Floor wastes, traps and vents

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Brush up on your knowledge of the technical terms for sanitary plumbing and how the various elements function and are installed.

**Water Traps**, floor wastes, floor waste gullies, vent pipes, drain vents, discharge stack vents – these are some of the terms used in reference to sanitary plumbing. A recent *Build* magazine readers’ survey indicated that there is some confusion with the terminology, but once explained, it is really quite straightforward.

**Sanitary plumbing explained**

Sanitary plumbing refers to the system of pipework that connects sanitary fixtures, such as toilets, sinks, hand basins, baths, showers and laundry tubs, to the sewerage system.

Under New Zealand Building Code clause G13 Foul water, sanitary plumbing is required to safeguard people from:
- illness due to infection or contamination from personal hygiene activities
- loss of amenity due to unpleasant odours or offensive matter from sewage disposal.

These objectives can be achieved by installing water traps and vents into sanitary plumbing systems in accordance with Acceptable Solutions G13/AS1, G13/AS2 and G13/AS3 or with AS/NZS 3500.2:2015 *Plumbing and drainage – Part 2: Sanitary plumbing and drainage*.

Using solutions from the Acceptable Solutions and AS/NZS 3500.2:2015 together is not an Acceptable Solution. If solutions from both systems are used in conjunction with one another, it becomes an alternative method.

**Water traps and vent pipes**

Water-filled traps in discharge pipes prevent foul air and gases in the sanitary plumbing system.

**Figure 1**  Principles of a water-filled trap.

**Figure 2**  Vented discharge pipe with P trap.
from entering the building interior (see Figure 1). However, such traps may also create some design issues.

As water flows through a pipe, air is pushed ahead of it. This increases the pressure ahead of the water flow while creating a negative pressure behind the water. If enough negative pressure is created, the water can be drawn out of the trap, thereby providing a route into the building for foul air and gases.

By installing a vent pipe on the discharge pipe that is open to the outside, air can enter into the system and prevent pressure variations causing water loss from the trap (see Figure 2).

Although a simple solution, it increases the amount of pipework required and in some situations, such as multi-unit dwellings or where there are internal bathrooms, may be more difficult to install.

Alternative systems to reduce the number of vent pipes have been developed but cannot always be used as they have restrictions affecting aspects of the system such as:
- pipe gradients
- pipe lengths
- the number of bends permitted
- the number of floors served
- the total height of the system
- connection points between pipes
- the loading on the system.

Air admittance valve
An alternative to an open-air vent pipe is an air admittance valve (AAV). This admits air into the system when water flow reduces the internal pressure and closes when the internal pressure of the system is equal or greater than the external pressure (see Figures 3 and 4).

AAVs have limitations in that they cannot equalise an increase in pressure within the system. Also, as the air movement is one way only, they cannot be used where air movement in and out of a system is required, such as in a discharge stack vent or a drain vent.

Discharge stack vent
A discharge stack vent is a vent pipe to a discharge stack, that is, a discharge pipe with one or more discharge pipe connections to the outside, allowing air movement in and out of the system.

Instead of maintaining pressure equilibrium, their primary function is to remove foul air and gases.

Drain vent pipe
Drain vent pipes remove foul air and gases from sewer drains also by allowing air movement in and out of the system. Every property must have a drain vent pipe that is open to outside and, as sewer gases are lighter than air, be located at the high end of the drain or soil stack.

Floor wastes
A floor waste is an outlet located at the low point of a graded floor and is designed to provide drainage for accidental water spillage. A floor waste may be:
- dry
- trapped
- a floor waste gully.

Dry and trapped floor wastes
A dry floor waste consists of a flush floor grating with a pipe that discharges either directly to the outside or over a gully trap (see Figure 5). Floor wastes are installed to provide drainage for accidental water spillage, and a dry floor waste
does not have a water trap. Without a trap, it must not be connected directly to a foul drainage system.

A trapped floor waste is similar to a dry floor waste but has a water trap to prevent smells.

**Floor waste gullies**
A floor waste gully (FWG) is a floor drain that can receive the discharge from a number of fixtures, but connections are limited by the number of discharge pipes and distance (see Figure 6). They may also be used as shower outlets so they are space saving, reduce the length of pipework and reduce the number of connections required to the drain.

**Installing floor waste and discharge pipes**
There are some limitations to the installation of both FWG and discharge wastepipes in suspended timber floors. When installing a FWG, the floor space must be deep enough to accommodate the unit. The typical depth for an FWG is approximately 290 mm, but this will vary depending on the manufacturer.

For suspended floors, discharge pipes from floor wastes and FWGs that run within the
depth of the floor are best run parallel to the floor joists. Proprietary products (joist brackets) or floor systems are available where pipes passing through the floor joist cannot be avoided. There must also be sufficient depth in the floor space to accommodate the pipe gradient.

FWGs installed under a concrete slab-on-ground floor are supported in compacted granular fill and should be set on a concrete base (see Figure 7). Where the riser pipe passes through the concrete, it must be sleeved or wrapped in a durable, flexible material. Pipes under the concrete must have clearance between the top of the pipe and the underside of the slab by:
- 50 mm under Acceptable Solution G13/AS2
- 25 mm under AS/NZS 3500.
Disadvantages of FWGs are that they may be noisy, and as with all water traps, the fixtures that discharge into them must be used regularly to ensure they remain filled with water.

Note: Granular hardfill and underslab insulation not shown for clarity.

Figure 6 Typical floor waste gully trap.

Figure 7 Floor waste gully installed under a concrete slab on ground.