Module 26: Sanitary ware & plumbing fittings

Module Objectives

By the end of this session, participants will understand:

1. How toilets work and the different types of toilet
2. Different types of other sanitary ware – such as bidets, basins, baths, and showers.
3. About taps and mixers

Module at a glance:

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Toilets

A toilet is a plumbing fixture primarily intended for the disposal of human excreta.

Various styles of toilets will be encountered in South African homes and the differences mainly relate to the positioning of the cistern (which holds the water for flushing the toilet) and the flush mechanism. All toilets discharge via a trap (water seal) into the drain/sewer system. A wax ring is used by plumbers to seal the joint between the cistern and the drain pipe.
Toilets are usually ceramic (fired pottery). This is called vitreous china and has a very hard surface. It is resistant to fading, staining, burning, scratching, and acid attack.

South African toilets usually have plastic, or wooden seats of widely varying quality.

**Useful note...**

*Most modern toilets are close-coupled – i.e. the cistern and the toilet bowl are fixed directly together by ceramic construction/design.*

Older homes have wall mounted cisterns with a pipe linking the cistern and the toilet bowl. In very old houses, a cast-iron (or plastic) elevated wall-mounted cistern with a pull chain attached to the lever of the discharge valve, may still be encountered.

Then there are toilets with concealed cisterns (built into the wall behind the toilet) and flush-master toilets (also known as a “flushometer”). In this system, each toilet in a home or building complex is linked directly to the main water pressure system or to a water reservoir in the ceiling. This allows for repeated flushing without have to wait for the cistern to refill.

The flushing mechanisms of most South African household toilets rely on gravity to pull the water with sufficient force from the cistern, into the bowl, when the release valve (or flapper valve) is opened. This strong flow of water is designed to wash the waste through the trap and down the drain. Once the cistern has emptied, the valve drops back into place and the weight of the water in the refilling cistern presses down on the release valve and keeps it watertight – until the next flush.

Cisterns are either lever or push button operated. Cisterns operated by a push button are available in single (6L) or dual flush (3L/6L). Two buttons allow for the user to select between a flush for urine or faeces. Because most of a household’s flushes are for urine, dual flush toilets can save a significant amount of water.
The majority of cisterns are now internal overflow; this means in the event of a failure, the water will be contained within the unit. A variety of different flush and cistern-fill mechanisms are used. Older toilets have a ball valve controlling the inflow to the cistern and a lever operated flush release valve (of various designs) at the base of the cistern.

Cistern fill valves control the water inflow into the cistern. The valves are of two main designs:

- The side-float design and;
- The concentric-float design.

The side-float design incorporates a float, usually ball-shaped, which is located to one side of the main valve tower, at the end of a rod or arm. As the side-float rises, so does the side-float-arm. The arm is connected to a linkage which blocks the water flow into the toilet tank, and thus maintains a constant level in the tank.

A concentric float valve opens when the water level in the cistern is low, allowing more water to enter. When the water level returns to the full level, the valve is shut. The newer concentric-float fill valve consists of a tower which is encircled by a plastic float assembly. Operation is otherwise the same as a side-float fill valve, even though the float position is somewhat different. By virtue of its more compact layout, interference between the float and the flush valve is greatly reduced, thus increasing reliability.

Helpful tip...

The concentric-float fill valve is also designed to signal to users automatically when there is a leak in the tank, by making much more noise when a leak is present, than the older style side-float fill valve which tends to be nearly silent when a slow leak is present.
Left: A typical modern toilet installation with a concentric valve flush mechanism. Right: The older style ball valve cock controlling the inflow and a lever controlled flapper valve controlling the flush.

Toilet design is constantly improving with the goal to maintain an efficient flush, but use less water. In the United States, these improved products are generally identified as high efficiency toilets or HETs. HETs possess an effective flush volume of 4.8 litres or less. HETs may be single-flush or dual-flush.

The performance of a flush-toilet in the US is rated by a Maximum Performance (MaP) score. The low end of MaP scores is 250. The high end of MaP scores is 1000. A toilet with a MaP score of 1000 should provide trouble-free service. It should remove all waste with a single flush; it should not plug; it should not harbour any odour; it should be easy to keep clean. The United States Environmental Protection Agency uses a MaP score of 350 as the minimum performance threshold for HETs.
There are no equivalent minimum standards (or MaP score requirements) in South African for toilet flushing. This may come:

**Finding...**

One study done by the University of the Witwatersrand, states that toilet flushing, places massive demands on South African water resources. In South Africa, domestic flushing consumes between 20-40 per cent of the total urban water demand.

Worldwide advanced technology is being integrated into toilets with more functions. These features, which will be seen increasing in up-market South African homes in the future, already include:

- Automatic-flushing mechanisms, operated by a photocell or other sensor. Typically these flush a toilet when the user stands up, or flush a urinal when the user steps away.

- Water jets, or "bottom washers" like a bidet, as an alternative to toilet paper.

- Blow dryers, to dry the body after use of water jets.

- Artificial flush sounds, to mask noises such as body functions.

- Urine and stool analysis, for medical monitoring. One Japanese smart toilet checks blood pressure, temperature, and blood sugar.

- Digital clock, to monitor time spent at the toilet.

- Automatic lid operation, to open and close the lid.

- Heated seats (some of which may overheat).

- Deodorizing fans.

- Automated paper toilet-seat-cover replacers, which automatically replace a paper toilet-seat cover with the push of a button.

- Electric Toilet Brushes
Bidets

A bidet is a vitreous china (porcelain) sanitary ware item designed for washing the crotch area. The word comes from the French for "pony" because the user sits astride the bidet while washing. A bidet is fitted with a cold (and usually hot) water supply which operates through various types of mixers. A bidet also incorporates a water trap seal and must be connected directly into the main 110mm waste via a 32mm pipe (not via a basin or bath waste pipe).

Basins

Basins in South African homes are of various types – the most common being wall-mounted, pedestal basins, drop-in basins (into a vanity counter top) and 'stand on top' basins. A variety of different materials are used to manufacture basins – the most common being vitreous china (porcelain).

Baths

Many baths are free standing. Modern free standing baths are carried on metal brackets with adjustable legs and incorporate an apron to conceal the brackets and legs. Old enamelled cast iron baths are much sought after and normally stand on ornamental legs. Repairs and re-enamelling of these older baths is a widely available service.

Older bathrooms often have built-in baths - normally of plastic or fibre construction. A common building error is to inadequately support the weight of a filled bath. The result is either excessive movement around the rim of the bath resulting in cracked caulking, or a hollow sounding bath which may be prone to failure.

Normally a built-in bath installation involves bricking-up the sides of the structure, then placing the bath on a bed of sand (often mixed with some cement) and then filling in around the sides before finishing off the top edges with concrete and tiles. Sometimes the rim of the bath itself forms the top edge.
The bathtub should be filled with water prior to caulking. The weight of the water will maximise the width between the tub/wall joints and reduce future movement, stress and cracking. The water should be left in the tub until the caulk bead is dry.

**Plugs & overflows from baths and basins**

There has been a lot of development in waste plug design for baths and basins and so a variety of different plug types are found in South African bathrooms. Old style rubber push-in/pull out plugs were replaced first by lever-operated metal plugs and now increasingly by one-push “clicker” plugs. If there is an overflow in the bath or basin this is linked to the waste via a slotted clicker plug.
Showers

The substrate of showers (floors and walls) needs to be adequately waterproofed (preferably with a suitable bituminous coating) prior to tiling and the installation of the doors/panels. Leaks in showers often occur because of poor grouting and sealing. Poor sealing is a particular danger if a shower tray has been installed – often used in an upstairs bathroom renovation – especially with wooden floors.

The bezel (cover plate) of the shower mixer can also be problematic, inasmuch that if the pipe penetrating the wall and tiling behind the bezel is not sealed, water from the shower can seep behind the tiles, resulting in tile delamination and damp on the opposite side of the wall.

Taps and Mixers

There are quite a variety of tap and mixer manufacturers on the market in South Africa. Many taps are also imported from overseas. The range is extensive and varied. There is however some important differences.

Firstly there are taps as in single taps, or single taps on a mixer body. These kinds of taps have washers and are easily repaired, and not as expensive as single handle mixers which have a ceramic disc mixer cartridge (see next page).

Single Taps

![Pillar tap](image1)
![Bib tap](image2)
![Pillar tap high waste](image3)
Mixers With Single Taps

Basin Mixer  Basin Mixer  Basin Mixer

Kitchen, Bath and Basin Taps

Bath Shower  Bath Shower  Basin Sink

Single handle mixers have, in the place of washers, a mixer cartridge. These cartridges are much more expensive than a tap washer – up to R500 per cartridge.

Mixer Taps With Single Handle

Basin mixer  Basin mixer  Bath/shower
Balance is achieved by installing a pressure control valve (multi-valve) on the main water inlet to the house. This valve is usually installed next to the hot water geyser, on the cold water supply. The cold water supply to the mixers etc. is then taken from a point between the pressure reducing valve and the geyser. This ensures that the cold water pressure is the same as the hot water pressure.

Installation of a pressure control valve can prove difficult in the older houses that have more than one water entrance point to the house. If a single handle mixer is installed in an un-balanced water pressure system, the mixer cartridge will not last long, and will need to be replaced, and the manufacturer’s guarantee will probably be void.

**Smart taps**

Fairly new to the South Africa market are "smart taps" with an under-counter installation able to deliver filtered water – either very hot (within 2 degrees C of boiling), or chilled water (11 degrees C).

Franke offers this range in South Africa under the brand Zip Hydrotap, Zip Boiltap and Zip Chilltap.

Installation requirements are a cold water feed – minimum pressure 150 kPa and an electrical supply via a standard three-pin plug. The device can be programmed to go into sleep mode during the night hours.
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