 — SAP structure overview



This document must be read in conjunction with:

- all governance and technical documents referred to in Section 5 of this document and
- any additional information specified by the NatHERS Administrator (Administrator).

## 1.1. NatHERS software for thermal performance energy rating

NatHERS accredited software tools for thermal performance calculate a dwelling's energy rating (from 0 to 10 stars) based on the estimated energy use for heating and cooling. The energy use is determined by the dwelling's design, construction materials, climate and assumptions about how the dwelling is used.

NatHERS accredited software tools produce an energy rating report in the form of a NatHERS Certificate (by Accredited Assessors) or a Rating Report (by a non-accredited assessor i.e. Rater), which can be used to:

- ensure the residential dwelling meets the mandatory energy efficiency requirements for new homes and major renovations required under the National Construction Code (NCC)
- compare the energy efficiency of various home designs
- advise prospective home buyers about the thermal performance of a home.

CSIRO's Chenath Engine is the underpinning calculation engine that NatHERS accredited software tools link to or need to align with. If a Software Provider plans on not using Chenath, they must first contact the Administrator to discuss their proposal. Only engines based on thermal building physics for air, moisture and heat transfer calculations will be considered.

Should a software tool not incorporate the Chenath Engine, several clauses in this Protocol may not apply. Alternative accreditation methodologies would need to be developed and approved by the NatHERS Steering Committee.

## 1.2. Using this document

This document is for Software Providers seeking software accreditation, reaccreditation or implementing updates under NatHERS Thermal stream.

### New accreditation

Software Providers seeking accreditation for the first time must undertake a two-phase process including:

- (1) an expression of interest (EOI) and
- (2) comprehensive testing.

### Reaccreditation

Reaccreditation is undertaken to maintain alignment across the tools. It occurs every three years and typically aligns with the three-yearly updates of the NCC. The process usually includes major updates, such as changes to the Chenath Engine, or input data, such as updates to the climate files and new building features.

### Minor updates

Updates and fixes will need to be implemented by accredited tools from time to time to facilitate innovation and amend minor errors. The rating impact of these must be limited so as not to

substantially alter the existing regulatory arrangements. These are often initiated by the Software Provider, but sometimes in response to issues identified by other parties.

### 1.2.1. Format of this document

#### Section 1 Introduction

Provides an overview of how this Protocol works, including the suite of documents which make up the Protocol.

#### Section 2 Mandatory inputs, outputs and conditions of NatHERS accredited software

Provides the accuracy requirements, a summary of key data sets, calculation rules and materials which need to be incorporated, applied and generated by software tools.

#### Section 3 Steps to obtain and maintain accreditation

Explains the activities to get accredited, reaccredited or implement software updates.

#### Section 4 Software Testing: methods and materials

Details the testing procedures and materials for accreditation, reaccreditation and software updates.

#### Section 5 Information sources

Software Providers must be familiar with and incorporate principles detailed in the documentation listed in this section to ensure correct functioning of the software.

## 2. Mandatory inputs, outputs and conditions of NatHERS accredited software

To understand the accreditation process, Software Providers must read this Protocol in conjunction with documents listed in Section 5: Information sources, and other documents required by the Administrator.

### 2.1. Software accuracy requirements

The consistency and accuracy of thermal performance ratings is fundamental to the objectives of NatHERS. Results must be accurate across a range of dwellings and produce results consistent with the benchmark tool, AccuRate Sustainability (AccuRate). Depending on the circumstance, software tools must be tested using up to nine NatHERS dwelling designs in different NatHERS climate zones to determine whether they meet minimum accuracy requirements for:

- accreditation and reaccreditation (Table 1) where accuracy requirements are assessed relative to the benchmark software tool, AccuRate and
- minor updates (Table 2) where ratings are compared to the most recently released software tool version.

**Table 1 — New accreditation and reaccreditation accuracy requirements**

	Condition	Parameter	Specification
	Condition 1	$\leq \pm 3\%$	Conditioned floor area tolerance. (The reported floor area is measured up to the inside edge of the dimensioned wall).
AND	Condition 2	100%	Heating load difference: $\leq \pm 10\%$ or $\leq \pm 10 \text{ MJ/m}^2 \text{ p.a.}$ AND Cooling load difference: $\leq \pm 10\%$ or $\leq \pm 10 \text{ MJ/m}^2 \text{ p.a.}$
AND	Condition 3a	$\geq 95\%$	Heating load difference: $\leq \pm 5\%$ or $\leq \pm 5 \text{ MJ/m}^2 \text{ p.a.}$ AND Cooling load difference: $\leq \pm 5\%$ or $\leq \pm 5 \text{ MJ/m}^2 \text{ p.a.}$
	<b>OR</b>		
	Condition 3b	$\geq 95\%$	$\leq \pm 0.2$ stars
AND	Condition 4	$\leq 75\%$	Limited simulation bias - less than 75% of star ratings shall be greater than the benchmark results



Table 2 — Minor update rating divergence limits

Percentage of simulations	Star difference compared to the latest version of the software
100%	$\leq \pm 1$ star
99%	$\leq \pm 0.2$ stars

## 2.2. Accredited mode – minimum requirements for accreditation

To comply with requirements under the NCC, energy efficiency ratings must be calculated by NatHERS accredited software tools run in accredited mode (also referred to as regulation mode). This ensures calculations for energy ratings are accurate, representative of Australian conditions and comparable across different types of dwellings and locations.

NatHERS accredited software tools may also have non-accredited modes of operation for the purpose of providing additional information and functionality for users. These non-accredited modes of operation are not covered by this Protocol.

### 2.2.1. Fixed data sets

Accredited mode requires software tools to demonstrate they can incorporate, at a minimum, data sets (i.e. fixed inputs and calculations) referred to in this section, including:

- NatHERS climate zones and weather data
- internal heat loads
- occupancy hours / thermostat and adjustable shade settings
- thermal properties of building materials
- default window values
- custom window database values
- infiltration calculations
- area correction factor
- starbands conversion table
- ceiling fan settings
- $C_p$  (wind pressure coefficient) values
- openings and perforation factors
- NatHERS software standardisation document
- additional features not listed above, including building orientation, terrain exposure, external sun obstructions, internal zoning and associated conditioning, floor and wall types, windows and shading. See the principles for ratings set out in the NatHERS Technical Note 2022.

### 2.2.2. Special exemptions

In special circumstances, Software Providers may apply for an exemption to being able to model a particular dwelling feature. To be eligible, the Software Provider must demonstrate that the level of impact is minor, i.e. can be absorbed by the standard SAP tolerances. If this is not possible the software may need to be excluded from particular features.

The special exemption process avoids software accreditation delays and provides rigour and transparency in decision-making. This process is outlined in the Standard Operating Procedure — Feature exemption application.

### 2.3. Chenath Engine and AccuRate Sustainability (benchmark tool)

The CSIRO Chenath Engine performs the majority of calculations and modelling required to produce a thermal energy rating.

CSIRO maintains and improves the Chenath Engine and makes it available to link to other NatHERS accredited software tools. The Chenath Engine integrates inputs from front-end software to calculate and produce energy ratings.

Front-end software tools intending to use the Chenath Engine must be capable of:

- producing a scratch file to be sent to the Chenath Engine
- converting the Chenath Engine output text files into an adjusted energy load.

The front-end software tool must also have a valid Chenath licence with CSIRO to be accredited.

The key roles of front-end software tools versus the Chenath Engine are summarised in Table 3.

It is essential that prospective Software Providers understand the working of the Chenath Engine, and the assumptions and rules of AccuRate, which is the benchmark front-end software tool. The Chenath Repository provides an open source library of key documents, including methodologies, algorithms and rules implemented in AccuRate and the Chenath Engine. Further documents and how to obtain them are listed in Section 5.

Further information: Chenath Repository <https://hstar.com.au/Home/Chenath>

Note:

- Any change to the Chenath Engine that is approved by the NatHERS Steering Committee for release may result in new benchmark results. In these circumstances, all accredited software tools will need to meet these new results by retesting as outlined in Section 3, in order to comply with NatHERS software tool accuracy requirements.
- This Protocol applies to software tools proposing to use the Chenath Engine.

**Table 3 — Key inputs and behavioural settings**

Inputs and behavioural settings	What does the accredited software tool do?	What does Chenath do?	More information
<b>Climate zones and weather data</b>			
<p><b>NatHERS climate zones and weather data</b>            NatHERS divides Australia into 69 regions, or climate zones, with similar climatic conditions. For each NatHERS zone there is corresponding hourly climate data for meteorological variables of temperature, humidity, wind speed and solar radiation over a one-year period. The climate data, which is representative of average climatic conditions, allows the energy performance of a building to be simulated for any given location.</p>	<ul style="list-style-type: none"> <li>• Stores NatHERS climate zone files (unique zone ID number, town/city, postcode, longitude and latitude) — provided by NatHERS</li> <li>• Stores hourly weather data files (*.txt file) — provided by NatHERS</li> <li>• Writes appropriate weather file name to scratch file</li> <li>• Allows Chenath to access weather data</li> </ul>	<ul style="list-style-type: none"> <li>• Reads weather file name and path from scratch file</li> <li>• Accesses the weather file content from the front-end software for simulation</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">Interactive NatHERS Climate Zone Map</a></li> <li>• Postcode to climate zone look-up table</li> </ul>

Inputs and behavioural settings	What does the accredited software tool do?	What does Chenath do?	More information
<b>Operational behaviours</b>			
<p><b>Internal heat loads</b> NatHERS has set assumptions on internal heat loads and the consequent need for active heating and cooling. The heat loads include latent heat (related to the change in moisture content in the air) and sensible heat (generated by occupants, cooking, lighting and electrical appliances not related to the change in the moisture content in the air). NatHERS accredited software tools must calculate the heat load for each hour in each dwelling zone.</p>	<ul style="list-style-type: none"> <li>Calculates hourly internal heat loads for each dwelling zone</li> <li>Writes data to scratch file</li> </ul>	<ul style="list-style-type: none"> <li>Reads hourly internal heat loads for each dwelling zone from scratch file for simulation</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Hstar portal – heat load tables</a></li> </ul>
<p><b>Occupancy hours thermostat settings</b> NatHERS requires all spaces to be identified as conditioned or unconditioned zones, based on the function of the space (how it is occupied), for example: living area, bedroom and laundry. This enables appropriate thermostat settings to be allocated to each dwelling zone.</p> <p><b>Thermostat settings</b> NatHERS has thermostat settings for heating and cooling at temperatures that people feel comfortable. NatHERS accredited software tools must incorporate hourly heating and cooling thermostat settings to maintain each zone's unique thermal comfort level.</p> <p><b>Adjustable shading</b> NatHERS accredited software tools must apply standardised schedules of indoor and outdoor adjustable shade settings. These settings are derived from the likely operation of shading devices during particular times of the day, under particular weather conditions.</p>	<ul style="list-style-type: none"> <li>Stores occupancy constants library (occupancy hours, thermostat settings, shading device operation rules for each climate zone and dwelling zone) – original *.dat files provided by CSIRO)</li> <li>Determines occupancy-related data for each dwelling zone</li> <li>Writes occupancy data to scratch file</li> </ul>	<ul style="list-style-type: none"> <li>Reads occupancy data for each dwelling zone from scratch file for simulation</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Hstar portal – thermostat settings</a></li> </ul>
<p><b>Infiltration calculations</b> NatHERS calculates hourly air changes for each dwelling zone. These are influenced by the terrain, dwelling height above ground, number and nature of ceiling penetrations, windows and doors, and the characteristics of the roof and sub-floor spaces.</p>	<ul style="list-style-type: none"> <li>Calculates infiltration parameters for each dwelling zone</li> <li>Writes infiltration parameters to scratch file</li> </ul>	<ul style="list-style-type: none"> <li>Reads infiltration parameters from the scratch file for simulation</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">Infiltration Calculations in AccuRate, Dong Chen, CSIRO</a></li> </ul>
<p><b>Wind pressure coefficient (<math>C_p</math>)</b> This measures the wind pressure on an opening relative to the dynamic wind pressure based on the dwelling footprint, dwelling height, wind direction, wall orientation and associated wing walls.</p>	<ul style="list-style-type: none"> <li>Calculates the <math>C_p</math> values for the scratch file</li> </ul>	<ul style="list-style-type: none"> <li>Uses the <math>C_p</math> values and other related information to calculate the air flow rate through openings.</li> </ul>	<ul style="list-style-type: none"> <li>Calculation of <math>C_p</math> values for scratch file</li> </ul>

Inputs and behavioural settings	What does the accredited software tool do?	What does Chenath do?	More information
<b>Physical items</b>			
<p><b>Thermal properties of building materials</b>            NatHERS accredited software tools must use standard thermal resistance and thermal capacitance data for all materials, as outlined in <i>Material Properties Used in NatHERS Software Tools</i>. “Materials” include normal materials, insulation (bulk) materials and air gaps. These materials are generic and the inclusion of a material/product by a commercial name is generally not supported. However, if a generic material cannot be selected and a product or material needs to be considered for inclusion, please refer to the ‘<i>Process for including (the properties of) new materials into NatHERS accredited software</i>’.</p>	<ul style="list-style-type: none"> <li>• Stores materials library file - original *.csv file provided by CSIRO</li> <li>• Writes material number and thickness to scratch file</li> </ul>	<ul style="list-style-type: none"> <li>• Stores materials library file (binary format)</li> <li>• Reads materials itemised in scratch file and matches this with the material properties in the binary format library, for simulation</li> </ul>	<ul style="list-style-type: none"> <li>• NatHERS website: <a href="#">Material properties used in NatHERS software tools</a></li> <li>• <a href="#">Process for including (the properties of) new materials into NatHERS accredited software.</a></li> </ul>
<p><b>Windows</b>            NatHERS accredited software tools must be able to incorporate data from two windows libraries.</p> <p><b>Default windows</b>            The original default windows library consists of 136 generic windows that can be used when the full information about the windows of a dwelling are not available at the time of rating. An additional comprehensive default windows library is expected to be available in 2023. If a default window is used in a NatHERS assessment, an allowable tolerance for the U-value and SHGC value will be shown on the NatHERS Certificate to allow the substitution of windows without re-rating.</p> <p><b>Custom windows</b>            The custom windows library includes specific windows available on the Australian market. Each window has been tested and approved using Australian Fenestration Ratings Council (AFRC) protocols.</p> <p>This library is routinely updated by the AFRC and needs to be uploaded to software tools on a regular basis. When custom windows are used in a NatHERS assessment, the windows will be displayed on the NatHERS Certificate and can be checked off for compliance.</p>	<ul style="list-style-type: none"> <li>• Stores default and custom windows libraries as *.csv files.               <ul style="list-style-type: none"> <li>○ CSIRO provides default windows library</li> <li>○ AFRC provides custom windows library</li> </ul> </li> <li>• Writes window system ID and corresponding windows features to scratch file</li> </ul>	<ul style="list-style-type: none"> <li>• Stores default and custom windows information in binary format libraries</li> <li>• Reads window library name (default or custom) and window system ID in scratch file and matches this to corresponding window in one of the binary format libraries</li> </ul>	<ul style="list-style-type: none"> <li>• NatHERS website: <a href="#">A guide to windows in NatHERS Software factsheet</a></li> </ul>

Inputs and behavioural settings	What does the accredited software tool do?	What does Chenath do?	More information
<b>Getting results</b>			
<p><b>Total energy load</b> NatHERS software must calculate the total average energy load, and the average heating and cooling loads over the total air conditioned floor area, in MJ/m<sup>2</sup> per annum.</p>	<ul style="list-style-type: none"> <li>• Nil</li> </ul>	<ul style="list-style-type: none"> <li>• Calculates energy loads based on inputs, and provides numbers to front-end software tools.</li> </ul>	
<p><b>Area correction factor</b> Once Chenath has calculated the energy loads, NatHERS software tools must apply an area correction factor. This accounts for the difference in total building surface area to floor area ratio in small versus larger dwellings, as well as dwellings with a partially shared external envelope (walls, floors or ceilings), by ensuring the heat transfer through the building fabric is proportionate to the total building surface area and that smaller dwellings are fairly compared with larger ones.</p>	<ul style="list-style-type: none"> <li>• Calculates <b>adjusted</b> total energy load (applies area correction factor formula)</li> </ul>	<ul style="list-style-type: none"> <li>• Nil</li> </ul>	<ul style="list-style-type: none"> <li>• Hstar portal "<a href="#">Area correction factors in AccuRate</a>", Dong Chen, 2012</li> </ul>
<p><b>Star rating</b> The NatHERS star ratings range (zero to ten stars in 0.1 star increments) for each climate zone is called a 'starband'. A total adjusted energy load (MJ/m<sup>2</sup> p.a.) has been determined for each 0.1 star increment for each NatHERS climate zone. This information is provided in a starbands conversion table.</p> <p>NatHERS accredited software tools must determine the total adjusted energy<sup>a</sup> load (MJ/m<sup>2</sup> p.a.), and convert this into a star rating using the starbands conversion table. This enables a fair comparison of buildings in different regions despite the variability in weather conditions across Australia.</p>	<ul style="list-style-type: none"> <li>• Determines the star rating based on the total adjusted energy load provided in the starbands conversion table.</li> </ul>	<ul style="list-style-type: none"> <li>• Nil</li> </ul>	<ul style="list-style-type: none"> <li>• NatHERS Stars in 0.1 star increments are available from NatHERS Administrator</li> <li>• Decimal Point Starbands paper, Dong Chen – available on request from the Administrator</li> </ul>

## 2.4. NatHERS Certificates, Rating Reports and Stamps

NatHERS accredited software tools must be able to produce:

- NatHERS Certificates and Stamps for ratings by NatHERS accredited assessors and
- Energy Rating Reports for ratings by non-accredited assessors, also known as Raters.

<sup>a</sup> Including ceiling fan wattage

These Certificates, Rating Reports and Stamps are required to generate accredited and non-accredited versions of the following formats:

- single dwelling (Class 1 and Class 2)
- summary Class 2
- summary Class 1 (optional).

They must also apply the specifications in the NatHERS Certificate and Stamp Fields Specifications document and design templates.

Thermal accredited tools not accredited for Whole of Home are not required to fill the Whole of Home specific sections of the NatHERS Certificate.

NatHERS Certificates and Rating Reports can be generated through the HSTAR online certification portal managed by the CSIRO ([queries.hstar.accurate@csiro.au](mailto:queries.hstar.accurate@csiro.au)). Alternatively, the functionality of creating a NatHERS Certificate can be embedded in the software tool's own portal. The Certificates and Rating Reports and associated floor plans must be accessible to the Administrator or their agent and Assessor Accrediting Organisations (AAOs) for quality assurance purposes. The Administrator shall also be provided with access to generate certificates for the purpose of iterative testing.

Data of all NatHERS Certificates and Rating Reports **must** be made available to CSIRO for inclusion on the Australian Housing Data website at <https://ahd.csiro.au/> in accordance with the Terms and Conditions of software accreditation.

## 2.5. NatHERS Accredited Software Tool Terms and Conditions

In addition to items raised above, further accreditation requirements are included in the Terms and Conditions. The intent of the Terms and Conditions is to protect the Software Provider and Administrator, define communication and data management and prevent incorrect or deceptive use of the software by users.

A Software Provider is required to adhere to the terms and conditions which, in summary, include:

- conditions or events which will end accreditation
- conditions for variation of agreement
- terms and conditions which a Software Provider must impose on users of the software when the software is used in accredited mode and non-accredited mode
- incorporating reasonable changes to the software tool
- software tool version management
- cyber security
- software user support
- restrictions on NatHERS Certificate generation based on the accreditation status of the assessor
- cooperating with AAO quality assurance activities
- Administrator's access to data and software
- limitation of Administrator's liability and indemnity
- Software Provider's minimum insurance
- use of NatHERS trade mark
- records management
- responsibility for costs
- confidentiality and privacy
- dispute resolution.

### 2.5.1. Requirements imposed on licensed users

To avert the incorrect or deceptive use of the software, the Administrator must have the ability to obtain from software providers appropriate and satisfactory information relating to an assessor's use of the software and creation of NatHERS Certificates or Rating Reports.

The Software Provider must impose conditions on a licensed user as provided in the Terms and Conditions (Appendix 1). This enables the Administrator or an AAO to conduct quality assurance, audits and investigations, and to pass on the findings to appropriate parties (State and Territory authorities and regulators, local councils, building certifiers/surveyors, builders and architects, homeowners).

### 3. Steps to obtain and maintain accreditation

This section details the processes to obtain accreditation for the first time, reaccreditation or implementing minor updates. Testing details are provided at Section 4.

1	Preliminary steps -- preparing	Software Provider: <b>research</b> and clarify requirements of accreditation	▶ section 3.1
↓			
2	Expression of interest	Software Provider: <b>submit</b> preliminary information (new accreditation only)	▶ section 3.2
↓			
3	Test and submit	Software Provider: <b>test</b> the software and submit preliminary accreditation material	▶ sections 3.3 and 4
↓			
4	Due diligence + feedback	Administrator: <b>review</b> submission and provide feedback	▶ section 3.4
↓			
5	Follow-up + final submission	Software Provider: <b>respond</b> to feedback from the Administrator, then submit final package	▶ section 3.5
↓			
6	Decision + confirmation	Administrator: <b>finalise</b> accreditation	▶ section 3.6
↓			
7	Release software	Software Provider: <b>release</b> software version	▶ section 3.7

#### 3.1. Step 1 — Preliminary steps — Software Provider

##### New accreditation

A Software Provider must become familiar with NatHERS and the accreditation requirements and processes, in order to determine whether to proceed with accreditation. The preparation includes reviewing this SAP, all documents and data inputs referred to in sections 2 and 5 and any other material stipulated or recommended by the Administrator.

The Software Provider must contact the CSIRO to obtain access to the Chenath Engine and AccuRate Sustainability (benchmark version).

##### Reaccreditation

The Software Provider must work with the Administrator to familiarise themselves with proposed NCC and other software updates, as well as any revised requirements, conditions and processes of reaccreditation.



#### Minor updates

The Software Provider must liaise with the Administrator to:

- confirm the appropriate testing or other evidence to demonstrate compliance with rating divergence requirements and
- discuss the timeline for release, including any special requirements.

### 3.2. Step 2 — Expression of interest (EOI) — Software Provider

This step applies only to Software Providers seeking accreditation for the first time.

#### New accreditation

The EOI process is the first of two phases for new accreditation. It provides an early opportunity for the Administrator and the Software Provider to work together to clarify any queries and address any issues that may arise throughout the software accreditation process.

A simple dwelling (SAP #110) must be rated as the first step for a new software tool. This helps Software Providers to quickly understand significant deviations from the required benchmark results. The test results do not need to meet the benchmark results in this early phase of the accreditation process.

The Software Provider must submit an EOI for Accreditation form, which includes the following information:

- summary of the new software tool (500 words maximum)
- indicative timetable for software testing and accreditation application
- any key issues (e.g. questions, concerns) or details of matters to be resolved and discussed with the Administrator, relating to the accreditation process
- independent tester's details (if known, this may be provided during the testing phase)
- in-principle agreement to the Terms and Conditions
- other supporting information (optional).

### 3.3. Step 3 — Test and submit — Software Provider

Precise software testing is required to ensure the software tool meets the accuracy requirements (Section 2.1). Testing materials and processes are detailed in Section 4.

In brief, the Administrator will:

- outline the testing requirements (dwellings designs and climate zones)
- confirm whether or not independent testing is required
- provide the test pack documentation and files.

#### New accreditation

Independent testing is a key quality assurance component of developing a high quality software tool.

The Software Provider will:

- nominate an independent tester (NatHERS accredited assessor) and seek approval from the Administrator.
- engage the assessor (pending Administrator agreement) at their own cost and detail the scope of testing (provided in Section 4.2) identified by the Administrator

- provide all relevant documentation and facilitate access by the independent tester to CSIRO benchmark software (as required) and the software tool to enable them to undertake the verification
- reiterate to the assessor that their work is independent in nature.

The Administrator will:

- review the nominated independent assessor and either require the Software Provider to select an alternative NatHERS accredited assessor if an actual or perceived conflict of interest exists, or agree to the engagement of the assessor
- provide the testing requirements and materials (Section 4 — Software testing: methods and materials)

The independent tester will provide evidence of accreditation with an AAO to the Administrator and Software Provider if requested.

When testing is complete, the Software Provider will submit the relevant material to the Administrator ([admin@nathers.gov.au](mailto:admin@nathers.gov.au)), listed in:

- Table 4 — checklist for items to be submitted as part of new accreditation. Not all items need to be submitted simultaneously.
- Table 5 — checklist for items to be submitted as part of reaccreditation. Not all items need to be submitted simultaneously
- Table 6 — checklist for submission of request for minor updates.

The Summary Class 1 and Class 2 Certificates, Rating Reports and Stamps, should be based on a minimum of two dwellings. The information may be drawn from:

- de-identified ratings in the Software Provider’s archives/library or
- SAP dwelling 610 (one for Class 2 summaries) and SAP dwelling 200 for Class 1 summaries.

## New accreditation

**Table 4 — Submission checklist - new accreditation**

	New accreditation Stage 1 — EOI phase	New accreditation Stage 2 – main testing phase
EOI form	<input type="checkbox"/>	—
Test result spreadsheet and software rating file	<input type="checkbox"/> Dwelling 110	<input type="checkbox"/> Software Provider, dwellings: 100, 200, 300, 400, 500, 610, 620 and 630 <input type="checkbox"/> Independent tester (if required by Administrator), dwellings: 200, 300, 400, 500 and 610
Beta version of software	—	
NatHERS Certificates	—	<input type="checkbox"/> Single dwelling 500 <input type="checkbox"/> Summary Class 2 <input type="checkbox"/> Summary Class 1
NatHERS Stamps	—	<input type="checkbox"/> Single dwelling 500 <input type="checkbox"/> Summary Class 2 <input type="checkbox"/> Summary Class 1 (optional)
Rating Report	—	<input type="checkbox"/> Single dwelling 500 <input type="checkbox"/> Summary Class 2 <input type="checkbox"/> Summary Class 1 (optional)

	New accreditation Stage 1 — EOI phase	New accreditation Stage 2 – main testing phase
Rating files used to generate summary certificate/report/stamp	—	<input type="checkbox"/>
Access to certificate portal	—	<input type="checkbox"/>
Training manual / user guide	—	<input type="checkbox"/>
Evidence of Chenath licence	—	<input type="checkbox"/>
Conflict of interest declaration form	—	<input type="checkbox"/> Independent tester only
Terms and Conditions – in principle agreement and proposed draft amendments/customisations		<input type="checkbox"/>
Any other material requested by the Administrator		<input type="checkbox"/>

## Reaccreditation

**Table 5 — Submission checklist — reaccreditation**

Item	Reaccreditation
Test result spreadsheet and software rating file	<input type="checkbox"/> Dwellings 200, 500 and 610
Beta version of software	<input type="checkbox"/>
NatHERS Certificates	<input type="checkbox"/> Single dwelling 500 <input type="checkbox"/> Summary Class 2 <input type="checkbox"/> Summary Class 1 (optional)
NatHERS Stamps	<input type="checkbox"/> Single dwelling 500 <input type="checkbox"/> Summary Class 2 Summary Class 1 (optional)
Rating Report	<input type="checkbox"/> Single dwelling 500 <input type="checkbox"/> Summary Class 2 <input type="checkbox"/> Summary Class 1 (optional)
Rating files used to generate summary certificate/report/stamp	<input type="checkbox"/>
Access to certificate portal	<input type="checkbox"/>
Training manual / user guide	<input type="checkbox"/>
Evidence of Chenath licence	<input type="checkbox"/>
Terms and Conditions – in principle agreement and proposed draft amendments/customisations	<input type="checkbox"/>
Any other material requested by the Administrator	<input type="checkbox"/>

## Minor updates

**Table 6 — Submission checklist – minor updates**

Item	
Evidence to support compliance with accuracy requirements	<input type="checkbox"/> Test results (for each dwelling) spreadsheet OR <input type="checkbox"/> Other rating impact data
Rating files	<input type="checkbox"/> Rating files for each dwelling simulated
Beta version of software	<input type="checkbox"/>
Minor Update request form	<input type="checkbox"/>

NatHERS Certificates and Stamps	<input type="checkbox"/> Only if and as requested by Administrator
Access to certificate portal and capability to generate certificates	<input type="checkbox"/>

### 3.4. Step 4 — Due diligence and feedback — Administrator

The Administrator (or their agent) will undertake due diligence on the submitted documentation and software files. This may include:

- spot check of rating results provided in the testing results spreadsheet
- modify corresponding features in the applicant’s and benchmark rating files to compare results to determine rating congruence – the Administrator will work with the Software Provider to resolve any concerns
- ensure the Certificate and Stamp fields are designed and populated correctly
- review fixed data inputs.

The Administrator may request further information from either the Software Provider or independent tester (in the case of new accreditations).

#### Minor updates

The process for minor updates is detailed in the Standard Operating Procedure: Minor Updates, available from the NatHERS Administrator upon request.

### 3.5. Step 5 — Follow-up and final submission — Software Provider

The Software Provider will address any requests from the Administrator. Where further concerns need to be resolved, the Administrator may initiate an independent verification process.

When all issues have been addressed, the Software Provider will submit any outstanding items listed in the table relevant to the particular accreditation process:

- Table 4 — Submission checklist - new accreditation
- Table 5 — Submission checklist — reaccreditation
- Table 6 — Submission checklist – minor .

### 3.6. Step 6 — Decision and confirmation — Administrator

#### New accreditation and reaccreditation

Once the software tool satisfies the minimum NatHERS accreditation requirements (Section 2) the Administrator will notify the NatHERS Steering Committee. Where special conditions are stipulated, Committee approval may be required, which may influence the final decision. The Administrator (on behalf of the NatHERS Steering Committee) will then offer NatHERS software re/accreditation to the Software Provider. The Accreditation Notice (letter of offer) must be countersigned and the Terms and Conditions agreed to by the Software Provider.

Unsuccessful applicants can make modifications to their software tool and reapply by submitting new simulation results.

#### Minor updates

Once the submission has been reviewed by the Administrator, applications are forwarded to the Australian Building Codes Board (ABCB) for information. Subsequently, unless further queries have

been identified, the Administrator will advise the Software Provider that they may proceed with releasing the new version of the software. The Administrator may stipulate special conditions, if any, including communications, release timeframe and transition timeframes. This will occur on a case-by-case basis, depending on the urgency of the update.

### 3.7. Step 7 — Release and phase out — Software Provider

#### Release new version

Any revisions, updates or new versions of NatHERS accredited software tools must be identified by a new version number.

The Administrator will work with the Software Provider to determine the timing and communications of the release of the new NatHERS accredited software tool, including updating the NatHERS website. The most appropriate software release timelines and transitioning arrangements will depend on a number of factors, including the scale of the impact on NatHERS and the regulatory environment as the higher priority.

#### Guidance to release timing

The Administrator will advise of the most appropriate strategy for release timing, including consideration of any impacts on NatHERS.

Where the impacts on NatHERS are **critical or major**, the cause must be addressed immediately or within the time period specified by the Administrator. Examples of critical or major impacts include:

- the tool consistently overstates the star rating
- NCC regulatory requirements are breached
- evidence of fraudulent practices
- no workaround for critical functionality or critical data
- misleading or incorrect information displayed on the Certificate.

Where the impacts on NatHERS are negligible/low, the timing of the release of the new version is at the Software Provider's discretion. The impact is considered to be negligible/low if the new version or the update:

- does not affect accreditation requirements, ratings, regulatory requirements
- is a minor inconvenience only
- is of a cosmetic or typographical nature.

#### Transition rules

Software transition rules, which must be implemented by the Software Provider, will be specified by the Administrator. These include:

- Class 1 thermal performance rating can only be started in the latest version of the software.
- Class 2 thermal performance rating, if it is the first in the development, can only be started in the latest version of the software.

Exemptions may apply where the assessor has a written request from a regulator to use a retired version<sup>b</sup>.

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<sup>b</sup> Both major and minor versions, when they are superseded by a new major or minor version become "retired". Retired versions can only be used for new ratings if the assessor has a written request from a regulator (the relevant certifier/building surveyor that will be certifying the documentation set for building approval), and should not be used for ratings not yet finalised wherever possible. Retired versions will be itemised in the new Accreditation Notice to ensure their long-term legitimacy.

### Accessing retired versions

Superseded versions of the software tool will remain accredited as per the Accreditation Notice. It is however imperative to ensure assessors move immediately or as quickly as possible to the most current version of the software.

## 3.8. Period of accreditation and withdrawal of accreditation

Accreditation is granted to a major software tool version (including its minor versions resulting from minor updates) in perpetuity, in accordance with the Accreditation Notice. Accreditation Notices are written confirmation granting NatHERS accreditation to a particular new Major version as well as extending continued accreditation to retired versions.

The period of accreditation is generally three years. Where possible, the accreditation term and expiry will align with major updates associated with the NCC amendment cycle. However:

- the Software Provider may seek a 12-month extension of accreditation
- the Administrator may agree to extend the accreditation on the same or varied Terms and Conditions as appropriate.

Accreditation of a software tool version(s) may be withdrawn if:

- ownership or control of the software tool is transferred from the Software Provider to another entity, or
- the Software Provider or software tool breaches requirements set out in the Software Accreditation Protocol Terms and Conditions.

Further information: [NatHERS Software Accreditation Terms and Conditions](#)

## 3.9. Costs

The Administrator does not impose a fee for accreditation. However:

- all stages of accreditation of software tools must be prepared and lodged at the expense of the Software Provider, including any costs from engaging an independent tester
- if further information is required to clarify or validate information in the application, this must be provided at the Software Provider's expense.

## 4. Software testing: methods and materials

The consistency and accuracy of thermal performance ratings is fundamental to the objectives of NatHERS.

NatHERS accredited software tools must meet minimum accuracy requirements for accreditation, reaccreditation and updates. The accuracy requirements are assessed relative to the benchmark software tool, AccuRate, which is the commercial software tool developed by CSIRO to interface with the Chenath Engine.

If the Software Provider fails to satisfy the requirements relating to a new version, or where an update of a previously accredited software tool is being reaccredited, and testing indicates a significant impact on the rating output of the software tool, the Administrator (on behalf of the NatHERS Steering Committee) may withhold accreditation of the updated software tool.

### 4.1. Testing materials

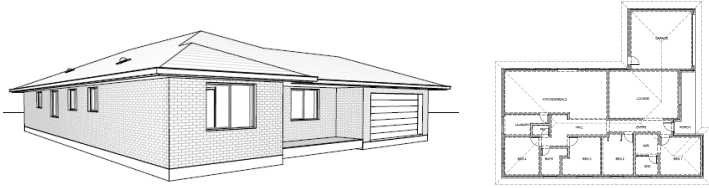
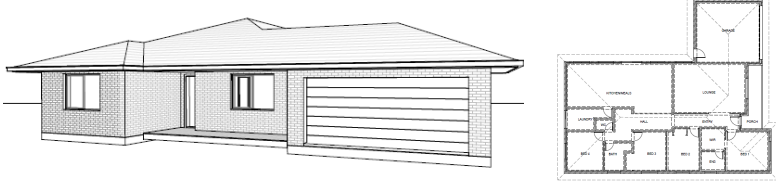
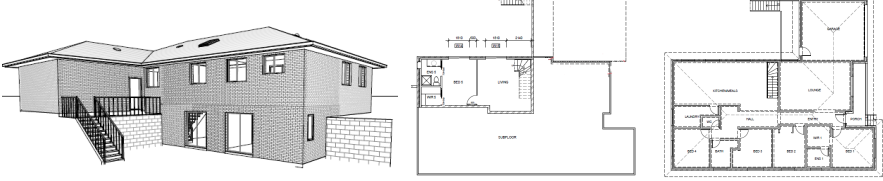
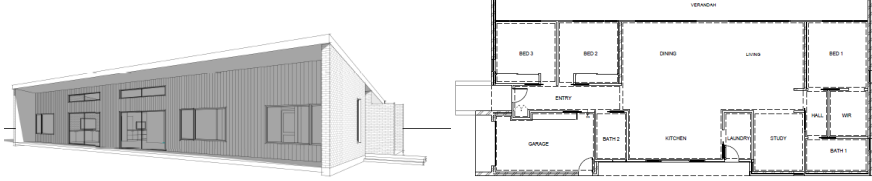
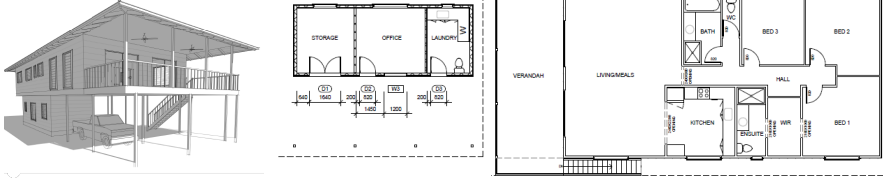
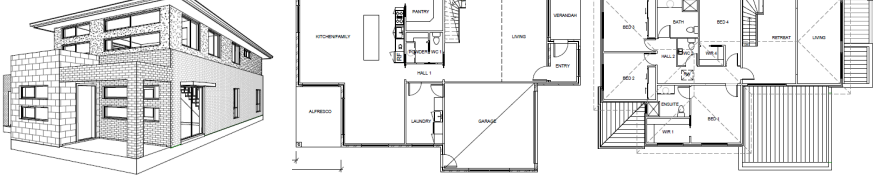
#### 4.1.1. NatHERS testing dwelling designs

The NatHERS thermal SAP dwellings include 9 Class 1 and 3 Class 2 designs (Figure 2). New accreditation entails modelling all 12 dwellings, whereas reaccreditation and minor updates are generally limited to designs 200, 500 and 610.

Each dwelling design (available from the Administrator) has unique specifications to test particular building features. The specifications explore the impact of:

- thermal bridging
- insulation levels and types
- window types, including glass, frame type and size
- glazing to floor area ratio
- floor construction, ventilation and coverings
- roof construction and colour e.g. attic, hip roof, concrete or flat
- wall construction and colour, solar absorptance, including thermal mass
- internal walls adjacent to subfloors and roof spaces
- internal zoning, including double height voids, apartment corridors and basements
- orientation
- terrain and exposure (impact of elevation)
- external shading from shade structures and neighbouring buildings
- infiltration e.g. windows, doors, exhaust fans
- ceiling penetrations
- other key construction techniques that may apply to particular NatHERS climate zones, such as building styles in tropical and cyclone prone areas.

Figure 2 — NatHERS test dwelling designs

<p><b>100</b> 4-bedroom single level brick veneer</p>	
<p><b>110</b> 4-bedroom single level brick veneer (simple construction details)</p>	
<p><b>200</b> 5-bedroom split level brick veneer</p> <p>Variations:</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> <b>200 TBV:</b> Timber frame brick veneer</li> <li><input type="checkbox"/> <b>200 StBV:</b> Steel frame brick veneer</li> <li><input type="checkbox"/> <b>200 StLC:</b> Steel frame light cladding</li> <li><input type="checkbox"/> <b>200 StMC:</b> Steel frame metal cladding</li> </ul>	
<p><b>300</b> 3-bedroom single level</p>	
<p><b>400</b> 3-bedroom “Queenslander” / pole house</p>	
<p><b>500</b> 4-bedroom double storey</p>	



<b>610</b> 1-bedroom ground floor apartment		
<b>620</b> 2-bedroom 5 <sup>th</sup> floor apartment		
<b>630</b> 2-bedroom top floor apartment		

## 4.2. Testing processes

The testing steps described in this section are a general guide only and in some circumstances may be modified if deemed necessary by the Administrator.

### Entering dwelling features into the software tool

Testing involves inputting SAP dwelling design specifications (available from the Administrator on request) into the software tool and recording the simulation results.

If a specification on the drawings appears ambiguous, refer to the AccuRate benchmark rating file which may clarify the specifications of an item. Please contact the Administrator if AccuRate does not provide clarification as required.

### Recording results – test results spreadsheet

The Administrator will provide the test result spreadsheet for new and reaccreditation testing. This is prepopulated with benchmark results for each dwelling in each climate zones. It includes the area adjusted heating, cooling and total energy loads (megajoules/m<sup>2</sup>/p.a.), star ratings and the dwelling's conditioned floor area. When the Software Provider enters their simulation results, the spreadsheet will calculate a pass/fail for each component and indicate whether the results fall within tolerances, compared to the benchmark tool.

For minor updates, the Software Provider will submit the minor update test result spreadsheet.

### Generating certificates and stamps

For new and reaccreditation processes, the Certificates, Rating Reports and Stamps need to be generated to ensure their fields are correctly designed and populated. The required Certificates, Rating Reports and stamps for new, reaccreditation and minor update processes are itemised in Table 4, Table 5 and Table 6.

### Submitting results

Once testing is complete, the Software Provider will submit the test results spreadsheet, software rating files and beta version to the Administrator at [admin@nathers.gov.au](mailto:admin@nathers.gov.au) and at least one secondary submission email as advised by the Administrator. Note that the beta version of the software tool is not required for the EOI phase.

## New accreditation

Software tools must be tested using up to 9 NatHERS dwelling designs in all NatHERS climate zones to determine how the software tool assesses thermal performance when compared to the benchmark software tool (AccuRate).

New accreditation entails two testing phases:

### EOI phase

The standard test subject is SAP dwelling 110 in all 69 NatHERS climate zones. Accuracy requirements do not apply to this dwelling; however the Software Provider should attempt to gain results as close as possible to the benchmark results. It provides an early opportunity for the Administrator and the Software Provider to work together to collaboratively resolve any issues that may arise through the formal accreditation process. The simple design of dwelling 110 allows Software Providers an opportunity to quickly understand significant deviations from the required test results. It tests a range of modelling features, including the ability of the software tool to follow the NatHERS zoning requirements and check the accuracy of thermal load calculations of conditioned and unconditioned zoned areas.

### Main testing phase

Testing is conducted by both the Software Provider and/or the independent tester, with spot checks by the Administrator.

The Software Provider must test all remaining SAP dwellings (100, 200 TBV, 200 StBV, 200 StLC, 200 StMC, 300, 400, 500, 610, 620 and 630) in all NatHERS climates zones, during this phase.

The independent tester must, at a minimum, test dwelling designs 200 StBV, 300, 400, 500 and 610 in all NatHERS climate zones. The tester must submit:

- a conflict of interest declaration
- a written statement that the verification was their work
- a report to the Administrator detailing findings and recommendations (if any), including an outline of the methods and assumptions used in testing to verify that software tool results are within required tolerances
- any other documentation recording data analysis
- completed software test results spreadsheets.

## Reaccreditation

The Software Provider must test dwellings 200 TBV, 200 StBV, 200 StLC, 200 StMC, 500 and 610 in all NatHERS climate zones. However, the Administrator and Software Provider will need to consult and confirm that the dwellings and climate zones are appropriate to test for the features being corrected/updated.

## Minor updates

The standard test dwellings are 200, 500 and 610, must be tested in all NatHERS climate zones. This requirement may be varied and alternative dwellings and/or testing procedures may be specified if these standard designs do not test for the proposed update. In this case, dwelling features may be modified (by agreement with the Administrator), alternative dwellings may be specified by the Administrator or historic software rating analysis may be used to demonstrate accuracy compliance.

Simulations must be done using the beta version of the software tool and results compared to the current public version of the tool's simulation results.

Test results must include a dwelling identifier, climate zone number, the star ratings calculated by the current version on the market and the proposed new version and the difference between these star ratings.

## 5. Information sources

The Software Provider must ensure they understand and apply aspects of the information referred to in Table 7. Further information relating to NatHERS is available at [www.NatHERS.gov.au](http://www.NatHERS.gov.au).

Methodologies, algorithms and rules implemented in AccuRate and the Chenath engine are key elements of rating software. Table 8 below is a collection of documentation for the NatHERS guides and materials. This list is subject to updates as new information and regulatory requirements emerge.

**Table 7 — NatHERS documentation**

Document	Available from
<a href="#">NatHERS Technical Note</a> <ul style="list-style-type: none"> <li>Principles for ratings in accreditation mode</li> </ul>	<a href="http://nathers.gov.au/resources">nathers.gov.au/resources</a>
Conflict of interest declaration form	admin@nathers.gov.au
Decimal-Point Starbands Used in AccuRate V1.1.4.1, Dong Chen, June 2013	CSIRO
Default windows library	
<a href="#">A guide to windows in NatHERS Software factsheet</a>	<a href="http://nathers.gov.au/resources">nathers.gov.au/resources</a>
Minor update request form	<a href="http://nathers.gov.au">nathers.gov.au</a>
NatHERS Climate Files	admin@nathers.gov.au
<a href="#">NatHERS Interactive Map</a>	<a href="http://nathers.gov.au">nathers.gov.au</a>
NatHERS Software Accreditation Terms and Conditions	<a href="http://nathers.gov.au">nathers.gov.au</a>
NatHERS Starbands – 0.1 star increments spreadsheet	admin@nathers.gov.au
Postcode to climate zone look-up table (spreadsheet)	admin@nathers.gov.au
<a href="#">Process for including (the properties of) new materials into NatHERS Accredited Software</a>	<a href="http://nathers.gov.au">nathers.gov.au</a>
NatHERS Software standardisation document	<a href="http://nathers.gov.au">nathers.gov.au</a>
Software testing dwelling designs (detailed drawing sets of all dwellings)	admin@nathers.gov.au
Software test results spreadsheet – new accreditation and reaccreditation	admin@nathers.gov.au
Software test results spreadsheet – minor update(s)	admin@nathers.gov.au
Standard Operating Procedure – Minor updates	<a href="http://nathers.gov.au">nathers.gov.au</a>
Standard Operating Procedure – Feature exemption application	<a href="http://nathers.gov.au">nathers.gov.au</a>
Trade mark / published guidelines – in prep	<a href="http://nathers.gov.au">nathers.gov.au</a>

Table 8 — CSIRO documentation / references

Document	Available from
<a href="#">AccuBatch V2.0 User Manual</a> , Dong Chen CSIRO, March 2010	<a href="https://publications.csiro.au/rpr/download?pid=csiro:EP101114&amp;dsid=DS4">https://publications.csiro.au/rpr/download?pid=csiro:EP101114&amp;dsid=DS4</a>
<a href="#">AccuRate and the Chenath Engine for Residential House Energy Rating</a> , Dong Chen 2016	<a href="http://hstar.com.au/Home/Chenath">hstar.com.au/Home/Chenath</a>
AccuRate Fan Speed Calculation, Dong Chen, CSIRO Sustainable Ecosystems, June 2018	CSIRO
AccuRate Sustainability V2.3.3.13, Internal Heat Gain Estimation from Occupants and Appliances, Dong Chen, May 2018	CSIRO
<a href="#">Area Correction Factors in AccuRate</a> v1.1.4.1, Dong Chen, 2012 <ul style="list-style-type: none"> <li>Treatment of the area adjustment for buildings with partially shared external envelope (walls, floors or ceilings)</li> </ul>	<a href="http://hstar.com.au/Home/Chenath">hstar.com.au/Home/Chenath</a>
Calculation of <i>cp</i> values for SCRATCH file, 8 August 2015	CSIRO
Fan Speed and Target Area for Large Size Ceiling Fans Dong Chen, CSIRO Energy, June 2021	
Starbands 20200610	CSIRO
Default windows library	tbd
Description of input data file for the AccuRate simulation engine V3.21 (AccurateEngine.exe), February 2019 <ul style="list-style-type: none"> <li>How to write a scratch file for Chenath</li> </ul>	CSIRO
<a href="#">Material Properties Used in NatHERS Software Tools</a> , 2012 – updated May 2022, Dong Chen <ul style="list-style-type: none"> <li>A list of material properties used in NatHERS software tools</li> </ul>	<a href="http://nathers.gov.au">nathers.gov.au</a>
<a href="#">Infiltration Calculations in AccuRate V2.0.2.13</a> , Dong Chen, 2013	<a href="http://hstar.com.au/Home/Chenath">hstar.com.au/Home/Chenath</a>
Modelling of Roof spaces, Sub-floors and Non-Vertical Air Gaps in the AccuRate Engine, October 2003	CSIRO
Openings and Perforations Used in AccuRate, Dong Chen, June 2014, modified August 2014	CSIRO