Plumbers Licensing Board
GOVERNMENT OF WESTERN AUSTRALIA

TECHNICAL NOTE

Technical Advice Line 1300 360 897

Pipe Sizing and Commissioning

Pipe sizing & commissioning

With the increasing demand on our drinking water supply, the necessity to conserve water in our drying climate and the requirement to comply with the 2003 edition of the plumbing standards AS/NZS 3500, it is vitally important to pipe size the supply of cold water to all outlets correctly.

Firstly, Section Three (3) of AS/NZS 3500.1:2003, which was previously removed from legislation in Western Australia, has now been reinstated under the Water Services Licensing (Plumbers Licensing and Plumbing Standards) Regulations 2000 (the Regulations) In particular Clauses 3.3.2 (Minimum Pressure 50 kPa) & 3.3.4 (Maximum Static Pressure 500 kPa) which are now pertinent factors in the pipe sizing exercise.

Secondly, the Regulations do modify this section by deleting the second paragraph of Clause 3.2.1 and the whole of Clause 3.5.2.

If you are certifying a water supply installation to AS/NZS 3500.1:2003, it is important to understand the methods of sizing the system and applying the provisions of equivalent pipe sizes for materials other than copper.

To pipe size correctly you will need to know the following information:

- **The pipe index length** — The distance from the water meter to the furthest outlet expressed in metres (m).
- **The highest outlet** — The vertical height from the water meter to the highest outlet expressed in metres (m).
- **Required pressure** — The minimum pressure allowable at the most disadvantaged outlet expressed in metres (m). Clause 3.3.2 requires a minimum pressure of 50 kPa (5m head).
- **Available pressure** — The minimum pressure that water is supplied at by the water service provider expressed in metres (m).
- **Flow rates and loading units** — Specific flow rates and loading units of fixtures and appliances from AS/NZS 3500.1:2003 Tables 3.1 & 3.3.

Once you have the required information it is time to pipe size using the following steps:

1. Sketch the installation, label the pipe sections & draw a table.
2. Insert loading units from Table 3.1 into the table and onto the drawing.
3. Insert flow rates from Table 3.1 for a single outlet and probable simultaneous flow rates from Table 3.3 for multiple outlets into the table.
4. Determine the available pressure.
5. Determine the pressure drop.
6. Calculate the index length.
7. Using Table C1 (30m head) & column 40m index length from Appendix 'C' pipe size each section of pipework in the table.

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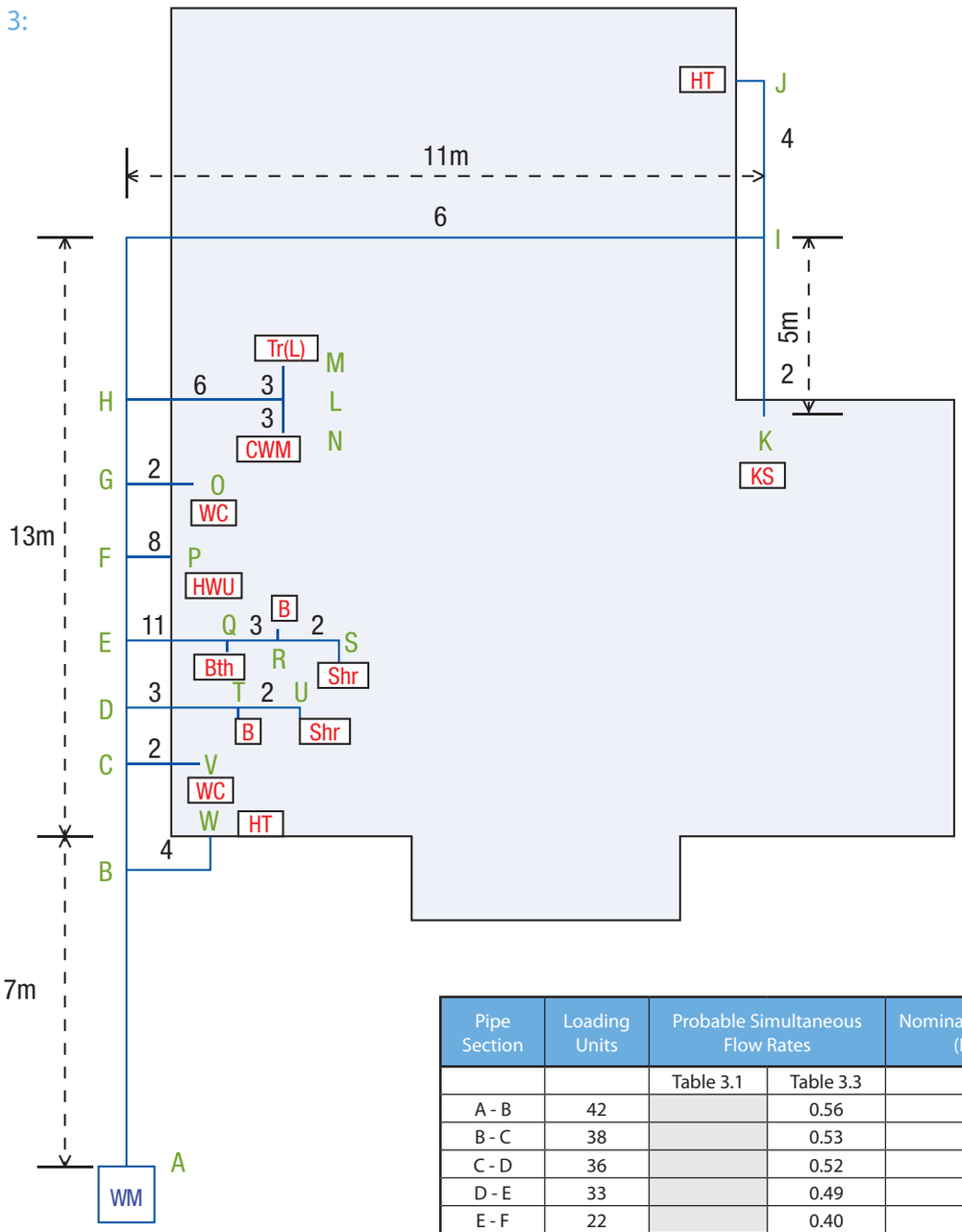
Step 1,2 & 3:



B	Basin
Bth	Bath
CWM	Clothes Washing Machine
HT	Hose Tap
HWU	Hot Water Unit
KS	Kitchen Sink
Shr	Shower
Tr(L)	Laundry Trough
WC	Water Closet
WM	Water Meter

Pipe Section	Loading Units	Probable Simultaneous Flow Rates		Nominal Pipe Size (DN)
		Table 3.1	Table 3.3	
A - B	42		0.56	20
B - C	38		0.53	20
C - D	36		0.52	20
D - E	33		0.49	20
E - F	22		0.40	20
F - G	14		0.31	18
G - H	12		0.29	18
H - I	6		0.20	18
I - J	4	0.20		18
I - K	2	0.10		15
H - L	6		0.20	18
L - N	3	0.20		18
L - M	3	0.12		15
G - O	2	0.10		15
F - P	8	0.20		18
E - Q	11		0.28	18
Q - R	3		0.14	15
R - S	2	0.10		15
D - T	3		0.14	15
T - U	2	0.10		15
C - V	2	0.10		15
B - W	4	0.20		18

Step 4:

The water service provider may be able to specify the minimum pressure available.
For this example the minimum pressure available is 400 kPa or 40m head.

Step 5:

The pressure drop is calculated using the following formula:

Pressure Drop	=	Minimum Available Head (m)	-	Highest Outlet (m)	-	Minimum Required
PD	=	At Water Meter		Height Above Water Meter		Head At Outlets Clause 3.3.2
PD	=	40	-	2	-	5
PD	=	33 (m)				

As a 33 metre head pressure drop table does not exist, using the next lower pressure drop table ensures a safety margin will be included. To pipe size this example the 30 metre head pressure drop table from Appendix 'C' will be used.

Step 6:

7m + 13m + 11m + 5m = 36m

If the pipe index length is between columns in Table C1 (30m head), using the next higher pipe index length column again ensures a safety margin is included. To pipe size this example the 30 metre head pressure drop table and the 40 metre index length column will be used.

Step 7:

(a) Size each individual pipe length by reading down the correct index length column (40m) to find a probable simultaneous flow rate equal to or greater than the probable simultaneous flow rate that has been entered into your table.

(b) Read across Table C1 (30m head) to the left hand column to find the appropriate pipe size for each length.

(c) Enter the pipe size into your table.

Equivalent Pipe Sizes:

This pipe sizing method uses copper as copper tube has traditionally proven to satisfy both the requirements for correct pipe sizing and the requirements of the Australian Standard. Therefore, the nominal pipe sizes (DN) and the minimum internal bore of the chosen material must then be checked against Table 1.3 to ensure correct sizes if materials other than copper are used. Failure to do this may mean pressures, flow rates and velocities will not comply with AS/NZS 3500.1:2003.

If in doubt ask the manufacturer to clarify the internal diameter of the pipe they are distributing.

NOTE:

- If the nominal pipe size is required to be DN18 and copper tubing is used, the nominal pipe size may be reduced to DN 15 provided the cold water is being supplied to one (1) outlet only.
- If the nominal pipe size is required to be DN18 and copper tubing is used, the nominal pipe size shall be increased to DN 20 when cold water is being supplied to two (2) or more outlets.
- DN 15 may also supply cold water to a combination bath shower assembly, a laundry trough and washing machine, or a kitchen sink and dishwasher configuration.
- Multiple dwellings - The probable simultaneous demand for multiple dwellings shall be not less than that shown in Table 3.2. These minimum flow rates shall be used to size the main supply piping for multiple dwellings.

Testing and Commissioning Water Services