

Plumbing Practice Note SH-01: Solar Heated Water

This Practice Note provides guidance on energy efficiency of solar hot water systems when using this option to meet the requirements of the Plumbing Regulations 2018 and the National Construction Code 2019.

The content below provides guidance on:

- Requirements for solar water heaters
- Compliance with the Plumbing Regulations 2018
- Installation requirements

Abbreviations and Definitions

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

- **Act** – Building Act 1993
- **BAB** – Building Appeals Board
- **BCA** – Building Code of Australia Volume Two
- **DtS** – Deemed-to-Satisfy
- **NCC** – National Construction Code 2019
- **PCA** – Plumbing Code Australia
- **RBS** – Relevant Building Surveyor
- **Regulations** – Plumbing Regulations 2018
- **SWH** – Solar Water Heater

Requirements for solar water heaters

The NCC Volume Three - Plumbing Code of Australia (PCA) is adopted by the Plumbing Regulations 2018.

Part B2 (Heated water services) of the PCA specifies the Objectives and Performance Requirements relating to the installation of heated water services.

Victoria has a variation to part B2. The variation applies through the energy efficiency Performance Requirements P2.6.1 and P2.6.2 of the BCA. A flowchart of compliance pathways for the variation is shown in Figure 1.

Performance Requirement - P2.6.1 Building

Performance Requirement P2.6.1 is extended through the Victorian Variation to include the efficient use of available water resources. It is important to note that the requirements of the Victorian Variation must be complied with, irrespective of any other Performance Requirement.

Performance Requirement - P2.6.2 Services

Performance requirement P2.6.2 excludes hot water supply systems in Victoria, as their design and installation is regulated by the Regulations. However, this does not remove the requirement to comply with Performance Requirement P2.6.1.

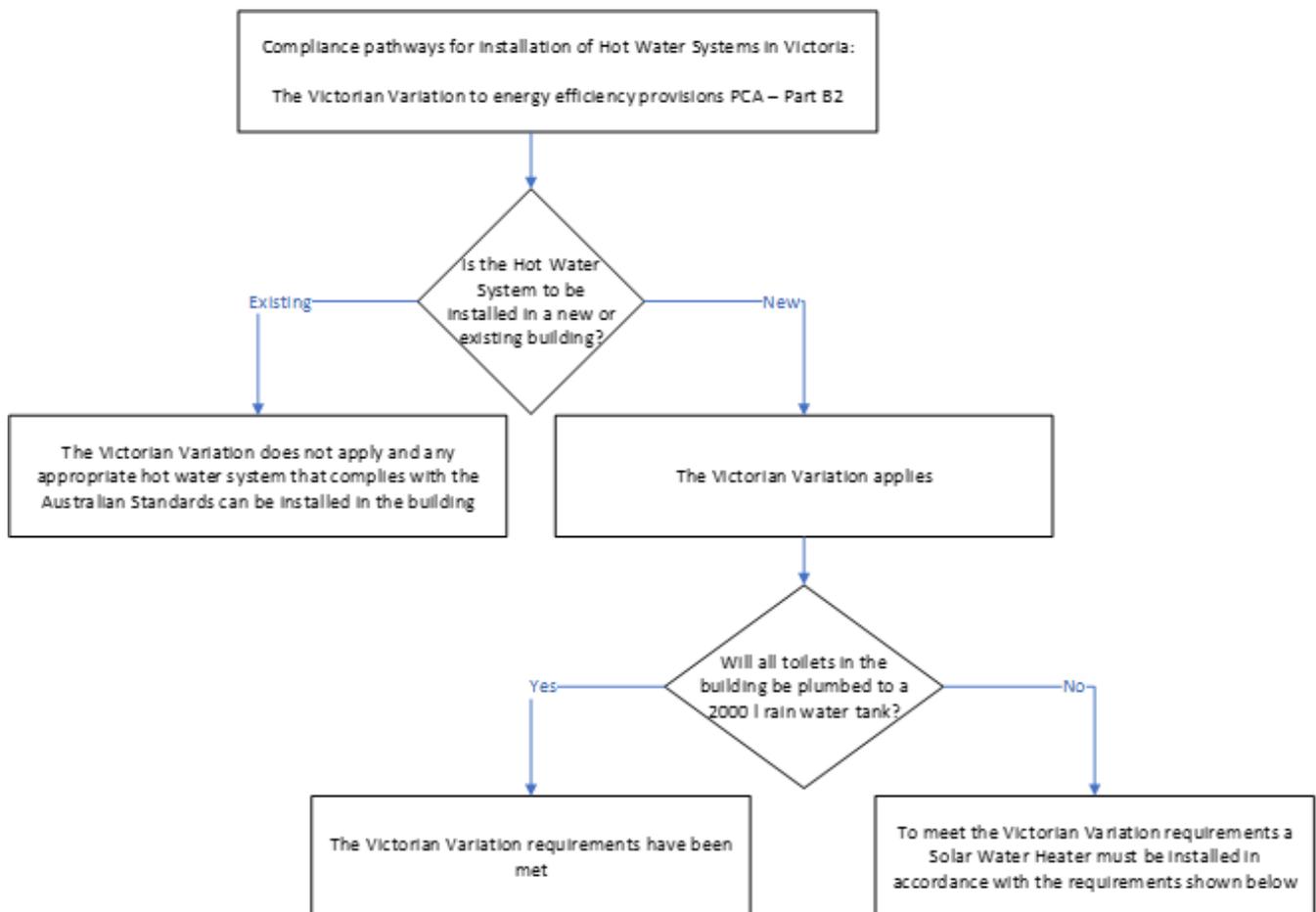


Figure 1: Overview of compliance path for meeting the Performance Requirement of the Victorian Variation

Compliance with the NCC energy efficiency requirements for Class 1 buildings is achieved by satisfying the Governing Requirements and each of the Performance Requirements through either:

- a DtS Solution,
- a Performance Solution, or
- a combination of Performance Solution and DtS Solution.

The Victorian Variation to the energy efficiency provisions of the BCA Volume Two has additional prescriptive requirements for the DtS Solution and Performance Solution (Verification Method) compliance pathways.

The Victorian Variation requires that a new Class 1 building must have either a rainwater tank connected to all sanitary flushing systems, or a solar water heater system installed in accordance with the Regulations.

Performance Solutions

In some instances, a Performance Solution may be developed as an alternative to a solar hot water system or a rainwater tank being installed. The Performance Solution must be thoroughly documented to demonstrate compliance with the BCA and must be approved for use under Performance Requirement P2.6.1.

Practitioners must check the building permit for any approved Performance Solutions, and follow the detail set out within. Any installation must be carried out in strict accordance with the Performance Solution approved as part of the building permit.

Example 1: Heat Pump Hot Water Systems

A homeowner wants to have an all-electric home and wants to install a heat pump hot water system. A Performance Solution is required and the proposal is documented in accordance with the BCA, with appropriate evidence to demonstrate equivalence to the DtS provisions in the context of P2.6.1 (e.g. the number of Small-scale Technology Certificates the heat pump attracts is greater than the number the alternative gas boosted solar hot water system would attract, therefore the heat pump is suitable for the relevant climate zone). The RBS assesses the Performance Solution on its merits and makes the decision to approve the Performance Solution because it satisfies the requirements of the BCA.

Building Appeals Board

An application may be made to the [Building Appeals Board](#) (BAB) to:

- modify a particular clause of the Building Regulations 2018 or the BCA, such as clause P2.6.1 and 3.12.0 of the BCA; or
- determine that the design of a building complies with the Act, the Building Regulations 2018 or the BCA.

Applicants must supply sufficient information on the proposed alternative for BAB to determine whether to approve a modification to the energy efficiency requirements of the BCA. Advice should be sought from the RBS before considering an application to the BAB.

Compliance with the Regulations

Requirements for SWH installed in new homes are set out in Schedule 2 of the Regulations.

Solar Water Heaters that perform to minimum 60% energy savings

A SWH in a new Class 1 building must perform to a minimum 60% energy savings, relative to energy consumption of a conventional water heater calculated in accordance with *AS/NZS 4234: Heated Water Systems – Calculation of energy consumption*.



AS/NZS 4234 Heated Water Systems – Calculation of energy consumption was updated in 2021, with a transition period until 1 September 2022. During this transition period, practitioners can continue to use the 2008 edition.

The Essential Services Commission maintains a website with a list of compliant SWHs. The list includes the SWH details such as brand, model number for each system, tank size, annual energy savings and number of solar collectors that need to be installed. Practitioners will find this information useful when they need to:

- provide a customer with information about what SWH they can use, or
- identify if a SWH meets the compliance requirements.

The SWH system selection is based on the number of bedrooms and the boost energy. There are two types of boost energy - gas or electric. To confirm if a solar water heater meets the minimum 60% annual energy savings, please visit the Victorian Energy Efficiency Upgrades Registry – Essential Services Commission [website](#). It is important that the selected system matches exactly the details on the website.

Checking product compliance on site

A SWH must have a label permanently attached to the heater's storage container. The label must be legible and must contain the following information:

"This solar water heater installation complies with the Plumbing Regulations 2018 (Victoria) when installed with the following collectors..."

Example label:

<i>No. of bedrooms in building</i>	<i>1-2</i>	<i>3 or more</i>
Number of collectors installed in building		
Model number of each collector installed in building		

The solar collectors must be adequate for the SWH and the number of bedrooms in the building.

The labelling above does not apply to heat pump water heaters, as they do not have solar collectors.

Boosting

A SWH that uses solar collectors and is installed in Victoria, needs to incorporate a booster. This is to ensure that hot water is available all year round and that it reaches suitable temperatures for safe operation in compliance with the Regulations.

Boosting can be provided by either gas or electric energy supply. If reticulated gas is available to the property, then the SWH must comply with the Victorian Variation.

Where reticulated gas supply from a gas company is NOT available for connection to the building, the SWH can be either:

- an electric boosted SWH, or
- a heat pump water heater.

It should be noted that all the systems listed above, regardless of the source of energy, must perform to a minimum 60% energy savings.

Heat pump water heaters as a solar option

For the purpose of the Regulations, a heat pump water heater is a type of SWH. There are three possible compliance pathways for SWHs, where reticulated gas is available to the property:

- install a rainwater tank connected to all sanitary flushing systems in accordance with the Regulations in addition to the heat pump water heater,
- install the heat pump water heater so that no part of the heater that is capable of heating water is connected to the electricity grid, or
- another Performance Solution approved by the RBS.

Installation requirements

Orientation and angle of solar collectors

A SWH system must collect enough energy to achieve the 60% annual energy saving. To achieve this, the solar collectors must face between 30° east and 60° west of magnetic north, as measured by a compass. A 35° angle to the horizontal is ideal but collectors may be installed at 35° ± 20° to allow for a different roof pitch/inclination. The most common roof pitch in Victoria (20° to 25°) is quite suitable.

Figure 2 illustrates the required system performance for different inclination angles and orientations of solar collectors. The grey area shows the acceptable inclination and orientation (the compliance area) for systems that perform to a minimum of 60% energy savings. The blue line shows an example of a system that is installed in accordance with the above requirements.

Figure 2 also shows how a better performing system meets the requirements of the Regulations. Upgrading the system to a more efficient one may be necessary, where the roof does not allow for collectors to be installed within the orientation or angle suitable for a system to achieve a 60% annual energy saving. Example 2 below demonstrates how Figure 2 can be used to identify the required performance the SWH must achieve in such cases.

Example 2: Solar Hot Water Systems installed outside the compliant angle and orientation

A plumber is installing a hot water system on a roof. The roof has an inclination of 40° to horizontal and the orientation of the roof allocated to the hot water system is 90° West of North. This is shown as the red line on Figure 2. In order to comply with the Regulations, a system that performs to 75 – 80 % energy savings will need to be installed. This can be found as shown on the Essential Services Commission [website](#).

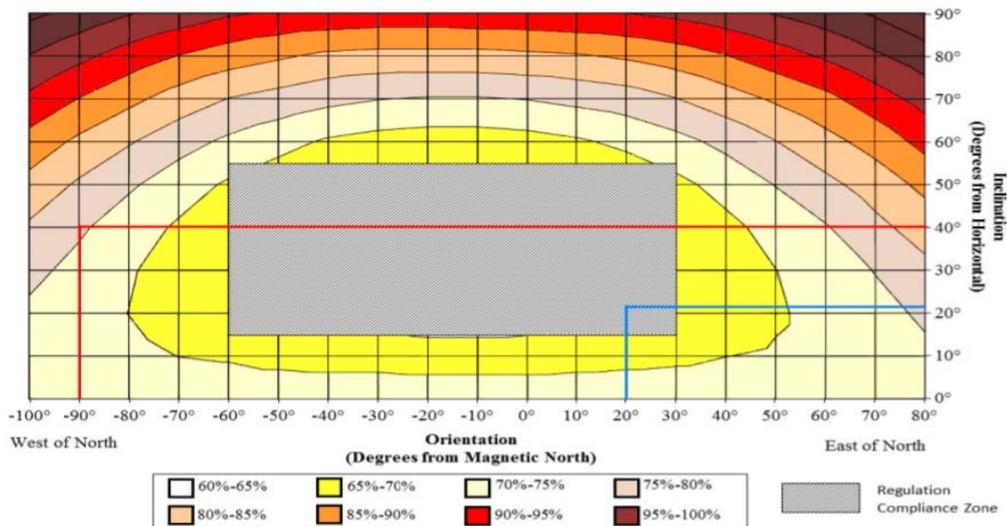


Figure 2: Overview of required solar HWS performance at various inclinations and orientations

Frost protection

Most inland areas of Victoria experience frost conditions and even the milder coastal areas can occasionally be subject to frost. Some solar panels are designed with frost protection and manufacturers will recommend frost protection for their units in Victoria.

Pipe insulation and other considerations

Design and installation of a heated water supply system is regulated under the Plumbing Regulations 2018.

The Regulations require that all heated water plumbing must meet the requirements of the PCA. These requirements are satisfied if the work is performed in accordance with *AS/NZS 3500.4:2018 Plumbing and drainage Part 4: Heated water services*.

AS/NZS 3500.4:2018 Plumbing and drainage Part 4: Heated water Services requires flow and return pipes between the collectors and storage container to be insulated to a minimum R-value of 0.3. This is equivalent to closed cell polymer insulation with wall thickness of 13mm.

Depending upon the Climate Region, the R-value may need to be increased to 0.6 or 1.0. Refer to Table 8.2.1 in *AS/NZS 3500.4:2018 Plumbing and drainage Part 4: Heated water*.

Thermal insulation materials must be capable of withstanding the high temperatures generated as a result of a solar HWS operation, and where external, appropriately weather resistant and protected from ultraviolet degradation.

When installing a SWH, consideration should be given to:

- temperature requirements e.g. storage and delivery temperature,
- temperature Pressure Relief (TPR) valve termination,
- the weight of any heated water storage container installed on a roof,
- compliance with the OH&S requirements, and
- manufacturer's installation instructions.



For further guidance on temperature control for heated water services, refer to [Plumbing Practice Note HW-02: Temperature control devices and heat retention for heated water piping associated with storage water heaters](#).

Related Documents

- Building Act 1993
- National Construction Code 2019
- Building Regulations 2018
- Plumbing Regulations 2018
- AS/NZS 3500.4: Plumbing and drainage – Part 4: Heated water services
- AS/NZS 4234: Heated water systems- calculation of energy consumption

Useful Links

- Australian Standards, SAI Global: <https://store.standards.org.au/>
- Australian Building Codes Board: <https://www.abcb.gov.au/>
- Victorian Legislation: <https://www.legislation.vic.gov.au/in-force/statutory-rules/plumbing-regulations-2018/003>
- Essential Services Commission: <https://www.veu-registry.vic.gov.au/Public/Public.aspx?id=Home>
- Sustainability Victoria: www.sustainability.vic.gov.au
- Solar Victoria: www.solar.vic.gov.au
- Victorian Building Authority: Energy efficiency requirements: <https://www.vba.vic.gov.au/consumers/home-renovation-essentials/energy-efficient-requirements>

Contact Us

If you have a plumbing technical enquiry, please email plumbingtechnicaladvice@vba.vic.gov.au or call 1300 815 127.

Victorian Building Authority

Goods Shed North
733 Bourke Street
Docklands VIC 3008

www.vba.vic.gov.au

Version

- Version 1.0, published 10 March 2022, supersedes Technical Solution Sheet No. 6.06 & 98.02 Solar Water Performance requirements and Technical Solution Sheet 6.13 & 98.01 Solar Heated Water - 6 Star requirements

Copyright

© March 2022 Victorian Building Authority (VBA).

This Practice Note has been prepared and published by the VBA for general educational and information purposes only. This publication must not be copied, reproduced, published, adapted, or communicated by any person without the VBA's prior written consent or as permitted by the Copyright Act 1968 (Cth). The VBA makes no warranties or representations whatsoever about the accuracy, reliability, suitability, completeness or authenticity of any information or material contained in this resource. Any use or reliance on such information is at a person's own risk. The VBA accepts no liability whatsoever for any direct, indirect, or consequential loss or damage any person may suffer arising out of or in connection with the access or use of this resource (including any third-party material included in this resource).