Government of Western Australia
Department of Mines, Industry Regulation and Safety
Plumbers Licensing Board

Technical Note

Technical Advice Line 1300 360 897
www.dmirs.wa.gov.au/building-and-energy

Heated water pipework

This technical note has been developed to assist the plumbing industry in Western Australia to comply with the prescribed plumbing standards and requirements for thermal insulation of heated water piping, including the design and placement of heat traps. The standards do not apply to existing heated water piping that is not related to the replacement of a water heater.

Insulation of pipework

The heating of water is one of the biggest consumers of energy for the typical household. It is important to reduce heat loss from heated water piping with adequate insulation to minimise energy consumption.

Section 8 of AS/NZS 3500.4:2021 provides that specific piping shall be thermally insulated to achieve a set resistance to heat loss.

The minimum piping insulation requirement is the equivalent (but not limited) to 13 mm (R=0·3) thick closed cell polymer insulation. This minimum requirement does not apply to all climatic regions in Western Australia. The three regions are listed in AS/NZS 3500.4:2021, appendix K. Areas subject to cooler temperatures require the equivalent (but not limited) to 25 mm (R=0·6) thick closed cell polymer insulation see diagram 1.

To achieve maximum energy efficiency, exposed pipework in these cooler climatic zones should be avoided where possible.

Relief valves fitted directly to the storage water heater and valves within 500 mm of the inlet and outlet of the water heater shall be insulated to 9 mm (R=0·2) thick closed cell polymer insulation.

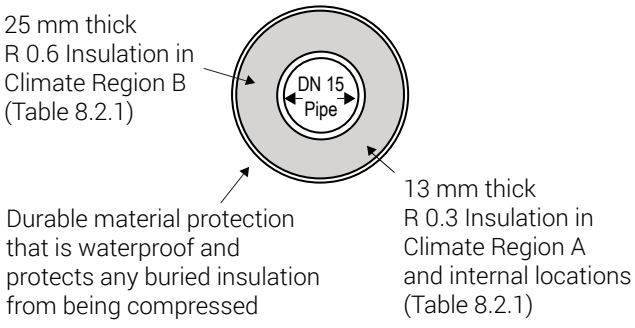

Diagram 1: Insulation requirements

Protection of insulation

All insulation exposed to the weather must be of a weather-resistant type or surrounded by a weather resistant enclosure. Insulation on buried piping shall be protected as follows:

- all absorptive insulation material shall be effectively protected against moisture penetration by an outer cover made of a durable waterproof material; and
- where insulation is cut for joining purposes the joint shall be wrapped with a durable inert waterproof tape.

General thermal insulation requirements

AS/NZS 3500.4:2021, clause 8.2.1 requires the following piping associated with all **storage water heaters** to be thermally insulated:

- the inlet and outlet pipes to and from the storage water heater, including valves, for a minimum of 500 mm measured along the pipe;
- all relief valves fitted directly to a storage water heater;
- the primary flow and return pipes, including valves, between an auxiliary heater and a storage water heater;
- all vent pipes to 300 mm above the working water level of the heated water system;
- on multiple installations, the whole heated water manifold including valves to a point at least 500 mm past the heated water outlet branch from the last water heater; and
- on a solar water heater installation, the pipework between a solar pre-heater and an in-line supplementary water heater.

The insulation requirements apply to all classes of buildings within Australia.

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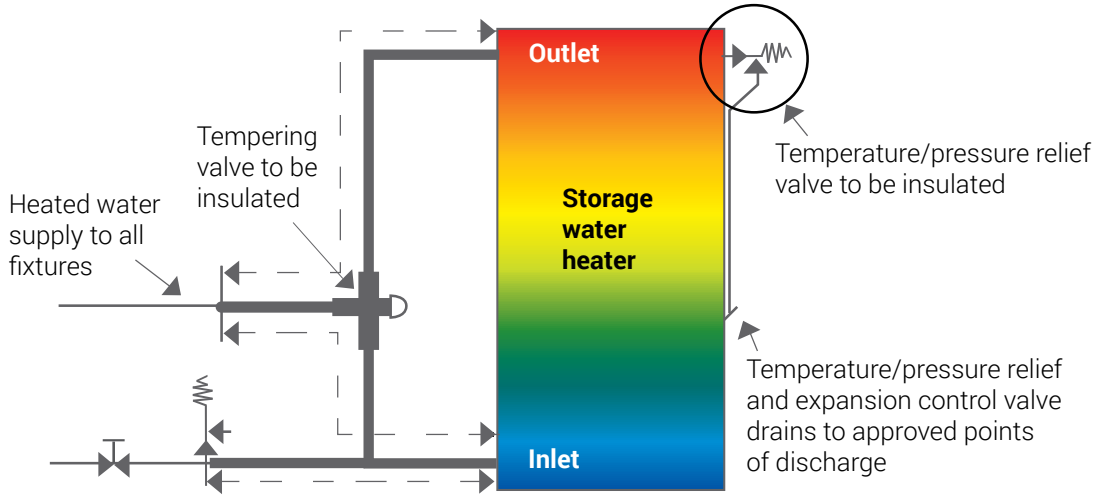
Non-circulating heated water piping

When a non-circulating heated water system is installed the following piping must be thermally insulated:

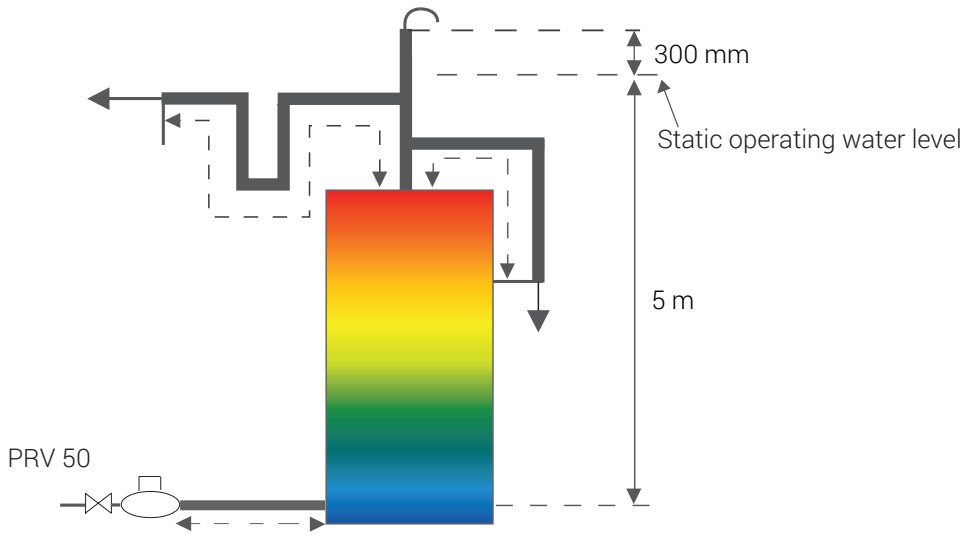
- all external heated water piping from the water heater to the primary kitchen sink;
- all heated water piping that is buried; and
- all heated water piping within a conduit.

An external location of a building is an unenclosed area and includes an open subfloor, verandah, carport or external wall. An enclosed roof space or pipework within a wall is not considered to be an external location for the purposes of insulating pipes.



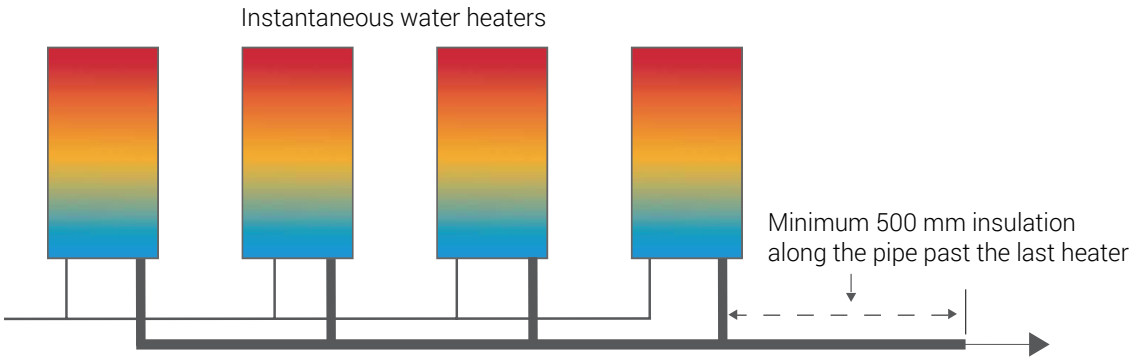
NOTE: Insulation for a minimum of 500 mm measured along the pipe as indicated by dashed lines
All valves to be insulated if within 500 mm from the storage water heater

Diagram 2: Insulation for storage water heaters



NOTE: Insulation for a minimum of 500 mm measured along the pipe as indicated by dashed lines

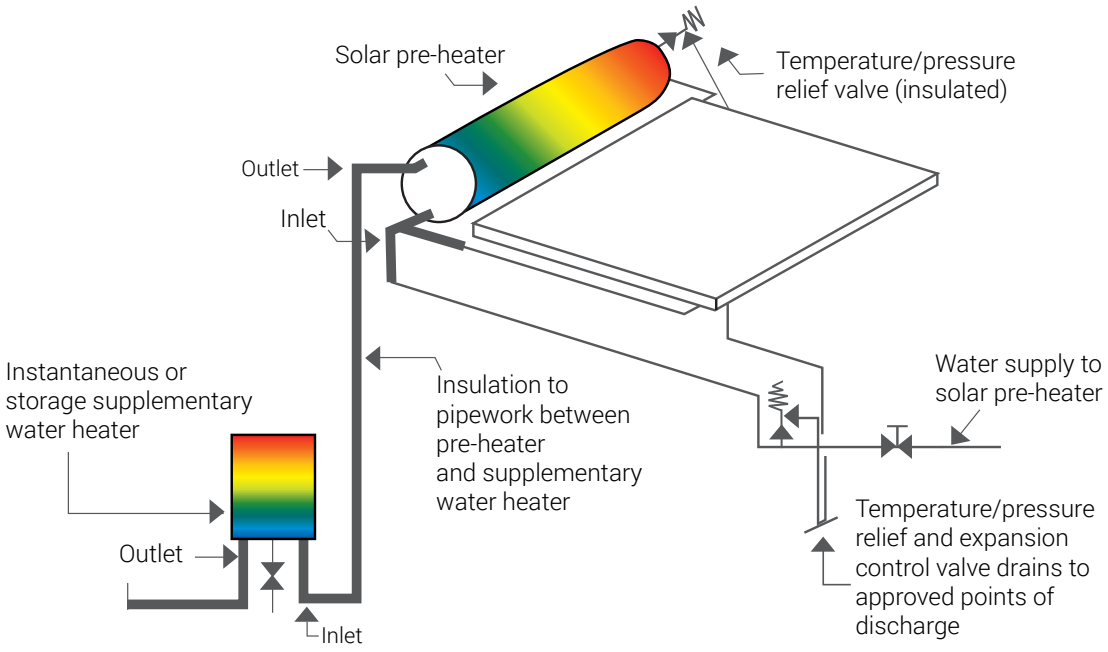
Diagram 3: Insulation of vents on low pressure water heaters



NOTE: Insulation for a minimum of 500 mm measured along the pipe as indicated by dashed line

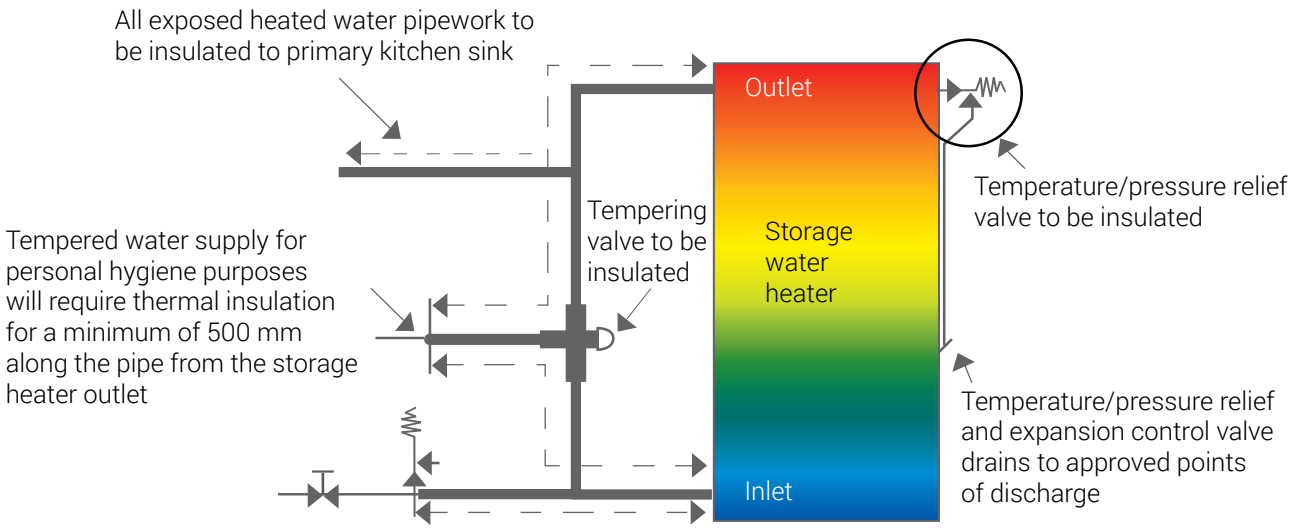
Insulation required on cold water inlet piping for storage water heaters

Diagram 4: Manifolded multiple instantaneous or storage water heater installations



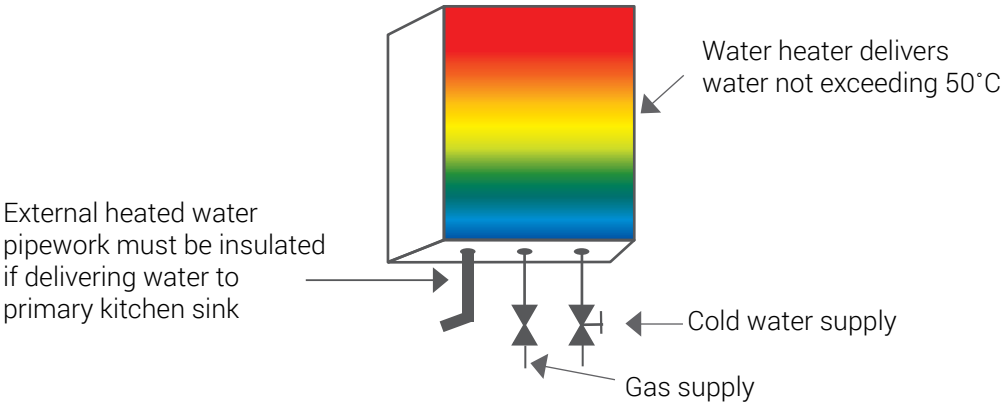
NOTE: Insulation required on cold water inlet piping for storage water heater

Diagram 5: Instantaneous or supplementary water heaters



NOTE: Insulation for a minimum of 500 mm measured along the pipe as indicated by dashed lines
All valves to be insulated if within 500 mm from the storage water heater

Diagram 6: Insulation for storage water heaters with dedicated line to kitchen sink



NOTE: Insulation

Diagram 7: Insulation for external instantaneous water heaters

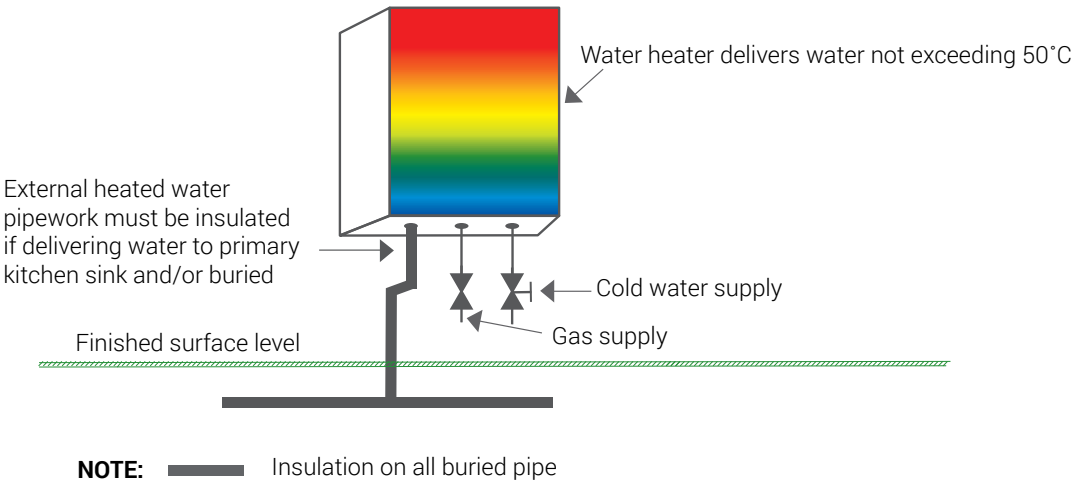


Diagram 8: Insulation for buried pipework from instantaneous and storage heaters

Circulating heated water piping

When a circulating water heating system is installed the following piping must be thermally insulated:

- all heated water piping that is buried;
- all heated water piping within a conduit;
- all internal and external flow and return piping including 500 mm along any branch from the flow and return piping; and
- The primary flow and return pipes, including valves, between an auxiliary heater and a storage water heater.

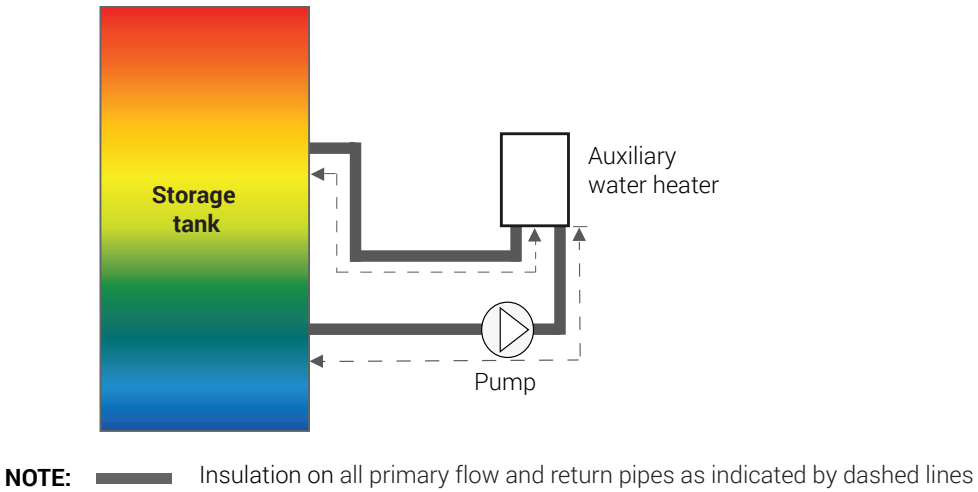
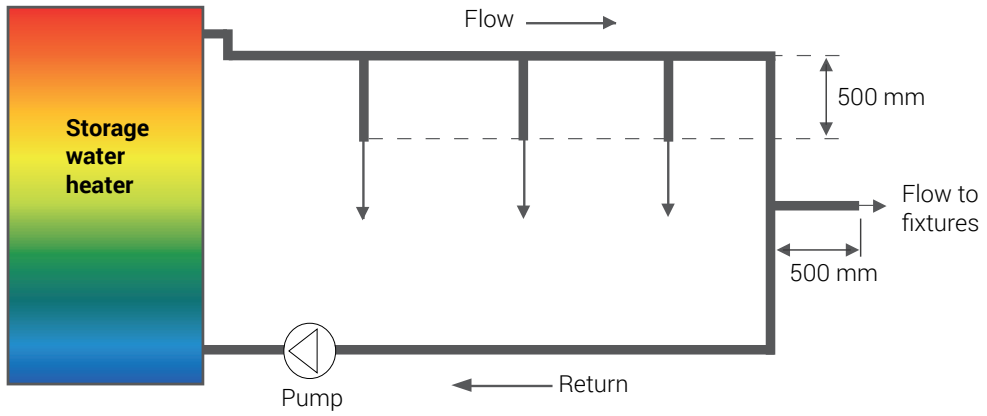


Diagram 9: Insulation on primary flow and return pipes between an auxiliary water heater



NOTE: All flow and return pipes fully insulated

Diagram 10: Insulation on flow and return pipes

Heat traps

To further assist in limiting heat loss as part of the water heating process, all new and replacement storage water heater installations are required to have a heat trap within one (1) metre from the outlet of the water heater and before the first branch.

As heated water rises, heat traps are required to limit convection currents within the heated water piping, ensuring that the water heater operates in a more energy efficient manner. In accordance with AS/NZS 3500.4:2021, clause 8.4 the heat trap must have a minimum vertical drop of 250 mm from the outlet level of the storage water heater. This also means that any branch on the heated water piping must be a minimum of 250 mm down the vertical leg of the heat trap.

An external heat trap is not required where a heat trap is integral with the water heater. Where the storage water heater has an integral heat trap this must be permanently marked and indicated on the water heater.

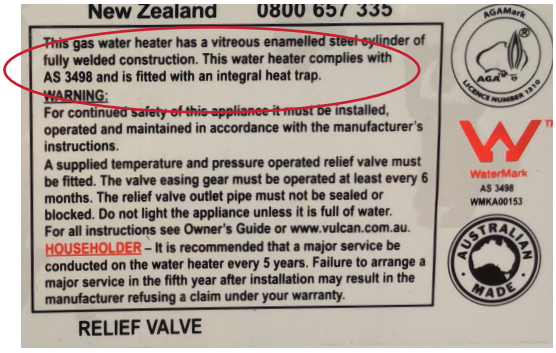


Photo 1: Typical data plate indicating integral heat trap on storage water heater

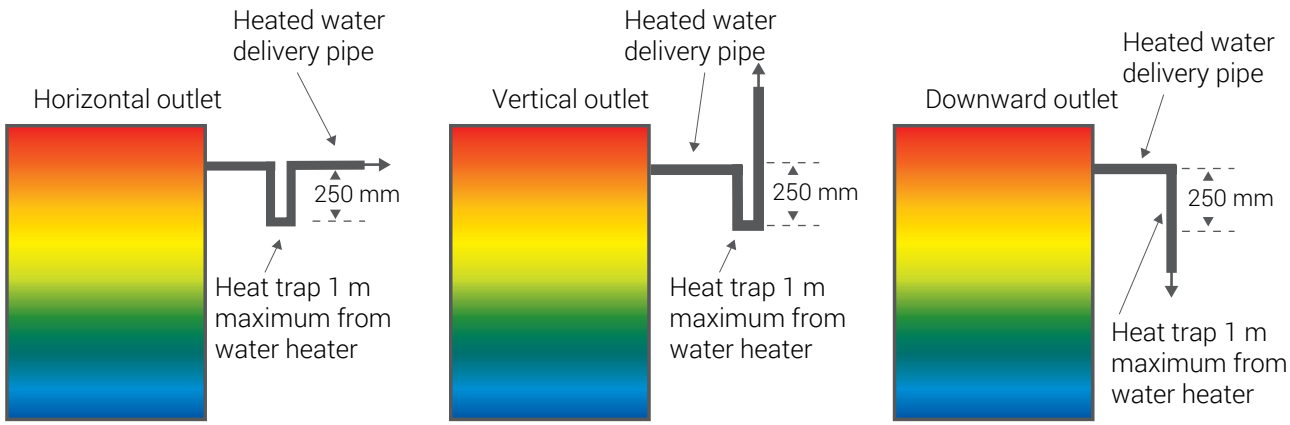


Diagram 11: Heat traps on storage water heaters

Photo 2: Typical insulation requirements on a storage water heater

Notes

The technical note series is issued by the Plumbers Licensing Board to assist the plumbing industry to comply with the Plumbers Licensing and Plumbing Standards Regulations 2000 (the Regulations) applicable to plumbing work in Western Australia.

Each technical note is to be read in conjunction with Part 6 of the Regulations that currently adopt the Plumbing Code of Australia (PCA) and the deemed to satisfy provisions of AS/NZS 3500:2021, parts 0, 1, 2 and 4 but modified in certain matters to suit the State's building approach and other local conditions.

Feedback

The Plumbers Licensing Board welcomes your feedback. If you have any questions on this technical note or any suggestions on any areas of plumbing work that the technical notes should cover, please contact the Board's Senior Technical Officer on (08) 6251 1377.

Copies

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