

# Technical Solution Sheet 1.02

## Sanitary Plumbing

### Thermal Expansion in Above Ground PVC-U Pipelines

#### AIM

The aim of this technical solution is to clarify the requirements where providing for thermal expansion in above ground PVC-U pipelines. This technical solution provides information to enable plumbers to correctly install above ground PVC-U pipes.

#### PLUMBING REGULATIONS 2008

The *Plumbing Code of Australia* (PCA) is adopted by and forms part of the *Plumbing Regulations 2008*. Part C1 of the PCA specifies the objectives and performance requirements related to the installation of sanitary plumbing systems. *AS/NZS 3500.2: Plumbing and drainage Part 2: Sanitary plumbing and drainage* is a “deemed to satisfy” document listed in Part C1 of the PCA and contains a section on “General Installation of Pipework”. *AS/NZS 3500.2* references *AS/NZS 2032: Installation of PVC pipe systems*, which details the expansion provisions.

#### BACKGROUND

The thermal linear expansion co-efficient of PVC-U pipe may be taken as  $7 \times 10^{-5} / K$ . In simple terms, this means that a 6m length of PVC-U pipe will expand 10mm in length over a temperature increase 25°C. Therefore, above ground PVC-U pipe must be installed to accommodate this expansion.

#### PROVISION FOR EXPANSION

##### 1. HOW TO APPLY EXPANSION PROVISIONS

Unless there is an alternative provision for thermal movement, pipelines must be fitted with expansion joints in the following locations:

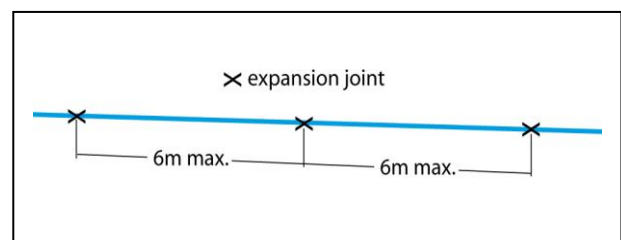
- At spacings no greater than 6m for cold pipelines or 4m for hot pipelines
- (see Figure 1).
- The maximum length of pipeline between fixed points shall not exceed 2m for cold pipelines or 1m for hot pipelines
- (see Figure 2).

##### 2. ALTERNATIVE PROVISION FOR EXPANSION

Expansion joints may be omitted if an alternative provision for expansion is made in one of the following ways:

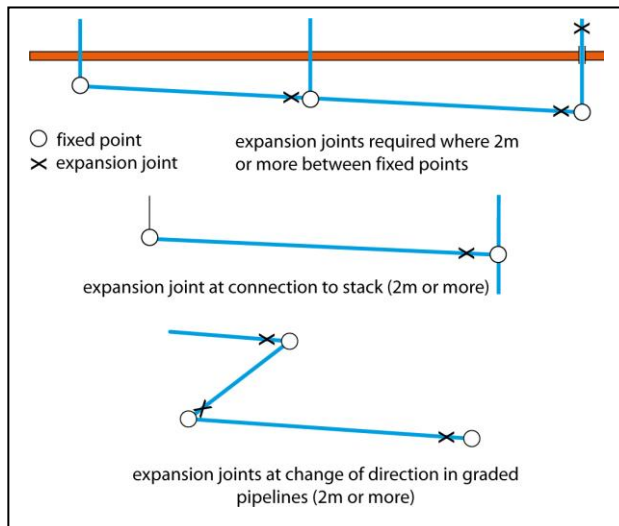
- In the graded pipeline from a fixture trap, provided that the trap is aligned with the pipeline, of plastic material, and the pipeline does not exceed 6m (see Figure 3)

**FIGURE 1 - MAXIMUM LENGTH OF PIPELINE BETWEEN EXPANSION JOINTS IN LONG PIPELINES: 6M FOR COLD PIPELINES AND 4M FOR HOT PIPELINES**



# Technical Solution Sheet 1.02

**FIGURE 2 - EXPANSION JOINTS BETWEEN FIXED POINTS IN GRADED PIPELINES SHALL NOT EXCEED: 2M FOR COLD PIPELINES AND 1M FOR HOT PIPELINES**



- Above the highest branch connection to a stack where the stack is free to move through a weatherproof sleeve (see Figure 4).
- At the base of an external vertical waste connected to a drainage trap and where the vertical waste is free to move through a sleeve (see Figure 5).
- At a junction or bend in a graded pipeline where the thermal movement can be accommodated by deflection of the offset leg without affecting the grade of the pipeline. The maximum length (L) and the minimum length (I) of the offset leg must conform to Table 1 and Figures 6 & 7.
- The following examples apply to what is known as “cold” pipelines. If the pipework is conveying hot fluids such as from a dishwasher, sterilizer or is located outside in direct sunlight where the material temperature may exceed 60°C, the maximum spacings between expansion joints is reduced from 6m to 4m. Also, the maximum length of pipeline between fixed points without an expansion joint or

alternative provision for expansion, is reduced from 2m to 1m.

## INSTALLING AN EXPANSION JOINT

There are two main points to remember when installing an expansion joint:

1. Ensure that it is clipped firmly so that there is no movement in the expansion joint itself. You will need the correct sized clip to fit the expansion joint body, a rigid clip shank and possibly a brace from the clip to an appropriate building fixing.
2. Ensure the correct distance for expansion is left in the expansion joint during installation.

## HANGERS AND CLIPS

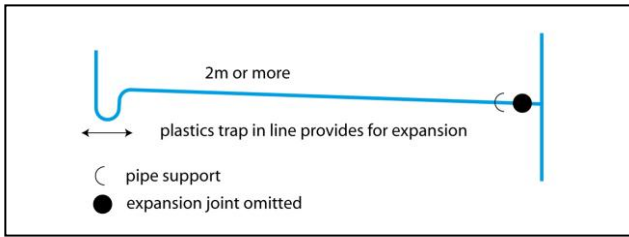
Hangers and clips must be corrosion resistant and appropriate for the intended environment. Pipe clips must not impede longitudinal movement when fully tightened and be spaced in accordance with [AS/NZS 3500.2](#).

**TABLE 1 - ALTERNATIVE EXPANSION PROVISION**

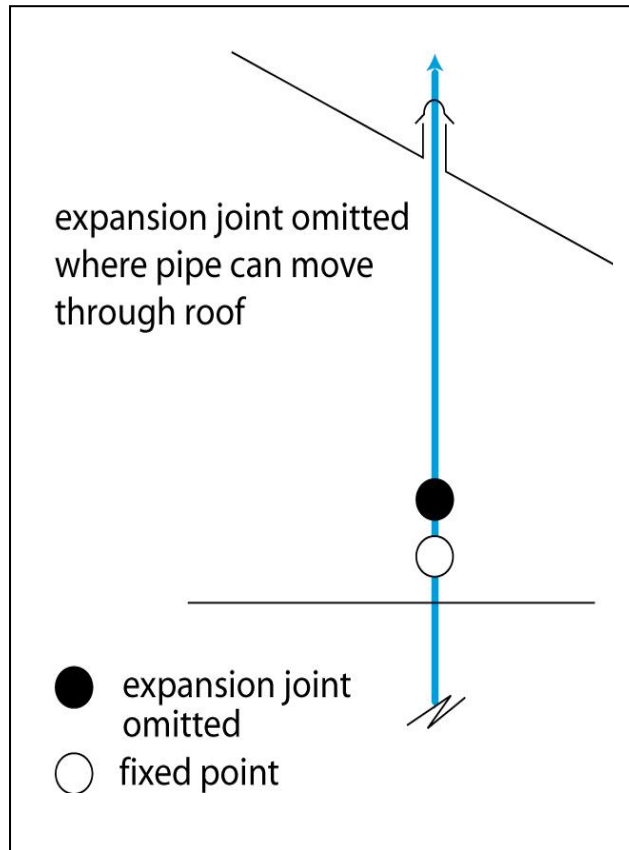
Nominal size of pipe mm	Maximum pipe length (L) m	Maximum length of offset leg (I) m
40,50	2.0	0.5
	3.0	0.6
	4.0	0.8
	6.0	1.0
65,80,100	2.0	0.75
	3.0	1.0
	4.0	1.1
	6.0	1.2

# Technical Solution Sheet 1.02

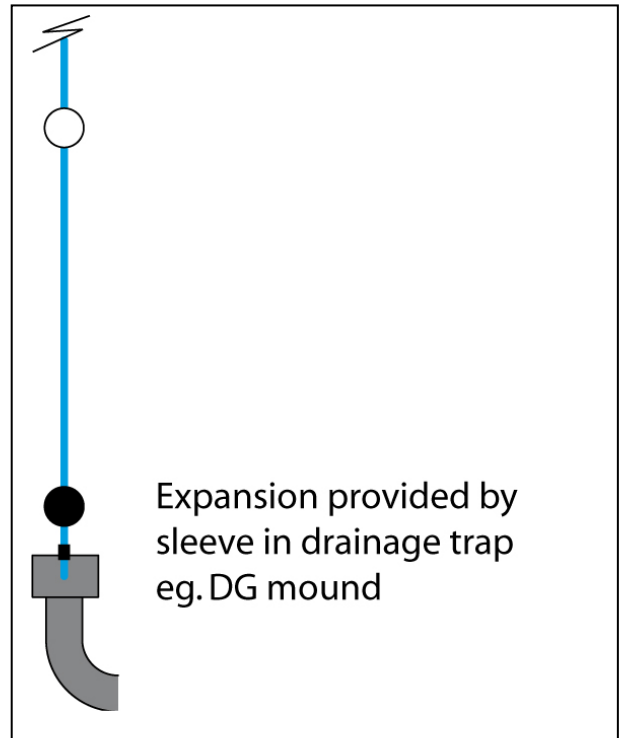
**FIGURE 3 – EXPANSION JOINT OMITTED WHEN PLASTIC TRAP USED IN LINE WITH PIPELINE**



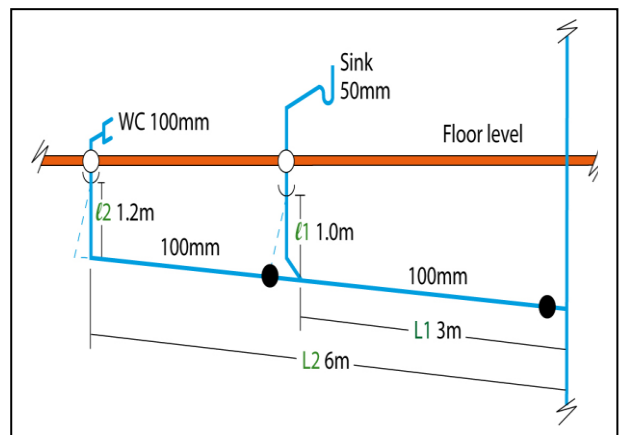
**FIGURE 4 - EXPANSION PROVIDED BY FREE MOVEMENT THROUGH WEATHERPROOF ROOF PENETRATION**



**FIGURE 5 – EXPANSION THROUGH SLEEVE AT A DISCONNECTOR GULLY OR BLEND**



**FIGURE 6 – APPLICATION OF TABLE 1**

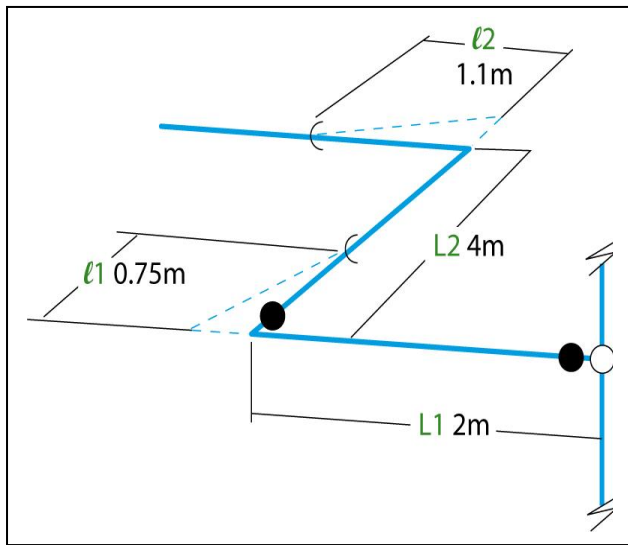


**Notes for figure 6:**

- L1 is DN100 PVC-U pipe 3m.
- From Table 1, L1 is 1.0m
- This means that provided the pipe support is 1.0 above the junction fitting expansion is provided by the flex in the PVC-U pipe
- L2 is 6m
- From Table 1, L2 is 1.2m

# Technical Solution Sheet 1.02

FIGURE 7 – APPLICATION OF TABLE 1



## Notes for figure 7

- L1 is DN100 2m long.
- From Table 1,  $l$  is 0.75m.
- This means that provided the pipe support is 0.75m upstream of the 90° bend, expansion is provided by the flex in the PVC-U pipe.
- L2 is DN100 PVC-U pipe 4m long.
- From Table 1,  $l2$  is 1.1m.