Cold Water Pipe Sizing, Testing and Commissioning

AIM

The aim of this technical solution is to clarify the requirements for sizing, testing and commissioning a cold water plumbing installation.

PLUMBING REGULATIONS 2008

The *Plumbing Code of Australia* (PCA) is adopted by and forms part of the *Plumbing Regulations 2008*. Part B1 of the PCA specifies the objectives and performance requirements related to the installation of cold water services. ***AS/NZS 3500.1: Plumbing and drainage Part 1: Water services***, is a "deemed to satisfy" document listed in Part B1 of the PCA and contains sections on "Sizing of water services" and "Testing and Commissioning".

CERTIFYING A COLD WATER PLUMBING INSTALLATION

There is an increasing variety of materials and products for the supply of cold (and heated) water. It is particularly important when using unfamiliar products to ensure that pipe sizing will be correct for adequate performance of the installation.

There are two ways that an installation may be certified as complying:

1. PCA - The purpose of this provision is to enable flexibility to achieve an installation outcome that may not strictly comply with ***AS/NZS 3500.1*** but will produce an equivalent performing result.
2. ***AS/NZS 3500.1*** - Generally, it is expected that plumbing work will be certified to ***AS/NZS 3500.1*** In this case, your work must comply with ***AS/NZS 3500.1*** and would meet the PCA performance requirements. If you are certifying a water supply installation to ***AS/NZS 3500.1*** it is important to understand how to size the system, and then select the correct pipe sizes for different pipe materials.

Example

This example (see Figure 1) follows the method of sizing a typical installation in accordance *with* ***AS/NZS 3500.1***. You will need to know the following:

- The Index length: The length in metres from the water meter to the most disadvantaged outlet. In this case to the back hose tap in this case 35m.
  The height in metres: The height in metres (above the water meter) of the highest outlet in this case 3m.
- The pressure available at the outlets:
  AS/NZS 3500.1 (Clause 3.3.2) requires a pressure of 50kPa (5m head) at the most disadvantaged outlet. In this case the back hose tap requires a minimum of 50kPa pressure at a flow rate of 0.20L/s (flow rate from Table 3.1)
- The available pressure: If the water authority will specify a minimum pressure available, use that figure. Alternatively, you can check the available pressure at the meter and use 67% of the reading to simulate minimum pressure conditions. In this case pressure at the meter is measured at 720kPa.

- Flow rates and loading units.
  AS/NZS 3500.1 Table 3.1 specifies flow rates and loading units of fixtures and appliances.

STEPS

1. Sketch the installation

The sketch should include the fixtures, their loading units and pipe sections identified by lettering as per example in Figure 2.

2. Determine Available Pressure

Measure static pressure at meter = 720 kPa
Allow 67% of 720 kPa to represent a minimum pressure = 482.4 kPa or 48.24m head

3. Determine Pressure Drop

The following formula is used to calculate the pressure drop along the index length.

P.D. = $H_m - H_s - H_x$
Where H_m = minimum available head in metres
= *In this case 48m*
H_s = height of the highest outlet
= *In this case 3m*
H_x = minimum head required at any outlet
= *In this case 5m*

Therefore:
P.D. = $H_m - H_s - H_x$
P.D. = 48 – 3 – 5
= 40m head

5. Equivalent Pipe Sizes:

The nominal pipe sizes (DN) must then be checked against *AS/NZS 3500.1* Table 1.1 to ensure correct sizes for material other than copper. Failure to do this may mean pressures flow rates and velocities will not comply with *AS/NZS 3500.1*

DN 20 is equivalent to:
- 25 Polyethylene (PE)
- 25 Crosslinked Polyethylene (PEX)
- 25 Polypropylene (PP-R)
- 22 Polybutylene (PB)

DN 18 is equivalent to:
- 20 PE
- 20 PEX
- 20 PP-R
- 20 PB

DN 15 is equivalent to:
- 16 PE
- 16 PEX
- 16 PP-R
- 18 PB

Also check that the internal bore of the chosen material is in accordance with *AS/NZS 3500.1* Table 1.3. Different classes of plastic pipes have different wall thicknesses, therefore internal diameters vary, reducing the bore of the pipe.
E.g. 20mm class 20 (PN 20) PEX has an internal bore of less than the 15mm specified in *AS/NZS* Table 1.3. If in doubt ask the manufacturer to clarify the internal diameter of the pipe.

FIGURE 1 - TYPICAL FIXTURE INSTALLATION

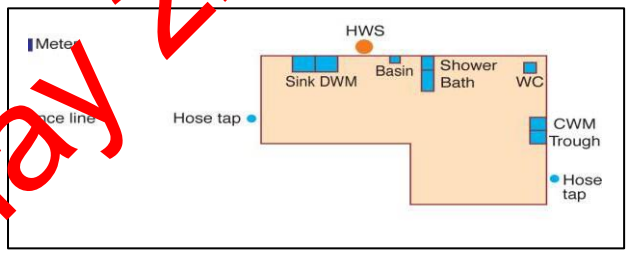

FIGURE 2 - EXAMPLE OF FIXTURE LOADING UNITS

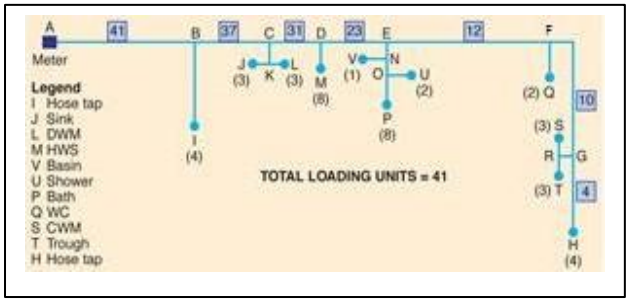

FIGURE 3 - LOADING UNIT TABLE

Pipe selection	Loading units	Probable sim flow	Normal pipe size (DN)
A-B	41	0.55	20
B-C	37	0.52	20
C-D	31	0.48	20
D-E	23	0.41	18
E-F	12	0.29	18
F-G	10	0.26	18
G-H	*	0.20	15
B-I	*	0.20	15
C-K	6	0.20	15
K-L	*	0.20	15
K-J	*	0.12	15
D-M	*	0.20	15
E-N	11	0.28	18
N-V	*	0.10	15
N-O	10	0.26	18
O-U	*	0.10	15
O-P	*	0.30	18
F-Q	*	0.10	15
G-R	6	0.20	15
R-S	*	0.20	15
R-T	*	0.12	15

FIGURE 4 - TESTING PROCEDURE