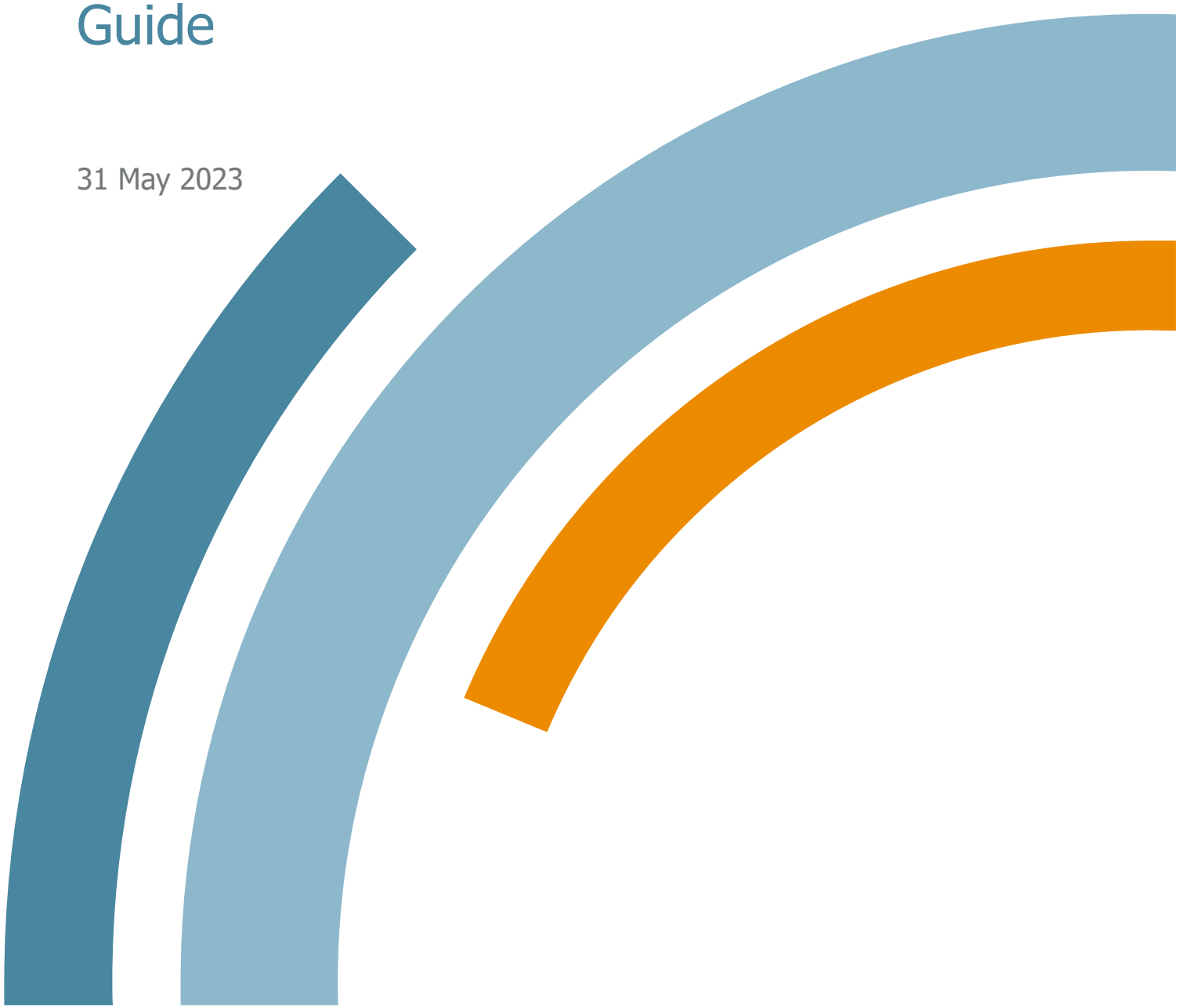
ESSENTIAL SERVICES COMMISSION

Victorian Energy Upgrades

Water Heating and Space Heating/Cooling Product Application Guide

31 May 2023



An appropriate citation for this paper is:

Essential Services Commission 2023, Water Heating and Space Heating/Cooling Product Application Guide: 31 May

Copyright notice

Contents

Introduction

This guide provides product applicants with guidance on how to apply for water heating and space heating/cooling products so that they are eligible to be installed and create Victorian Energy Efficiency Certificates (VEECs) under the Victorian Energy Upgrades (VEU) program in Victoria and/or Energy Savings Certificates (ESCs) under the Energy Savings Scheme (ESS) in New South Wales.

About this guide

This guide provides instructions on how to apply for approval of the following products:

- Water heating products (Victoria and New South Wales):
  - Electric boosted solar water heater (VEU product categories 1C(i) and 3D, ESS activity definitions D18 and D20)
  - Heat pump water heater (VEU product categories 1D(i) and 3C, ESS activity definitions D17 and D19)
  - Gas or LPG boosted solar water heater (ESS activity definition D21)
- Space heating/cooling products (Victoria only):
  - Space heating and cooling products – high efficiency air conditioner (VEU product category 6)
  - Gas heating ductwork (VEU product category 28).

Products approved for use under the VEU program in Victoria will be listed on the commission's Register of Products.

Water heating products approved for use under the ESS in New South Wales will be listed on the Independent Pricing and Regulatory Tribunal (IPART) of New South Wales List of Accepted Products.

This guide is divided into the following sections:

- The introduction.
- Section 1 – general information on product applications.
- Section 2 – the performance criteria and documentary evidence required for water heating products.

- Section 3 – the performance criteria and documentary evidence required for space heating/cooling products.

You should also read the commission's Application Guide for Product Applicants, which provides additional information on:

- The application and assessment process, including things to bear in mind throughout the process.
- Product application functionality in the VEU registry.
- The commission's Register of Products.

Who should use this guide

You should use this guide if you are:

- applying for water heating products to be approved for installation under the VEU program (Victoria) and/or ESS (New South Wales)
- applying for space heating and/or cooling products to be approved and/or listed on our Register of Products under the VEU program (Victoria)
- interested in understanding the product application requirements for water heating and space heating/cooling products under the VEU program and/or ESS.

You must hold a VEU account in the VEU Registry to apply for product approval/listing for the above products.

Seeking assistance

If you have questions about your application that are not covered in this guide, please contact us: Phone (03) 9032 1310 or email veu@esc.vic.gov.au

If you intend to submit a product application, please use the designated 'notes' field in the online product portal to liaise directly with the product officer responsible for assessing your application.

If you have a question relating to specific product requirements under the ESS legislation, contact IPART: Phone (02) 9290 8452 or email ESS@ipart.nsw.gov.au.

Related legislation

This is a guide published by the commission pursuant to section 13 of the Essential Services Commission Act 2001

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

- the Victorian Energy Efficiency Target Act 2007 (the VEET Act)
- the Victorian Energy Efficiency Target Regulations 2018 (the VEET Regulations)
- the Victorian Energy Upgrades Specifications 2018 (the VEU Specifications)
- the Victorian Energy Efficiency Target Guidelines (the VEET Guidelines)
- the New South Wales Energy Savings Scheme Rule of 2009 (ESS Rule).

View the Victorian legislative documents at www.esc.vic.gov.au/veu-legislation.

View the Energy Savings Scheme Rule at www.ess.nsw.gov.au/Home/About-ESS/Legislation-ESS-Performance/ESS-Rule.

The information in this publication is intended to provide general guidance only. It does not constitute legal or other professional advice and should not be relied on as a statement of the law in any jurisdiction. While the commission has made every effort to provide current and accurate information, you should obtain professional advice if you have any specific concern, before relying on the accuracy, currency or completeness of this information.

1. Product requirements

1.1. Product criteria and documentation

Products must meet the specified requirements to be:

- listed on the commission's Register of Products to create Victorian Energy Efficiency Certificates (VEECs) (for installation in Victoria)
- listed on IPART's List of Accepted Products and create Energy Savings Certificates (ESCs) (for installations in New South Wales).

No deviations from the listed standards will be accepted.

The product categories listed in the Register of Products are prescribed by the VEET Regulations and VEU Specifications, and are a matter for the Department of Energy, Environment and Climate Action.

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. 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.

If you are unable to provide sufficient evidence that a product meets the minimum specified requirements, the product will not be approved.

Consult the relevant sections of the VEET Regulations and VEU Specifications, and/or the ESS Rule when preparing evidence for your application.

1.2. Electrical Equipment Safety System requirements (Victoria only)

The Electricity Safety Act 1998 requires compliance with Electrical Equipment Safety System (EESS), which regulates the supply of in-scope electrical equipment (low voltage equipment for household, personal or similar use) in Victoria.

Persons importing or manufacturing in-scope electrical equipment must comply with the requirements of the ESSS and register themselves as a responsible supplier. The EESS requires risk levels 2 and 3 in-scope electrical equipment to be registered on the EESS database. This registration also requires risk level 3 equipment to be certified by a Recognised External Certification Scheme (RECS) or a Regulatory Authority (RA).

As at the date of publication of this product guide, the following risk level classifications of the EESS apply:

- Heat pump water heaters without a heating element are classified as risk level 1 in-scope electrical equipment
- Air conditioners incorporating non-flammable or low flammable refrigerants are classified as risk level 2 in-scope electrical equipment
- Electric boosted solar water heaters, heat pump water heaters with a heating element, and air-conditioners incorporating flammable refrigerant are classified as risk level 3 in-scope electrical equipment

In Victoria, the Electrical Equipment Safety System is regulated by Energy Safe Victoria. Accredited persons are responsible for understanding and complying with their obligations under the EESS. Certificates under the VEU program cannot be created in relation to a prescribed activity under the VEU program if the product installed is not in compliance with the EESS.

We note the commission may remove a product from the Register of Products if satisfied that the product may be unsafe. Where electrical equipment is not registered in the EESS as required, this may raise safety concerns that may result in the product being removed from the Register of Products.

2. Water heating product performance and documentation requirements (Victoria and New South Wales)

2.2. Electric boosted solar, gas/LPG boosted solar and heat pump water heater product requirements

Under the transitional arrangements set out in the VEU Specifications, products which are tested and modelled on AS/NZS 4234: 2008 and listed on the commission's Register of Products by 31 May 2023 will continue to be eligible for VEECs when installed up to 30 June 2024. From 1 July 2024, only products which are tested and modelled based on AS/NZS 4234:2021 are eligible for VEECs.

We assess products to check whether solar and heat pump water heating products meet the minimum eligibility requirements of the:

- VEET Regulations and VEU Specifications (for products to be installed in Victoria) and/or
- the ESS Rule (for products to be installed in New South Wales).

These performance requirements are published on the commission's Register of Products and/or IPART's List of Accepted Products.

Table 1: Product criteria for electric boosted solar, gas/LPG boosted solar and heat pump water heater products

Product category number	Product	Product criteria
1C(i) (VEU)/ 3D(VEU)/ D18 (ESS)/ D20 (ESS)	Electric boosted solar water heater	• Certified by an accredited body as complying with AS/NZS 2712. • Have an insulated storage volume not exceeding 700 litres. • To be installed in Victoria under the VEU program, a product must: – achieve ≥60% annual energy savings determined in accordance with AS/NZS 4234 -2021 and the calculation

Product category number	Product	Product criteria
		method described in Appendix A when modelled in climate zone 4.[1] – be modelled based on two load sizes. Product to be used for a medium upgrade, must be modelled under 'medium' and 'small' load conditions based on AS/NZS 4234:2021. Product intended for a small upgrade must be modelled under 'small' and 'very small' load conditions based on AS/NZS4234:2021.[2] • To be installed in New South Wales under the ESS program, a product must: – achieve ≥60% annual energy savings when determined in accordance with AS/NZS 4234:2021 and the calculation method described in Appendix A when modelled in climate zone 3. – be modelled using either a small or medium peak hot water load size in accordance with AS/NZS 4234:2021.[3]
1D(i) (VEU)/ 3C (VEU)/ D17 (ESS)/ D19 (ESS)	Heat pump water heater	• Certified by an accredited body as complying with AS/NZS 2712. • To be installed in Victoria under the VEU program, a product must: – achieve ≥60% annual energy savings determined in accordance with AS/NZS 4234:2021 and the calculation

[1] For the purposes of demonstrating compliance with the minimum annual energy savings requirement, a VEU product used for a 'medium upgrade' must be modelled at the 'medium' load in AS/NZS 4234:2021 and a VEU product used for a 'small upgrade' under this scenario must be modelled at the 'small' load in AS/NZS 4234:2021.

[2] Modelling for two load sizes is required as the VEU Specifications provide that the Bs and Be values to be used in calculating the emission reduction for a 'medium upgrade' is to be determined when modelled with the 'small' load as defined in the AS/NZS 4234:2021 standard, and that the Bs and Be values for a 'small upgrade' is to be determined when modelled with the 'very small' load as defined in the AS/NZS 4234:2021 standard.

[3] The NSW load modelled is the largest of 'medium' or 'small' that can achieve 60% savings. Lower average hot water use in NSW households is accounted for post modelling in the calculation of energy savings.

Product category number	Product	Product criteria
		method described in Appendix A when modelled in climate zone HP4-AU for products installed in climatic zone 4 [2, 4] – achieve ≥60% annual energy savings determined in accordance with AS/NZS 4234:2021 and the calculation method described in Appendix A when modelled in climate zone HP5-AU for products installed in climatic zone 5 [2, 4] – use a refrigerant that has a global warming potential (GWP) of less than 700[5] – be modelled based on two load sizes. Products to be used for a medium upgrade must be modelled under 'medium' and 'small' load conditions based on the AS/NZS 4234: 2021. Products to be used for a small upgrade must be modelled under 'small' and 'very small' load conditions based on AS/NZS4234:2021.[3] • To be installed in New South Wales under the ESS program, a product must – achieve ≥60% annual energy savings determined in accordance with AS/NZS 4234: 2021 and the calculation method described in Appendix A, when modelled in climate zone HP3-AU for products installed in BCA climate zone 2,3,4,5, or 6[6] – achieve ≥60% annual energy savings determined in accordance with AS/NZS 4234: 2021 and the calculation method described in Appendix A, when modelled in climate zone HP5-AU for products installed in BCA climate zone 7 or 8

[4] Climate zones for a Victorian postcode to be determined in accordance the Location Variable List table in the VEU Specifications 2018.

[5] A requirement for products installed under the VEU program from 1 July 2024. See appendix D for list of refrigerants with their GWP values.

[6] Refer to the Australian Building Codes Board Climate Zone Map to identify the relevant BCA climate zones.

Product category number	Product	Product criteria
		– be modelled using either a small or medium peak hot water load size in accordance with AS/NZS 4234:2021.[7]
D21(ESS) only	Gas or LPG boosted solar water heater	• Certified by an accredited body as complying with AS/NZS 2712 • Must have an insulated storage volume not exceeding 700 litres • Must achieve ≥60% annual energy savings when determined in accordance with AS/NZS 4234 -2021 and the calculation method described in Appendix A, when modelled in climate zone HP3-AU for products installed in BCA climate zone 2,3,4,5, or 6[8] • Must be modelled using either a small or medium peak hot water load size in accordance with AS/NZS 4234:2021.[9]

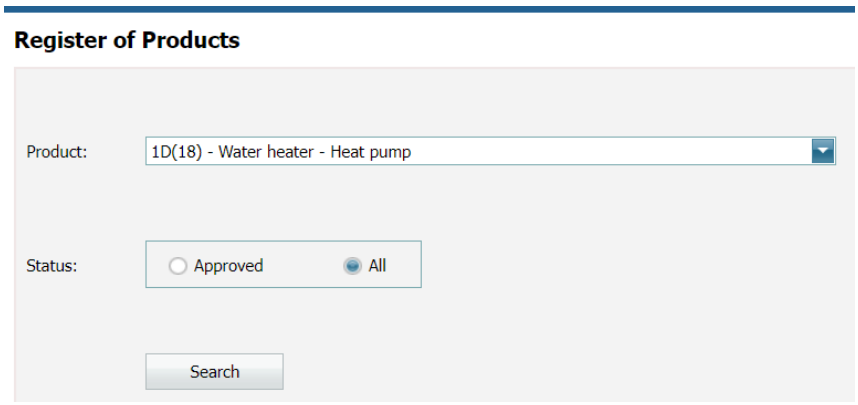
A product does not need to achieve ≥60% annual energy savings across all climate zones to apply for approval. However, it will only be able to claim certificates for installations in climate zones where it has met the ≥60% annual energy savings threshold.

A product is not permitted to be listed on the Register of Products to both AS/NZS 4234:2008 and AS/NZS 4234:2001 at the same time. When a product which is listed under the AS/NZS 4234:2021 standard, this product will cease to be listed under the AS/NZS 4234:2008 standard on the Register of Products from 31 May 2023.. This will mean that any installation undertaken using the product from 1 June 2023 will be calculated using the AS/NZS 4234:2021 calculations in the VEU Specifications (i.e. scenario 1C(i) calculation for installing electric boosted solar or scenario 1D(i) calculation for installing heat pump water heater) once the product is listed under the AS/NZS 4234:2001 standard on the Register of Products.

Stakeholders who are interested in finding out the performance parameters of a product against the AS/NZS 4234:2008 standard once its listing has been ‘end-dated’, can view the product listing by searching using status of ‘All’ in the Register of Products.

[7] The NSW load modelled is the largest of “medium” or “small” that can achieve 60% savings. Lower average hot water use in NSW households is accounted for post modelling in the calculation of energy savings.

[8] Refer to the Australian Building Codes Board Climate Zone Map to identify the relevant BCA climate zones.



2.2.1 Supporting evidence and file naming conventions – solar and heat pump water heaters

Product brand and model numbers must reconcile precisely for the online VEU Registry, AS/NZS 2712 certification, and the product data plates.

All supporting documents must specify the product brand and model number. All brands and models must reconcile precisely with the brands and the models on the supporting documents. The proposed products, components, brands, and models must reconcile with the brand and the models shown on the supporting documents.

All test reports must be produced by National Association of Testing Authorities (NATA) accredited (or equivalent) test laboratories. Australian manufacturers can test their products in their own in-house NATA accredited laboratories.

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. A manufacturers declaration will not be accepted for AS/NZS 2712 certification or product data plates.

Any supporting document with unexplained model variations will not be accepted.

We will accept a representative test report[9] for tanks and collectors if the differences between the tested product and the products represented by the report are unlikely to affect the performance of the products. The applicant must include a manufacturer's declaration that includes a comparison of

[9] Test reports should be less than 10 years old from the date of product application.

product specifications between the tested model and the model applied in the application. The comparison should cover detailed information about the specifications listed below and any other specifications which might affect the performance of the components referred to in the declaration.

Product specifications for tanks:

- the insulation material and thickness
- the tank dimensions
- the water container material and wall thickness
- the position of fittings (element, thermostat, and openings for water in and out).

Product specifications for collectors:

- the glass type (specify thickness, transmissivity, and surface treatment)
- the absorber surface, material, and design
- the collector insulation material and thickness
- collector dimensions.

We will use this information to determine whether a representative test report is acceptable. We will accept a product test report if the product specifications remain the same since the test.

You do not need to submit modelling outputs for all climate zones for a product when applying for approval.

Applicants must apply the naming conventions shown in the following table.

Table 2: Required documentary evidence and naming conventions for water heating product applications

Product category	Document requirement	Documentary evidence	Naming convention and upload format
Electric boosted solar 1C(i) (VEU)/ 3D(VEU) D18 (ESS)/ D20 (ESS) Heat pump water heater 1D(i) (VEU)/ 3C(VEU) D17 (ESS)/ D19 (ESS)	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, 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: 2021 (Victoria and NSW) reports produced by modelers that include	PDF document Brandname_model number.pdf

Product category	Document requirement	Documentary evidence	Naming convention and upload format
Gas / LPG boosted solar)/ D21(ESS only)		simulations as specified by the commission (including the appropriate tables from Appendix C, AS/NZS 4234). The Australian standard AS/NZS 4234 was updated in 2021. The new version is AS/NZS 4234: -2021. VEU and ESS will only accept product performance established according to the AS/NZS 4234 - 2021.	
	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). The test report shall require all the reporting requirements specified in the standard. See Appendix C of this document for additional clarification.	PDF document Brandname_HeatPumpModelNo_5125.pdf

Product category	Document requirement	Documentary evidence	Naming convention and upload format
	Thermal performance of all tanks including electric heated tanks	Test report: AS/NZS 4692 or equivalent. AS/NZS 1056.1 was superseded on 19 March 2021. This standard will no longer be accepted from that date.	PDF document Brandname_TankModelNo_4692.pdf
	Test report for all storage and in-line gas heaters	Test report: AS 4552 or AS/NZS 5263.1.2 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 including test report for measured flow rate and power measured flow rate in standard configuration. For variable flow systems include a description of the flow rate control algorithm.	PDF document PumpBrandname_PumpModelNo.pdf
	Controller specifications	Description of the thermostat controller algorithm and all the pump control set points, information about different modes and algorithms including user adjustable settings that impact on the energy use. Include the legionella control method. If there is a built-in electrical booster element, provide details on how and when the	PDF document ControllerBrandname_ControllerModelNo.pdf

Product category	Document requirement	Documentary evidence	Naming convention and upload format
		booster is used to heat the water.	
	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
	Photograph of relevant data plate(s)	Photo of the product data plate for integrated heat pumps. For split or separate heat pumps photo of the tank data plate and heat pump unit data plate.	PDF document Brandname_TankModelNo_DataPlates.pdf

Product category	Document requirement	Documentary evidence	Naming convention and upload format
	Manufacturer's installation instructions	Manufacturer's installation instructions including installation instructions consistent with the Plumbing Regulations 2008 (as amended from time to time).	PDF document Brandname_modelNo_Installation Instructions.pdf
	EESS registration	Evidence of EESS registration (for risk level 2 and 3 water heaters) Screenshot of listing on EESS database clearly showing brand/model and risk level. For products with risk level 3, a copy of the certificate of conformity	PDF document Brandname_modelNo_EESSregistration.pdf Certificate Brandname_modelNo_CertificateofConformity.pdf

2.2.2 Modelling requirements in accordance with AS/NZS4234

The AS/NZS 4234 – Heater water systems – calculation of energy consumption was updated in June 2021.

Victoria

When submitting applications for use under the VEU program, you must ensure products are modelled following AS/NZS 4234:2021 and modelled based on two load sizes.

- TRNSYS performance modelling under two system load sizes are identified as 'system load size' and 'step down load size'.
- For a medium size system, enter the:
  - percentage annual energy savings, Be and Bs values when modelled with the 'medium' load as defined in the AS/NZS 4234:2021 standard in the fields labelled 'system load size'
  - percentage energy savings, Bs and Be values when modelled with the 'small' load as defined in the AS/NZS 4234:2021 standard in the fields labelled 'step down load size'.

- For a small size system, enter the:
  - percentage annual energy savings, Bs and Be values when modelled with the ‘small’ load as defined in the AS/NZS 4234:2021 standard in the fields labelled ‘system load size’
  - percentage annual energy savings, Bs and Be values when modelled with the ‘very small’ load as defined in the AS/NZS 4234:2021 standard in the fields labelled ‘step down load size’.

To be eligible under the VEU program, the percentage annual savings under the system load size must be 60% or greater.

Once we have reviewed a product and accepted it has met the criteria applying to the product category, we will approve the product for listing on the Register of Products. This includes publishing of information of the product performance parameters for that product to the register.

New South Wales

- When submitting applications for use under the ESS, you must ensure products are modelled in accordance with AS/NZS 4234:2021 and modelled based on one load size in accordance with AS/NZS 4234:2021.
- For a medium size system, enter the Bs and Be values when modelled with the ‘medium’ load as defined in the AS/NZS 4234:2021 standard in the fields labelled ‘system load size’.
- For a small size system, enter the Bs and Be values when modelled with the ‘small’ load as defined in the AS/NZS 4234:2021 standard in the fields labelled ‘system load size’.

2.2.3 Submitting residential solar hot water and heat pump product applications to VEU and the ESS programs

The product applicants can submit product applications for the VEU program (Victoria), ESS program (NSW) or both. When you apply, please select the relevant state from the options below.

- VIC only – applications for the Victorian VEU program
- NSW only – applications for the ESS program in New South Wales
- VIC and NSW combined – applications for both VEU and ESS programs.

In addition to selecting the state, you must select the correct Victorian and/or NSW Peak Loads.

You are able to propose a product for one or more climatic zones.

When submitting product applications, applicants can upload one product at a time or use the new bulk upload function. Usually, there is a limit of three products per application. Under special circumstances (eg. for similar products with a series), we allow upload of up to eight products per

application. When uploading more than three products, please ensure that the following criteria are met.

- One component (i.e., the tank, solar collector, or heat pump) is shared across a family of products within the application.
- Each product listed in the application has a single technology (i.e. pumped inline boost, thermosiphon, integrated HP, non-integrated HP etc.).
- One AS 2712 certificate covers all products in the application.
- The total number of test reports supporting the products does not exceed ten.

When using the bulk upload function, the applicant can download the upload form using the function ‘Generate product upload form’. Once the form is populated with product information, you can upload the form using the ‘upload products’ function.

3. Space heating/cooling product performance and documentation requirements (Victoria only)

3.1. High efficiency air conditioner product requirements

3.1.1. Product criteria for air conditioners

- A product that is registered to the Greenhouse and Energy Minimum Standards (Air Conditioners up to 65kW) Determination 2019 (Cth)
- For products registered to the Greenhouse and Energy Minimum Standards (Air Conditioners up to 65kW) Determination 2019 (Cth) that have a HSPF and TCSPF for the specified GEMS Residential or Commercial Cold Zone, the product must:
  - achieve the minimum HSPF and TCSPF for the specified GEMS Residential Cold Zone (categories 6A, 6B, 6D, 6E and 6F) specified in table 3 below.
  - achieve the minimum HSPF and TCSPF for the specified GEMS Commercial Cold Zone (categories 6C and 6G) specified in table 3 below; and
  - be registered to the relevant class (or classes) under that determination, specified in table 3 below.
- For products registered to the Greenhouse and Energy Minimum Standards (Air Conditioners up to 65kW) Determination 2019 (Cth) that does not have a HSPF and TCSPF for the specified GEMS Residential or Commercial Cold Zone, the product must:
  - achieve the minimum ACOP and AEER specified in table 3 below
  - be registered to the relevant class (or classes) under that determination, specified in table 3
- The global warming potential (GWP) of the refrigerant used in an air conditioner to be installed with a rated cooling capacity below 15kW must be less than 700.[10]

[10] See Appendix D for list of refrigerant types with their GWP values

Table 3 – Minimum efficiency requirements for air conditioners to be installed.

VEU product category	Product description[11]	GEMS 2019 Class	GEMS 2019 min HSPF	GEMS 2019 min TCSPF	GEMS 2019 ACOP	GEMS 2019 AEER
6A	Ducted air to air R < 10 kW	Classes 10 or 15	3.6	4.4	3.9	3.5
6B(i)	Ducted air to air 10 kW ≤ R < 25 kW	Classes 6 (ducted units only), 11 or 16	3.4	4.2	3.7	3.4
6B(ii)	Ducted air to air 25 kW ≤ R ≤ 39 kW	Classes 6 (ducted units only), 11 or 16	3.2	3.6	3.7	3.4
6C	Ducted air to air 39 kW < R ≤ 65 kW	Classes 7 (ducted units only), 12 or 17	3.2	4.8	3.5	3.2
6D	Non-ducted air to air R < 4kW	Classes 8, 13 or 18	4.2	5.4	4.4	4.1
6E(i)	Non-ducted air to air 4 kW ≤ R < 7 kW	Classes 9, 14 or 19	3.7	5.0	4.0	3.7
6E(ii)	Non-ducted air to air 7 kW ≤ R < 10 kW	Classes 9, 14 or 19	3.6	4.8	3.9	3.7

[11] "R" refers to the standard rated standard cooling full capacity as defined in the Greenhouse and Energy Minimum Standards (Air Conditioners up to 65kW) Determination 2019

6F	Non-ducted air to air 10kW ≤ R ≤ 39kW	Classes 6 (non-ducted units only), 11, 16 or 20	3.6	4.6	3.9	3.6
6G	Non-ducted air to air 39kW < R ≤ 65kW	Classes 7 (non-ducted units only), 12, 17 or 21	2.7	5.3	3.8	3.4

3.1.2. Documentary evidence

- Evidence of GEMS registration
  - downloadable product list (Excel file) from GEMS (www.energyrating.gov.au) – please highlight the product models proposed under the application.
- AS/NZS 3823 test report produced by a NATA accredited laboratory (or equivalent) confirming the following product values:
  - Product brand and model
  - Product description including product class.
  - Rated standard cooling and heating capacities
  - HSPF and TCSPF values specified in for residential and commercial cold and mixed climate zones
  - ACOP and AEER values
  - Refrigerant type
- Evidence of EESS registration which includes a screenshot of the listing on EESS database clearly showing brand/model and risk level and a copy of the certificate of conformity.

3.2. Gas heating ductwork

Table 4 – Product criteria and required documentary evidence for gas heating ductwork products

VEU product Category	Product criteria	Documentary evidence
Flexible ductwork (28A)	Flexible ductwork that: • is tested and 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 accredited body or an approved laboratory as complying with AS/NZS 4859.1 • achieves a minimum R-value of R1.5 when measured in accordance 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 under Part A6 of Volume One of the BCA, 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 under Part A6 of Volume One of the BCA, achieves the minimum total R value specified by Specification J5.2b of Volume One of the BCA	Test report by a NATA accredited laboratory or equivalent body showing compliance with the product criteria.
Rigid ductwork (28A)	Rigid ductwork that: • is tested and certified by an approved laboratory as complying with AS 4254.2 • is insulated using bulk insulation that is certified by an accredited body or	Test report by a NATA accredited laboratory or equivalent body showing compliance with the product criteria.

approved laboratory as complying with AS/NZS 4859.1

- achieves a minimum R-value of R1.5 when measured in accordance 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 manufacturers 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 under Part A6 of Volume One of the BCA, 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 under Part A6 of Volume One of the BCA,, achieves the minimum total R value specified by Specification J5.2b of Volume One of the BCA

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 and SA/SNZ MP 104:2021[12] using the TRNSYS program or extensions of the software in the TRNSYS modelling package.

It is required to ensure that the product can deliver the selected load in the middle of winter, and to determine the annual energy savings in:

- climate zone 4 for solar water heaters in Victoria
- climate zone 3 for solar water heaters in New South Wales
- climate zone HP4-Au and/or HP5-Au for heat pumps in Victoria, and/or
- climate zones HP3-Au and/or HP5-Au for heat pumps in New South Wales.

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.

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). 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 in Victoria
- climate zone 3 for solar water heaters in New South Wales
- climate zones HP4-Au and/or HP5-Au for heat pumps in Victoria, and/or
- climate zones HP3-Au and/or HP5-Au for heat pumps in New South Wales.

[12] SA/SNZ MP 104:2021 Modelling of heated water systems in accordance with AS/NZS 4234:2021, using TRNSYS

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.

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, provided:

- the model setting is within the range of settings available for the actual product; and
- the model achieves the following related Australian Standards requirements; and
- the thermostat settings are the same for both modelled sizes (Victoria).
  - minimum delivery temperature of 45°C; and
  - the product must control for legionella according to AS 3498 (various options are available).

Mid-winter load delivery

The system must report the minimum delivery temperature under the selected load [13] as specified in AS/NZS 4234. 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.

Solar water heater products must be capable of mid-winter load delivery and its performance must be evaluated for:

- climate zone 3 if they are to be installed in New South Wales
- climate zone 4 if they are to be installed in Victoria.

Special considerations for air-source heat pump storage water heaters

The heat pump water heater performance for products to be installed in Victoria must be evaluated for climate zones HP4-Au and/or HP5-Au. Products must achieve:

[13] Both modelled load sizes for Victoria.

- 60% annual energy savings at the system load size in climate zone HP4-Au to be installed in climate zone 4
- 60% annual energy savings at the system load size in climate zone HP5-Au to be installed in climate zone 5. Note zone HP5-Au corresponds to Australian Building Code zones 7 and 8.

Refer to the Location Variable List table in the VEU Specifications for the climate zones of Victorian postcodes.

The heat pump water heater performance for products to be installed in New South Wales must be evaluated for climate zones HP3-Au and/or HP5-Au. Products must achieve:

- 60% annual energy savings in climate zone HP3-Au to be installed in BCA climate zone 2,3,4,5, or 6
- 60% annual energy savings in climate zone HP5-Au to be installed in BCA climate zone 7 or 8.

Refer to Table A26 of the ESS Rule for the BCA climate zones for New South Wales postcodes.

Presentation of results

Annual purchased energy consumption data should be entered into the VEU register with a precision of four significant figures. The 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 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, 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, 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 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 override 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 which allow the user to reset the boost controller and do not automatically reset to the operating conditions used during the rating calculation should be modelled with the boost control in continuous mode.

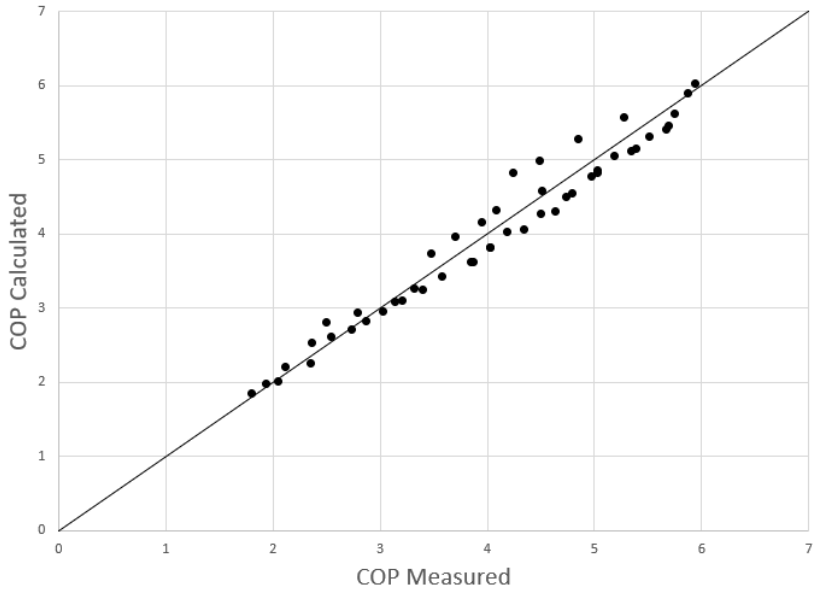
Appendix C: AS/NZS 5125 reporting requirements

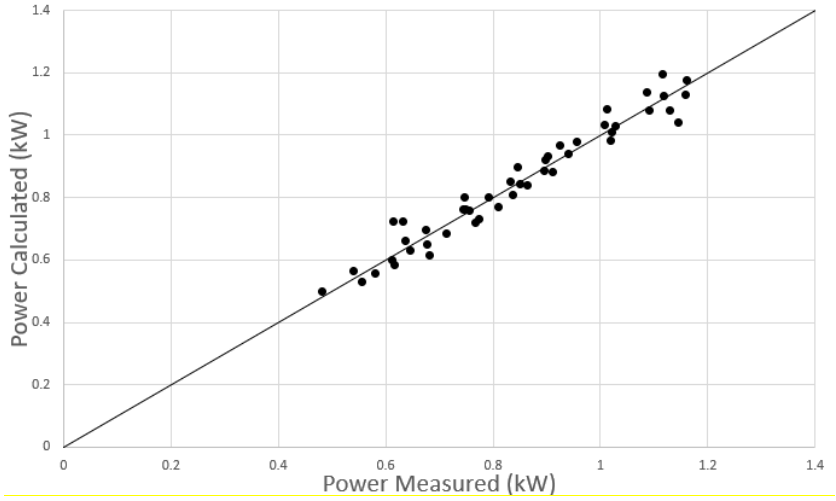
When testing heat pump water heaters, Appendix F of AS/NZS 5125 specifies the minimum data reporting required in the test report.

Please note:

Clause F6.2 of AS/NZS 5125 requires graphs of measured values(test) against the values established through regression analysis are included in the report.

Examples are shown below.





Appendix D: List of refrigerant global warming potentials (GWP)

Table 5: List of refrigerant types with global warming potentials (GWP) values*

Refrigerant Type	Substance name/HFC Blend	GWP
R-1234yf	HFO-1234yf	5
R-1234ze(E)	HFO-1234ze	5
R-125	HFC-125	3500
R-1270	HC-1270	5
R-12A	HC-12A	5
R-134A	HFC-134A	1430
R-143A	HFC-143a	4470
R-152A	HFC-152a	124
R-170	HC-170	5
R-227EA	HFC-227EA	3220
R-22A	HC-22A	5
R-23	HFC-23	14800
R-236CB	HFC-236CB	1340
R-236EA	HFC-236EA	1370
R-236FA	HFC-236FA	9810
R-245CA	HFC-245CA	693
R-245FA	HFC-245FA	1030
R-290	HC-290	3
R-32	HFC-32	675
R-365MFC	HFC-365MFC	794
R-404A	HFC-404A	3922
R-407A	HFC-407A	2107
R-407B	HFC-407B	2804
R-407C	HFC-407C	1774
R-407D	HFC-407D	1627
R-407E	HFC-407E	1552
R-407F	HFC-407F	1825
R-407G	HFC-407G	1463
R-41	HFC-41	92
R-410A	HFC-410A	2088
R-410B	HFC-410B	2229
R-413A	HFC-413A	2053
R-417A	HFC-417A	2346
R-417B	HFC-417B	3027
R-417C	HFC-417C	1809
R-419A	HFC-419A	2967
R-419B	HFC-419B	2384
R-421A	HFC-421A	2631
R-421B	HFC-421B	3190
R-422A	HFC-422A	3143
R-422B	HFC-422B	2526
R-422C	HFC-422C	3085
R-422D	HFC-422D	2729
R-422E	HFC-422E	2592
R-423A	HFC-423A	2280

Refrigerant Type	Substance name/HFC Blend	GWP
R-424A	HFC-424A	2440
R-425A	HFC-425A	1505
R-426A	HFC-426A	1508
R-427A	HFC-427A	2138
R-428A	HFC-428A	3607
R-429A	HFC-429A	13
R-430A	HFC-430A	94
R-43-10MEE	HFC-43-10MEE	1640
R-431A	HFC-431A	36
R-434A	HFC-434A	3245
R-435A	HFC-435A	26
R-437A	HFC-437A	1805
R-438A	HFC-438A	2264
R-439A	HFC-439A	1983
R-440A	HFC-440A	144
R-442A	HFC-442A	1888
R-444A	HFC-444A	87
R-444B	HFC-444B	293
R-445A	HFC-445A	129
R-446A	HFC-446A	459
R-447A	HFC-447A	582
R-447B	HFC-447B	739
R-448A	HFC-448A	1386
R-449A	HFC-449A	1396
R-449B	HFC-449B	1411
R-449C	HFC-449C	1250
R-450A	HFC-450A	601

Refrigerant Type	Substance name/HFC Blend	GWP
R-451A	HFC-451A	146
R-451B	HFC-451B	160
R-452A	HFC-452A	2139
R-452B	HFC-452B	697
R-452C	HFC-452C	2219
R-453A	HFC-453A	1765
R-454A	HFC-454A	236
R-454B	HFC-454B	465
R-454C	HFC-454C	145
R-455A	HFC-455A	145
R-456A	HFC-456A	684
R-457A	HFC-457A	136
R-458A	HFC-458A	1650
R-500	HFC-500	8077
R-502A	HC-502A	5
R-503	HFC-503	14560
R-507A	HFC-507A	3985
R-508A	HFC-508A	13214
R-508B	HFC-508B	13396
R-512A	HFC-512A	189
R-513A	HFC-513A	629
R-513B	HFC-513B	593
R-515A	HFC-515A	386
R-600	HC-600	5
R-600a	HC-600a	3
R-601A	HC-601a	5
R-717	HC-717	0

Refrigerant Type	Substance name/HFC Blend	GWP
R-744	HC-744	1

***** Sources: Intergovernmental Panel on Climate Change (IPCC) fourth assessment report, 2007 and the Department of Agriculture, Water and the Environment website.

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. Annual Coefficient of Performance has the same meaning as in AS/NZS 3823.2.
AEER	Annual Energy Efficiency Ratio and has the same meaning as in AS/NZS 3823.2. This metric is used to determine the energy efficiency of a product for cooling.
AGA	Australian Gas Association
AGA product directory	The AGA publishes a Product Directory of all type tested products that are currently certified by AGA. Available at: https://www.aga.asn.au/product_directory
BCA	Building Code of Australia, forming part of the National Construction Code.
commission	Essential Services Commission
ESS Rule	Energy Savings Scheme Rule of 2009
ESC	Energy savings certificate under the New South Wales' Energy Savings Scheme

Term	Definition
ESS	Energy Savings Scheme (in New South Wales)
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/
GWP	Global warming potential
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.
HSPF	Means the Heating Seasonal Performance Factor which is the ratio of the total annual amount of heat, including make-up heat, that the equipment can add to the conditioned space when operated for heating in active mode to the total annual amount of energy consumed by the equipment during the same period.
RTHC	Rated total heating capacity
TCSPF	Means the Total Cooling Seasonal Performance Factor which is the ratio of the total annual amount of heat that the equipment can remove from the

Term	Definition
	conditioned space to the total annual amount of energy consumed by the equipment, including the active and inactive energy consumption.
TRNSYS	This is a brand of modelling software commonly used for establishing performance of solar and heat pump hot water systems.
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 program	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
2.1	Update to: • the gas storage (activity 1A) water heater and instantaneous water heater (activity 1B) product requirements • guidance on supporting evidence for heat pump and solar hot water systems • to guidance on supporting evidence for space heaters and ducted gas heaters.	11 March 2020
2.1	Update to section 1.2 and included missing GEMS product categories	23 April 2021
2.2	Update to section 2.2 to include further guidance on using test reports and representative tests	13 August 2021

Version	Amendments made	Date published
2.3	Update to section 3.4 to clarify that product with ACOP of less than 4.2 is not eligible for use under activity scenarios 10A(iii) and (v)	11 November 2021
2.4	Update to integrate water heating product applications with NSW's Energy saving scheme	1 April 2022
2.5	Clarified that VEU program will accept only solar and heat pump water heating products approved under the AS/NZS 4234 -2008.	22 April 2022
2.6	Clarified the process for adding GEMS-listed products to the commission's Register of Products'. Introduced updates to product application process for solar or heat pump hot water products.	06 September 2022
2.7	Minor update to gas heating ductwork product criteria to align with VEU Specifications – 13.0	19 September 2022
2.8	Provided further clarification on accreditation of laboratories. All test reports must be produced by NATA accredited (or equivalent) test laboratories. Australian manufacturers can test their products in their own inhouse NATA accredited laboratories. Updated section 2.2.1 to clarify requirements for AS/NZS 5125 test reports. Added Appendix C to demonstrate those requirements.	15 December 2022
2.9	Updated to reflect release of VEU Specifications 15.0.	31 May 2023