

Hot Water Plumbing HW 01 | Temperature control devices and heat retention for heated water piping associated with storage water heaters

Audience

The audience/s for this Practice Note include/s:

- | | |
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| <input checked="" type="checkbox"/> Architects/ Designers | <input checked="" type="checkbox"/> Owner Builders |
| <input checked="" type="checkbox"/> Builders | <input checked="" type="checkbox"/> Plumbers |
| <input checked="" type="checkbox"/> Building Surveyors/ Inspectors | <input checked="" type="checkbox"/> Real estate management agents |
| <input checked="" type="checkbox"/> Engineers | <input checked="" type="checkbox"/> Trades and Maintenance (inc. Electricians) |
| <input checked="" type="checkbox"/> Homeowners / Residential Tenants | |

Purpose

This Practice Note provides guidance on the **Deemed-to-Satisfy** requirements for the installation of temperature control devices, and pipework heat retention associated with storage heated water systems.

The content below provides guidance on:

- Hot water safety
- Heated water delivery temperature
- When to apply the requirements
- Where should the temperature control device be installed

Abbreviations & 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, the Plumbing Regulations 2018 or the National Construction Code.

- **PCA** – Plumbing code of Australia 2022 (National Construction Code, Vol 3)
- **Regulations** – Plumbing Regulations 2018
- **Standard** – AS/NZS 3500.4

Hot water safety

To protect against the growth of Legionella bacteria it is a legal requirement that heated water is stored and delivered under conditions which avoid the likelihood of Legionella growth. To achieve this water heaters must store heated water at a minimum temperature of 60°C, or the water heater must conform to the requirements Clause 7.2 of AS 3498.



Each year, hot tap water causes serious scalds to many small children and elderly or disabled people around Australia. More than 90 per cent of these scalds occur in the bathroom, where the delivery temperature of water from showers or taps is high enough that a person cannot react in time to avoid scalding.

- At 68°C, it can take as little as one second to cause a full skin thickness scald.
- At 50°C degrees, it takes up to five minutes.

For this reason, the plumbing laws prescribe maximum temperatures for outlets at sanitary fixtures in a range of situations.

Heated water delivery temperature

To prevent scalding, the Plumbing code of Australia (PCA) requires the delivery temperature of water used for personal hygiene purposes (primarily bathroom taps) to be limited to a prescribed temperature for a specific type of building, these are:

- 45°C for early childhood centres, primary and secondary schools, and nursing homes or similar facilities for young, aged, sick, or disabled persons
 - In these situations, the water temperature **must** be controlled by a thermostatic mixing valve conforming with AS 4032.1, or thermostatically controlled tap conforming with AS 4032.4.
- 50°C for all other buildings.
 - In these situations, either a tempering valve conforming with AS 4032.1, or a water heater designed not to exceed 50°C may be used to control the water temperature. In the case of a water heater, it must be marked **“this appliance delivers water not exceeding 50°C in accordance with AS 3498”**.
- Note that restricting the delivery temperature in kitchens and laundries is optional.

When to apply the requirements

The requirement to limit certain water delivery temperatures applies to all new heated water installations.

A new heated water installation includes:

- a heated water service installed on the premises or recreational vehicle for the first time; or
- an existing water heater that is replaced with a like-for-like water heater in the same location
- an existing water heater that is replaced with a different type of water heater in the same location
- an existing water heater that is relocated and reconnected to, some or all of the sanitary fixtures to which it was previously connected
- where more than one existing sanitary fixture is replaced with new similar fixtures; or
- an existing heated water service on the premises is altered or extended to serve additional sanitary fixtures.

These requirements do not apply to the replacement of a water heater unit in the same location where the original installation did not require a temperature control valve, for example:

- Where a water heater in a Class 1 dwelling which was built prior to 5 August 1998 and has not been altered since, is replaced with a water heater in the same location.



Historically, temperature requirements for heated water installations have satisfied the Performance Requirements of the Plumbing Code of Australia (PCA) by simply complying with the primary standard for heated water installations, AS/NZS 3500.4 (Plumbing and drainage Part 4: Heated water services).

Changes to the 2021 version of this standard have seen the requirements for heated water delivery temperature removed from the standard and elevated to the Plumbing Code of Australia (PCA).

In practice, the **mandatory temperature requirements** remain the same even though they have been removed from the standard.

Where should the temperature control device be installed

As restricting the delivery temperature of heated water in kitchens and laundries is optional, the temperature control device is often installed at the hot water unit in a manner that restricts the temperature to the whole house. While this practice is not illegal, for many people it is often found to be unsatisfactory for effective clothes washing and food preparation areas.

In circulated heated water systems, to control the reproduction of legionella, the water returning to the water heater must not be less than 55°C. For this reason, heated water that is supplied to personal hygiene fixtures must be tempered near to the fixture outlet location, either as an individual fixture, or group of fixtures if permitted by device manufacturer. It is important to note that the circulated water must not be returned to the storage water heater once the temperature has been reduced to less than 55°C.

To avoid contractual issues and complaints plumbers should discuss the configuration of the heated water piping system and what best serves the client's/builder's purposes prior to the installation.

Figure 1 below depicts a typical (recommended) storage water heater configuration with 2 uncirculated heated water lines, serving both hygiene and kitchen/laundry fixtures.

Heat retention for heated water piping

To assist in limiting heat loss from pipes conveying heated water, the pipes must be insulated (lagged).

When installed under certain conditions, these pipes may also need to be insulated to prevent freezing of the water. The requirement to insulate piping applies regardless of the pipe material used.

Piping to be insulated

The following must be insulated to achieve a minimum R value:

- The cold-water inlet pipe from 500mm prior to connection to the HWU.
- The PTR valve (insulation must not to impede the operation of the valve)
- The outlet pipe must be insulated from the water heater to the primary kitchen sink, and
- for the first 500mm from the HWU on any other heated water pipe that does not supply the primary sink or, where an external heat trap is fitted, to a point 150mm down the first vertical leg of the heat trap.

The R value of the insulation required will depend upon the climate region, as set out in Section 8 of AS/NZS 3500.4.



Example climate region - Melbourne is Region B

- Pipes in internal locations required an R value 0.3 (13mm closed cell polymer may be used) Pipes in external locations require an R value 0.6 (25mm closed cell polymer may be used).
- Other piping in the heated water system must also be thermally insulated as outlined in Table 8.2 of AS/NZS 3500.4. For example, non-circulating external heated water piping must be insulated from the water heater to the primary kitchen sink. Melbourne Climate Region B requires insulation with an R value 0.6 (25mm closed cell polymer may be used).
- All circulating heated water piping on solar hot water heating systems must be insulated with appropriate insulation.
- Protection against freezing is specified in Clause 4.12 of AS/NZS 3500.

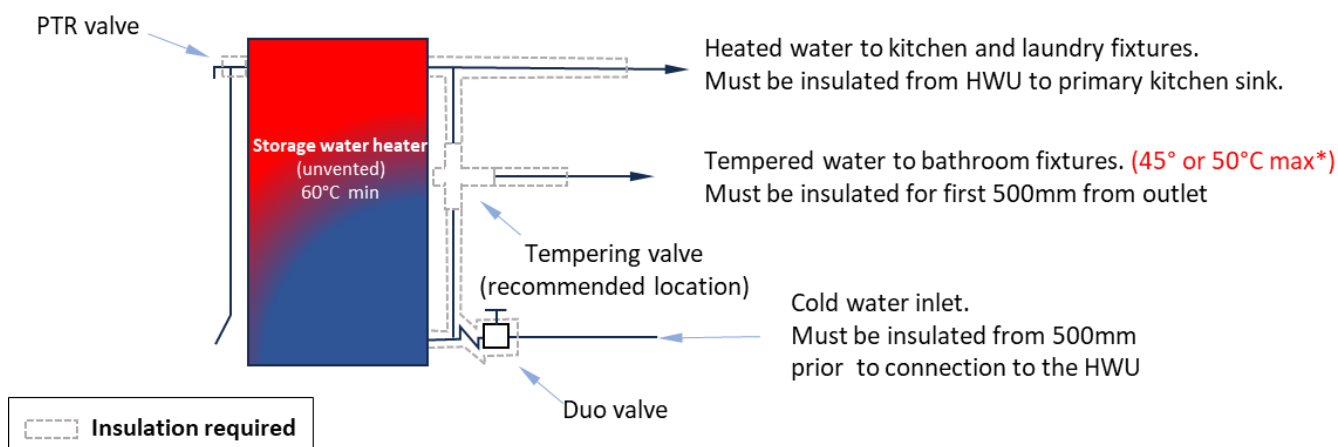


Figure 1 – Typical (recommended) installation of a storage water heater with a tempering valve and pipework insulation.

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Restrictions on the use of permanent connections and plastic piping

At storage temperatures, heated water can damage plastic pipes and fittings and for this reason the following restrictions apply:

- Plastics pipes and fittings must not be installed between the cold-water isolation valve and the inlet to a water heater.
- Plastics pipes and fittings must not be connected within 1 m of the outlet of a water heater unless immediately downstream of the temperature control valve
- Connection to the water heater must be made by unions or similar demountable couplings
- Metallic pipe must be used for the PTR drain line.



Figure 2 (below) provides guidance on the metallic pipe requirements and plastic pipe and fitting exclusion zones.

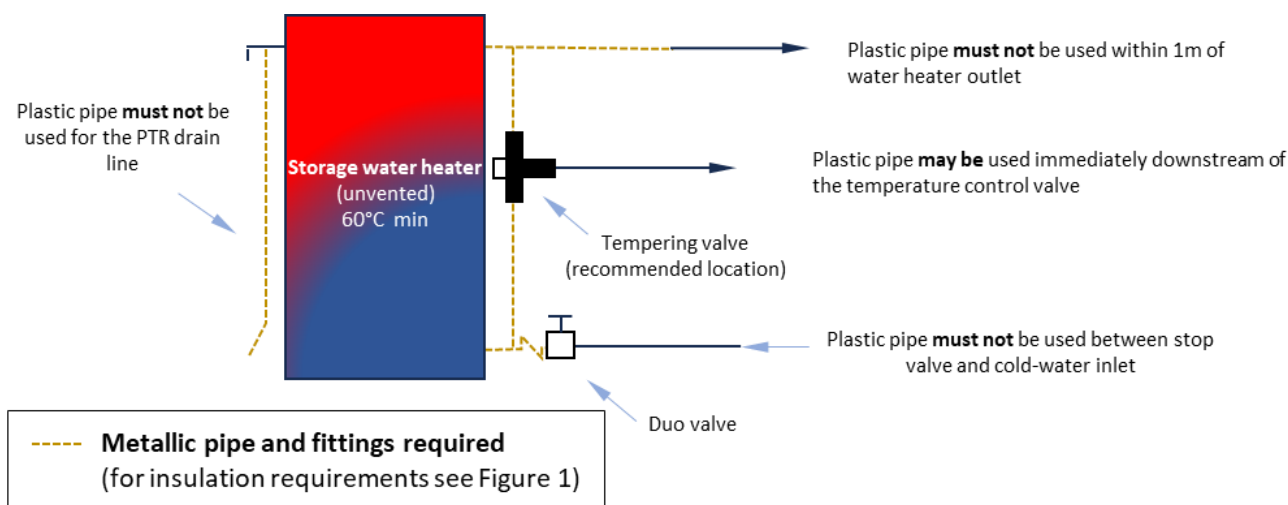


Figure 2 – Metallic pipe requirements (plastic pipe and fitting exclusion zones)
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Related Documentation

- Building Act 1993
- Plumbing Regulations 2018
- National Construction Code 2022

List of Amendments

- Updated figures
- Update to location of temperature requirements
- Expanded detail on when to apply the requirements
- Updated template and formatting

Document history

| | |
|------------------------|---|
| Sector | Plumbing |
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