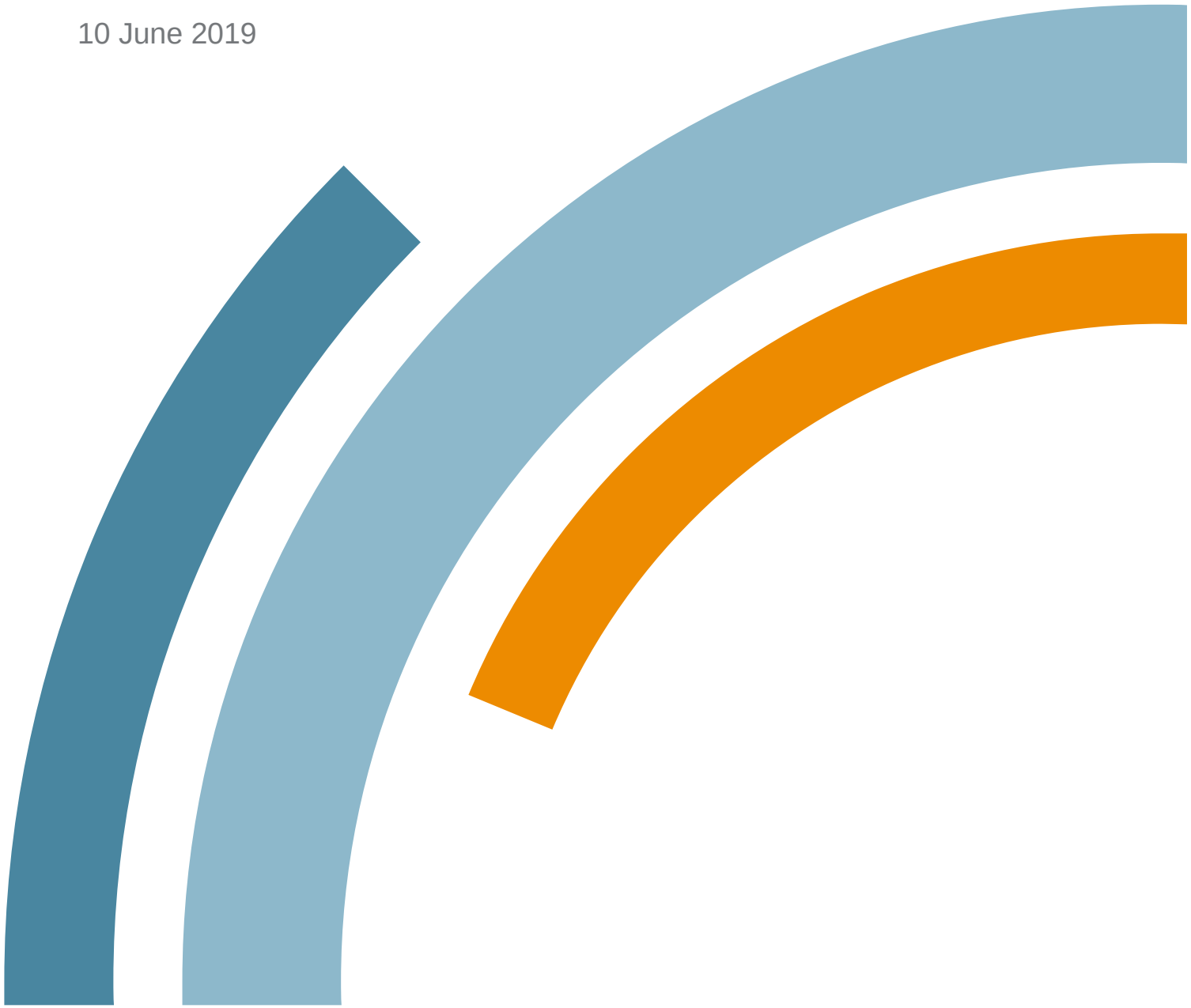
ESSENTIAL SERVICES COMMISSION

Victorian Energy Upgrades

Water Heating and Space Heating/Cooling Product Application Guide

10 June 2019



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Introduction

This guide provides product applicants with guidance on how to apply for water heating and space heating/cooling products to be listed on our Register of Products, so that they are eligible to be installed and create Victorian energy efficiency certificates (VEECs) under the Victorian Energy Upgrades (VEU) program.

About this guide

This guide provides instructions on how to apply for a water heating or space heating/cooling product to be listed on our Register of Products.

The products covered by this guide are:

- Water heating products:
  - Gas or LPG storage water heater (product category 1A)
  - Gas or LPG instantaneous water heater (product category 1B)
  - Electric boosted solar water heater (product category 1C)
  - Heat pump water heater (product category 1D)
  - Gas or LPG boosted solar water heater (product categories 1F and 3B)
- Space heating/cooling products:
  - High-efficiency ducted gas heater (product category 5A)
  - Ducted air to air heat pump (product category 7A)
  - Gas or LPG space heater (product category 9A)
  - Space air to air heat pump (product category 10A)
  - Ducted evaporative cooler (product category 23A)
  - Gas heating ductwork (product category 28)

This guide is divided into three sections:

- Section 1 provides general information on product applications.
- Section 2 provides further detail of the performance criteria and documentary evidence required for water heating products.
- Section 3 provides further detail of the performance criteria and documentary evidence required for space heating/cooling products.

You should also read our Application Guide for Product Applicants, which provides additional information on:

- Our Register of Products.
- Our product application and assessment process, including things to bear in mind throughout the process.
- Some product application functionality.

Who should use this guide

You should use this guide if you are

- applying for water heating and space heating/cooling products to be listed on our Register of Products under the Victorian Energy Upgrades program.
- interested in understanding the product application requirements for water heating and space heating/cooling products under the VEU program

You must hold a VEU account to apply for a product listing. Find out more about creating a VEU account at www.esc.vic.gov.au/become-veu-accredited

Seeking assistance

If you encounter difficulties with your application that cannot be answered using this guide contact us on (03) 9032 1310 or veu@esc.vic.gov.au

We appreciate the time and effort that businesses put into their applications and product officers will endeavour to work with you during the assessment process.

If you have submitted a product application, please use the designated 'notes' field in the online product assessment tool to communicate directly with the product officer responsible for assessing your application.

Legal context for this guide

We have prepared this guide as a general summary of relevant parts of:

- Victorian Energy Efficiency Target Act 2007 (the VEET Act)
- Victorian Energy Efficiency Target Regulations 2018 (the VEET Regulations)
- Victorian Energy Upgrades Specifications 2018 (the VEU specifications)
- Victorian Energy Efficiency Target Guidelines (the VEET guidelines)

View these documents at www.esc.vic.gov.au/veu-legislation

This guide should not be relied upon as substitute for legal advice and should be read in conjunction with the above source documents. In the event of inconsistency between this guide and the source documents, the content in the source documents apply.

1. Product requirements

1.1. Product criteria and documentation

Products must meet the specified requirements to be listed on the Register of Products and create VEECs. We do not accept deviations from the listed standards.

You must review and familiarise yourself with the product performance and documentation requirements for each type of product before testing products and submitting product applications.

If you are unable to provide sufficient evidence that a product is capable of meeting the minimum criteria, the product will not be approved.

For most of the product categories listed on the following pages, you must submit an independent third-party verification of the product performance against established safety and performance standards, such as a test report from an accredited laboratory.

Consult the relevant sections of the VEET Regulations and VEU specifications when preparing documentary evidence for your application.

1.2. GEMS products under the program

Some products listed on the Australian Greenhouse and Energy Minimum Standards (GEMS) Register can be used for VEU installation activities, even if not listed on our Register of Products.

However, for practical purposes a product must be listed in our Register of Products in order to create VEECs in our registry system. GEMs products include:

- Ducted air to air heat pump (product category 7A)
- Room air to air heat pump (product category 10A)

View the GEMS Register at reg.energyrating.gov.au/comparator/product_types/

The register is maintained by the Australian GEMS Regulator, which is also responsible for administering the GEMS Act, and monitoring and enforcing compliance with the GEMS Act.

Adding GEMS-listed products to our Register of Products

We populate the register on a periodic basis (at least annually) with eligible products from the GEMS Register.[1]

Usually, you will not need to apply to us to have a GEMS-listed product added to our register. However, in some cases the data available from the GEMS product registers is incomplete and in such cases these products may not be added to our register until additional data is provided. Likewise, if a product is added – or an update made – to the GEMS Register, that change may not be reflected in the Register of Products immediately.

In order to add GEMS products to our Register of Products:

- the brand and model of the product must comply with the relevant GEMS determination and be registered on the GEMS Register
- the product category must meet the product criteria specified in the VEET Regulations and the minimum energy efficiency requirements specified in the VEU specifications
- evidence of GEMS registration must be submitted in the form of a downloadable product list (CSV file) from the GEMS Register demonstrating compliance with the product criteria (accessible via https://reg.energyrating.gov.au/comparator/product_types/).

Products that are removed from the GEMS Register cease to be eligible for VEU installation activities from the date of removal. If you are aware of your product being removed from the GEMS Register prior to its GEMS expiration date, please let us know immediately.

[1] Note that due to data quality issues we encounter when reviewing the GEMS Register, a product may not be added to our Register of Products as part of this periodic update.

2. Water heating product performance and documentation requirements

2.1. Product categories 1A and 1B: Gas water heaters

Product category number	Product category	Product criteria	Documentary evidence
1A	Gas or LPG storage water heater	Gas or liquefied petroleum gas storage water heater certified by an accredited body as achieving a minimum 5 star rating when tested in accordance with AS/NZS 5263.1.2.	AGA Certificate or listing on AGA directory demonstrating compliance with the product criteria.
1B	Gas/LPG instantaneous water heater	Gas or liquefied petroleum gas instantaneous water heater certified by an accredited body as achieving a minimum 5 star rating when tested in accordance with AS/NZS 5263.1.2.	AGA Certificate or listing on AGA directory demonstrating compliance with the product criteria.

2.2. Product categories 1C, 1D, 1F, and 3B: Solar and heat pump water heaters

We work with an external service provider to assess whether solar water heating products meet the minimum eligibility requirements of the VEET Regulations.

We also publish additional solar water heater performance data on our Register of Products, which are not relevant to the calculation of VEECs, but which assist licenced plumbers and builders to identify which solar water heater products are capable of complying with the Plumbing Regulations 2008 (Vic).

Product category number	Product	Product criteria
1C	Electric boosted solar water heater	• Certified to AS/NZS 2712. • Achieves 60% annual energy savings when determined in accordance with AS/NZS 4234 and the calculation method described in Appendix A, when modelled in climate zone 4 • The proposed products, components, brands and models must reconcile with the brand and the models shown on the supporting documents. – All supporting documents must specify the product brand and model number. If supporting documents contain different brands and/or model numbers, the applicant must submit a manufacturer's declaration clearly reconciling the different product brands and/or model numbers used across supporting documents with the brands and model numbers proposed under the schedule.
1D	Heat pump water heater	• Certified to AS/NZS 2712 • Achieves 60% annual energy savings determined in accordance with AS/NZS 4234 and the calculation method described in Appendix A, when modelled in climate zone HP4-AU for products installed in climate zone 4 • Achieves 60% annual energy savings determined in accordance with AS/NZS 4234 and the calculation method described in Appendix A, when modelled in climate zone HP5-AU for products installed in climate zone 5 • The proposed products, components, brands and models must reconcile with the brand and the models shown on the supporting documents. – All supporting documents must specify the product brand and model number. If supporting documents contain different brands and/or model numbers, the applicant must submit a manufacturer's declaration clearly reconciling the different product brands and/or model numbers used across supporting documents with the brands and model numbers proposed under the schedule.
1F & 3B	Gas or LPG boosted solar water heater	• Certified to AS/NZS 2712. • Achieves 60% annual energy savings when determined in accordance with AS/NZS 4234 and the calculation method described in Appendix A, when modelled in climate zone 4. • The proposed products, components, brands and models must reconcile with the brand and the models shown on the supporting documents. – All supporting documents must specify the product brand and model

Product category number	Product	Product criteria
		number. If supporting documents contain different brands and/or model numbers, the applicant must submit a manufacturer's declaration clearly reconciling the different product brands and/or model numbers used across supporting documents with the brands and model numbers proposed under the schedule.

Product Category number	Product	Required template / guidance documents
1C/1D	Water heating – electric boosted solar or heat pump	• Template - application spreadsheet • See Appendix A
1F/ 3B	Water heating – gas / LPG boosted solar	• Template - application spreadsheet • See Appendix A

Supporting evidence and file naming conventions

All brands and models must reconcile precisely with the brands and the models on the supporting documents. Any supporting document with unexplained model variations will not be accepted. Applicants must apply the naming conventions shown in the following table.

Product Category	Requirement	Documentary evidence	Naming convention and upload format
Electric boosted solar (1C) Heat pump water heater (1D)	Application spreadsheet	You can apply for multiple products under the one application. Please provide one completed application spreadsheet listing specifications for each model being applied for as part of the current application.	MS Excel document More than one product can be included in the excel spreadsheet, so the name needs to include the date and brand(s): BrandName_YYYYMMDD_commission.xls. e.g. for a solar water heater from Brand ABC provided on 2 January 2014 the filename would be ABC_20140102_ESC.xls
Gas / LPG boosted solar	TRNSYS model	TRNSYS model for the product, including decks and all input and output files.	Input (deck), output, and list files and, if appropriate, file describing incident angle modifier. Brandname_model number_ESC.lst,

(1F/3B)			Brandname_model number_ESC.DCK, Brandname_model number_ESC.out and if appropriate Brandname_ModelNumber_IAM.txt
	TRNSYS modelling reports (If available)	AS/NZS 4234:2008 Reports produced by modelers that include simulations as specified by the commission (including the appropriate tables from AS/NZS 4234 Appendix C).	PDF document Brandname_model number.pdf
	Accreditation certificate	AS/NZS 2712	PDF document Brandname_ModelNo_2712.pdf
	Thermal performance of solar collector	Test report: AS/NZS 2535.1 or equivalent (only required for systems incorporating a solar collector).	PDF document Brandname_CollectorModelNo_2535.pdf
	Thermal performance of heat pump (COP and power correlations)	Test report: AS/NZS 5125.1 (only required for systems incorporating heat pumps).	PDF document Brandname_HeatPumpModelNo_5125.pdf
	Thermal performance of all tanks including electric heated tanks	Test report: AS/NZS 4692 or equivalent.	PDF document Brandname_TankModelNo_4692.pdf
	Test report for all storage and in-line gas heaters	Test report: AS 4552 or equivalent Including as appropriate; start up capacity, maintenance rate, burner capacity and efficiency.	PDF document Brandname_ModelNo_4552.pdf
	Pump specifications	Test report: AS/NZS 4234:2008 section 2.2.5 including test report for measured flow rate and power measured flow	PDF document PumpBrandname_PumpModelNo.pdf

		rate in standard configuration. For variable flow systems include a description of the flow rate control algorithm.	
	Controller specifications	Description of the thermostat controller algorithm and the pump control set points or algorithm. Must include legionella control method.	PDF document ControllerBrandname_ControllerModelNo.pdf
	No load system operation test result	AS/NZS 2712:2007 No load system operation test report for the system or family of systems applied for (*solar systems only*).	PDF document Brandname_NoLoadModelNo_2712.pdf
	Schematic of the system and bill of materials	Parts list including insulation included or specified for piping etc. schematic diagram including all relevant control valves and flow meter if appropriate, solar or heat pump flow and return pipes and temperature sensor location/s.	PDF document Brandname_ModelNo_schematic.pdf
	Dimensioned diagram of the tank	Dimensioned inner tank drawing including cold inlet and hot outlet positions, element position (*if fitted*), flow and return positions for auxiliary heater (*if appropriate*), solar or heat pump flow and return ports and temperature sensor location/s.	PDF document Brandname_TankModelNo_dimension.pdf

3. Space heating/cooling product performance and documentation requirements

3.1. Product category 5: High efficiency ducted gas

Product criteria	Documentary evidence
A product that: • is certified by an accredited body to achieve a minimum 5 star rating when tested and rated in accordance with AS/NZS 5263.1.6 • has a minimum thermal output (or capacity) of 10 kW as determined in accordance with AS/NZS 5263.1.6	Evidence of certification demonstrating compliance against the product criteria: screen shot of listing on the Gas Technical Regulators Committee database (http://equipment.gtrc.gov.au) indicating a status of 'Certified'.

3.2. Product category 7: Ducted air to air heat pump

Product criteria	Documentary evidence
A product that: • complies with the GEMS (Air Conditioners and Heat Pumps) Determination 2013 (Cth) has a minimum RTHC of 10kW at the H1 temperature condition • has a minimum ACOP of: – 3.7, if the RTHC is less than 19kW – 3.9 if the RTHC is 19kW or greater	Evidence of GEMS registration - downloadable product list (CSV file) from GEMS (www.energyrating.gov.au) .

3.3. Product category 9: Gas or LPG space heater

Product criteria	Documentary evidence
A product that: • is certified by an accredited body to achieve a minimum 4 star rating when tested and rated in accordance with AS/NZS 5263.1.3 • has a minimum thermal output (or capacity) of 2 kW as determined in accordance with AS/NZS 5263.1.3	Evidence of certification demonstrating compliance against the product criteria: screen shot of listing on the Gas

	Technical Regulators Committee database (http://equipment.gtrc.gov.au) indicating a status of 'Certified'.
• has a room sealed flue	Product specification sheet

3.4. Product category 10: Room air to air heat pump

Product criteria	Documentary evidence
A product that: • complies with the GEMS (Air Conditioners and Heat Pumps) Determination 2013 (Cth) • achieves minimum RTHC is of 2 kW at the H1 temperature condition • has a minimum ACOP of: – 4.2, if the RTHC is less than 3 kW – 4 if the RTHC is 3kW or greater	Evidence of GEMS registration: downloadable product list (CSV file) from GEMS (www.energyrating.gov.au) .

3.5. Product category 23: Ducted evaporative cooler replacing a refrigerative air conditioner

Product criteria	Documentary evidence
A product that: • complies with and is tested in accordance with AS 2913 • has a minimum 7 kW rated output • has a minimum effective energy efficiency ratio (EER) of 20 based on measurements of nominal rating (kW) and electricity consumption undertaken according to AS 2913, and calculated according to the formula: EER = 0.2 x EERFL + 0.3 x EER50% + 0.5 x EER20% Where: EERFL is the nominal rating (kW) ÷ electricity consumption (kW) at rated airflow EER50% is the nominal rating (kW) ÷ electricity consumption (kW) at 50% rated airflow EER20% is the nominal rating (kW) ÷ electricity consumption (kW) at 20% rated airflow.	Test report showing compliance with AS 2913-2000. Note that the test report must show all the performance variables (EERFL, EER50%, and EER20%).

3.6. Product Category 28: Gas heating ductwork

Product Category	Product criteria	Acceptable evidence
Flexible ductwork (28A)	Flexible ductwork that: • is certified by an approved laboratory as complying with AS 4254.1 and is labelled in accordance with that standard • is insulated using bulk insulation that is certified by an approved laboratory as complying with AS/NZS 4859.1 • is constructed and installed in accordance with AS 4254.1 and uses fittings that – if installed in a class 1 or 10 Building, achieves at least the R-value specified by Table 3.12.5.2 of Volume Two of the BCA – if installed in a class 2 to 9 Building, achieves the minimum total R value specified by Specification J5.2b of Volume One of the BCA • achieves a min R-value of R1.5 when measured in accordance with AS/NZS 4859.1.	Test report by a NATA accredited laboratory or equivalent body showing compliance with the product criteria.
Rigid ductwork (28A)	Rigid ductwork that: • is certified by an approved laboratory as complying with AS 4254.2 • is insulated using bulk insulation that is certified by an approved laboratory as complying with AS/NZS 4859.1 • is longitudinally labelled at intervals of no more than 1.5 meters in characters that are clearly legible and at least 18mm high and state the duct manufacturer's or assembler's name, the diameter of the duct core, the R-value of the bulk insulation and whether the ductwork complies with AS 4254.2 • is constructed and installed in accordance with AS 4254.2 and uses fittings that – if installed in a class 1 or 10 Building, achieves at least the R-value specified by Table 3.12.5.2 of Volume Two of the BCA – if installed in a class 2 to 9 Building, achieves the minimum total R value specified by Specification J5.2b of Volume One of the BCA • achieves a min R-value of R1.5 when measured in accordance with AS/NZS 4859.1.	

Appendix A: Annual Solar Energy Calculation Method for Domestic Solar and Heat Pump Water Heaters

TRNSYS

Modelling must be conducted in accordance with AS/NZS 4234:2008 (Heated water systems – Calculation of energy consumption including Amendments 1, 2 and 3) using the TRNSYS program or extensions of the software in the TRNSYS modelling package. It is required to ensure that the product is capable of delivering the selected load in the middle of winter, and to determine the annual energy savings in climate zone 4 for solar water heaters, or both climate zone HP4-Au and HP5-Au for heat pumps. Modelling should be carried out using a simulation time step of 0.1 hour or less.

Modelling must employ either the small or medium load size as described in AS/NZS 4234:2008.

Key model parameters

The calculation of energy consumption must use the method set out below:

- Collector inclination = 25°, azimuth = 0° North (as per the “North Orientation” in AS/NZS 4234:2008). Note the alternative “representative average installation” ” collector inclination = 20°, azimuth = 45 can also be used.
- Weather data to be used in the simulation must be climate zone 4 for solar water heaters, or both climate zones HP4-Au and HP5-Au for heat pumps.

Boosting regime

The boosting regime modelled must be consistent with the way the product will be installed. See Appendix B for further guidance on user override of time limited boosting.

Off-peak boosting

Most electric boosted solar water heaters installed in Victoria are boosted off peak, and should be sized to minimise boosting required during peak times. The model must separately report the total energy supplied in each boost mode (peak and off peak) throughout the modelling calculation.

Off-peak electric boost availability times

For off-peak electric boost availability times, refer to the AS/NZS 4234:2008 “night rate”.

Off- peak electric boost systems with one element

Off-peak electric boost systems with one element may be set to allow the booster to be energised with a ‘one shot’ boost if the delivered water temperature falls below a set threshold, with the control reverting to regular operation after one boost cycle. This feature may only operate once per day.

Continuous boosting

For electric boosted solar water heaters and heat pumps that are to be installed on the more expensive continuous boosting tariff, the system should be modelled with the boost control in continuous mode. The results must note that the modelling assumed a continuous tariff.

Variable thermostats

Products with variable thermostats which facilitate user override are acceptable. The commission does not specify which thermostat setting should be used in the model, as long as:

- the model setting is within the range of settings available for the actual product; and
- the model achieves the following related Australian Standards requirements:
  - minimum delivery temperature of 45°C; and
  - the product must control for legionella (various options are available).

Mid- winter load delivery

The system must report the minimum delivery temperature under the selected load as specified in AS/NZS 4234:2008. The purpose of this requirement is to ensure the consumer has sufficient hot water through periods of low solar gain.

The modelling procedure allows for one-shot boosting where installations connected to off-peak supply will enable this to occur as outlined in the Boosting Regime section above. If the product fails to meet this condition, a lower load should be selected. If the product fails to meet this condition under the small load, the product is not eligible.

Heat pump products must be capable of mid-winter load delivery in climate zone HP4-Au if they are to be installed in climate zone 4, and in climate zone HP5-Au if they are to be installed in climate zone 5.

Special considerations for air-source heat pump storage water heaters

Heat pump water heater performance must be evaluated for climate zones HP4-Au and HP5-Au and both sets of results provided to the commission. Products must achieve:

- 60% Annual Energy Savings in climate zone HP4-Au to be installed in climate zone 4
- 60% Annual Energy Savings in climate zone HP5-Au to be installed in climate zone 5. Note zone HP5-Au corresponds to Australian Building Code zones 7 & 8.

Presentation of results

Results must be presented in the current version of the Solar and Heat Pump Water Heater Product Application Form available at www.esc.vic.gov.au/veu-product-applicants. A separate row must be used for each system. Please enter only the required data marked by light blue cells. Do not modify formulas or hidden data.

Annual purchased energy consumption data should be entered with a precision of four significant figures. The final result of “annual purchased energy savings (%)" is published with a precision of two significant figures.

Appendix B: User over-ride of time-limited boosting and one-shot boosting

The concept of time limited boosting used in off-peak electric water heaters has been adopted for some solar/gas-storage water heaters. The purpose of using time-limited boosting in solar/gas storage water heaters is to separate the solar and gas energy inputs in time so that the solar input can occur over the day without the gas boost operating and diminishing the solar performance. Schemes that have been adopted to maximise the solar performance of solar/gas storage water heater include:

- time clock limit of gas operation
- intelligent controller that senses solar availability and the quantity of hot water in the tank and minimises gas operation during solar input periods.

Systems using this type of control scheme can be configured to achieve reasonable solar contribution. However, if the time clock or controller settings are adjustable by the user then there may be a significant reduction of solar contribution. User adjustment of the boost control could occur during periods of bad weather or when there is a short term high demand.

Automatic resetting controls off-peak boosting

The current methodology accounts for the potential user adjustment of the auxiliary boosting by requiring that the controls automatically reset to the conditions used for the rating analysis within 24 hours of any user adjustment of the controller.

Both gas and electric products that allow user over-ride of an auxiliary booster control that automatically resets within 24 hours should be modelled using a ‘one-shot’ boosting option that is initiated when the delivery temperature drops to a level where the product would fail the minimum delivery temperature requirement. This feature may only operate once per day. The one-shot threshold temperature should be 45°C or higher depending on the product design.

Permanent user over-ride controls off-peak boosting

Products that allow the user to reset the boost controller and that do not automatically reset to the operating conditions used during the rating calculation should be modelled with the boost control in continuous mode.

Glossary

Term	Definition
Accredited body	In relation to a product, this means a body accredited under the Joint Accreditation System of Australia and New Zealand to give product certification or component certification of a product.
ACOP	Annual coefficient of performance is the ratio of a product's rated heating capacity to its effective power input at its rated heating capacity.
AGA	Australian Gas Association
AGA product Directory	The AGA publishes a Directory of all type tested products that are currently certified by AGA. Available at: https://www.aga.asn.au/product_directory
AP	An accredited person is a business that has been accredited by the commission to operate within the VEU program. An AP is entitled to create VEECs through the undertaking of energy efficient activities which are prescribed under the Principal Regulations.
Business premises	Under the VEU program, business premises are defined as: (i) the premises that is not registered as a residential premises (see definition below), and (ii) the premises not registered as a 'scheduled activity premises' unless it has been 'opted in' to the VEU program pursuant to Regulation 10AA of the Principal Regulations.
commission	Essential Services Commission
ESV	Energy Safe Victoria
GEMS	Greenhouse and Energy Minimum Standards
GEMS Act	Greenhouse and Energy Minimum Standards Act 2012 (Cth)
GEMS Register	Means the register kept by the Greenhouse and Energy Minimum Standards Regulator under the GEMS Act and made available to the public at http://reg.energyrating.gov.au/comparator/
NATA	National Association of Testing Authorities
Residential Premises	A building classified under part A3 of the Building Code of Australia as a class 1, 2, 3, or 4 building.
RFI	Request for further information

Term	Definition
RTHC	Rated total heating capacity
VEEC	Victorian energy efficiency certificate. Each VEEC represents one tonne of carbon dioxide equivalent (CO_2-e) abated by the prescribed activity.
VEET Act	Victorian Energy Efficiency Target Act 2007
VEET Regulations	The Victorian Energy Efficiency Target Regulations 2018
VEU	Victorian Energy Upgrades program
VEU specifications	Specifications published by the Secretary under regulation 35 of the VEET Regulations

Document version control

The RM reference for this document is: C/18/24089

Version	Amendments made	Date published
1.0	First release	10 December 2018
2.0	• Inclusion of new reporting requirements for performance of heat pump products in climate zone HP5-Au as defined in the 2018 VEU Specifications. • Update on requirements regarding brand/model reconciliation • Incorporation of the former “Annual Solar Energy Calculation Method for Domestic Solar and Heat Pump Water Heater” into Appendix A and Appendix B (with minor amendments for clarification) • Removal of maximum threshold for peak (day rate) boost energy for off-peak electric boost systems	10 June 2019