Plumbers, Gasfitters and Drainlayers Board

Level 8, 70 The Terrace
P O Box 10655, Wellington 6140
Tel 0800 743 262, 04 494 2970
www.pgdb.co.nz

Plumbing information sheet No. 18

Achieving Hot Water Delivery Temperatures

Aim

The aim of this technical information sheet is to help plumbers know what is required to install hot water systems safely with adequate flow rates of heated water.

G12 Water supplies

Legionella bacteria:

New Zealand Building Code (NZBC) G12.3.9 states that "A hot water system must be capable of being controlled to prevent the growth of legionella bacteria."

In order to prevent the growth of legionella bacteria hot water cylinders should be kept at temperatures not less than 60˚C.

Hot water temperatures:

NZBC G12.3.6 states that "Where hot water is provided to sanitary fixtures and sanitary appliances, used for personal hygiene, it must be delivered at a temperature that avoids the likelihood of scalding."

In order to prevent from scolding the delivered hot water temperature at any sanitary fixture used for personal hygiene shall not exceed:

- 45˚C for early childhood centres, schools, old people's homes, institutions for people with psychiatric or physical disabilities, hospitals; and
- 55˚C for all other buildings (Note: AS/NZS 3500.4 which is cited in G12/VM1 has a maximum temperature of 50˚C).

Sanitary fixtures used for personal hygiene includes showers, baths, hand basins and bidets.

In kitchens and laundries, heated water must be delivered to fixtures and appliances at flow rates and temperatures which are adequate for the correct functioning of those fixtures and appliances. The temperature required may be greater than 55°C.

Tempering valves

Installing a tempering valve is the common method of reducing the hot water temperature to prevent from scolding. When installing a tempering valve, consideration should be given to how the valve may affect the flow rate of the hot water, and an appropriate sized valve shall be used.

Required flow rates at outlets:

Water pipes shall be sized to achieve the flow rates in the table below.

Acceptable Flow Rates to Sanitary Fixtures

Sanitary fixture	Flow rate and temperature l/s and ˚C	How measured
Bath	0.3 at 45˚C	Mix hot and cold water to achieve 45°C
Sink	0.2 at 60˚C (hot)* and 0.2 (cold)	Flow rates required at both hot and cold taps but not simultaneously
Laundry tub	0.2 at 60˚C (hot)* and 0.2 (cold)	Flow rates required at both hot and cold taps but not simultaneously
Basin	0.1 at 45˚C	Mix hot and cold water to achieve 45°C
Shower	0.1 at 42˚C	Mix hot and cold water to achieve 42°C
***** The temperatures in this table relate to the temperature of the water used by people in the daily use of the fixture. **Note:** The flow rates required by Table 3 shall be capable of being delivered simultaneously to the kitchen sink and one other fixture.		

Table adapted from G12/AS1, Table 3

Energy efficiency

Consideration must be given to energy efficiency when achieving the above flow rates. In order to increase efficiency the hot water pipe run should be kept as short as practicable.

NZS 4305:1996 requires the total volume of hot water pipe run to a kitchen sink outlet to not exceed 2 litres. The table below shows the maximum pipe lengths to a kitchen sink at different pipe sizes.

Nominal pipe size (mm)	10	15	20
Length (m)	25	12	7

Table adapted from NZS 4305:1996, Table 5

Dead ends

Heated water must be stored and delivered under conditions which avoid the likelihood of the growth of Legionella bacteria and contamination of drinking water.

Dead ends in both heated and cold water installations can place the drinking water at risk. A dead end is a branch in a water supply line that does not have an outlet or a draw off point that is used. While there is no flow, the water in the branch stagnates and water quality deteriorates. Therefore, plumbers should reduce the risk by ensuring all dead ends of piping are removed, or kept to a minimum.

In heated water systems, a dead end, especially those that branch from a circulatory system can create conditions for Legionella growth and must be avoided. Dead ends are typically created in renovation work rather than in new installations.

Dead ends should be eliminated, preferably by removing the tee or branch fitting, or at the very least by disconnecting the disused branch pipe and sealing the branch (see example below).

Example of dead ends

