
A comparative study on high-level cisterns and 2 types of flush-valves for heavy traffic toilet usage

High-level cisterns

High-level cisterns are not at all suitable for schools and other high-traffic areas, for three very important reasons:

1. The cistern or “tanke” needs time to fill up with water after each flush. The minimum time needed is 1 minute, provided there are no blockages of the inlet valve due to impurities in the water. If there is blockage of the inlet valve, which is very common here in Malaysia due to our dirty water, filling up the cistern can take 10 minutes or more.
What high-traffic areas such as schools require is “water at call” due to high traffic in the toilet during the 15 minutes recess. This means water is constantly available, and zero refilling time is required.
2. The cistern and the flushing mechanism are usually for domestic use, and are not meant for heavy duty usage, particularly the cheap plastic models often installed. In schools, they would need constant replacement and repair. Students will not be able to flush the toilets during down-time, hence depriving the students with the correct mindset that there is a need to flush toilets.
3. High-level cisterns are very prone to vandalism. Generally, covers are missing, internal mechanism are pilfered.



Conclusions:

High-level cisterns are cheap, but are the wrong specification for heavy traffic usage and are constantly out of order. They are inherently prone to vandalism, and ultimately unsuitable for schools.

Flush-valves

Flush-valves provide the concept of “water at call”. One can continuously push the button and 6 litres of water will always flush the toilet with zero waiting time. This is due to the mechanism using the large water tank located above/within the roof as the “tanke”. As long as this tank has water, there will be water at call each time the toilet is flushed, therefore ideal for schools and other high traffic toilets.

There are two types of flush-valves:

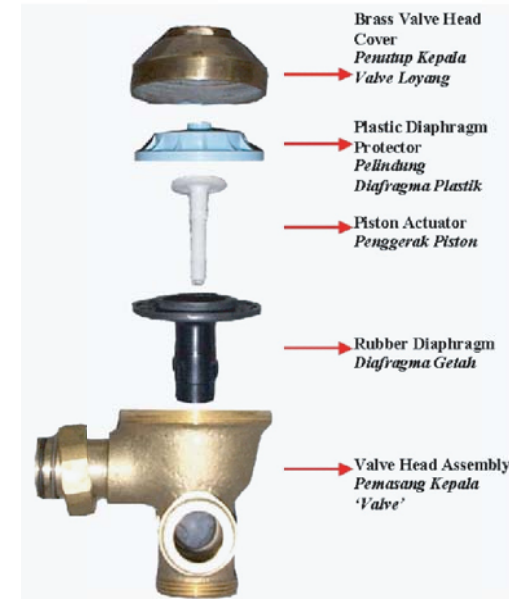
1. Low Pressure Membrane Flush-valves

- An extremely low maintenance flush-valve with a 5 year supplier warranty, ensuring that the mechanism works each and every time the button is pushed.
- Works from 5psi to 80psi pressure.
- Extremely robust; designed with only 5 components. Functions extremely well when used in a dirty water environment, as any blockage is easily washed away, and the valve operates as if new.
- No plumber is required to maintain membrane flush-valves.
- The sensor version is mechanically activated and requires zero maintenance, except for battery changes. 4 “AA” batteries will last 2 years, given 3000 flushes per month (100 uses per day for each toilet).

Conclusions:

The 5psi-80psi low pressure “Membrane” flush-valve is most suitable for schools for the following reasons:

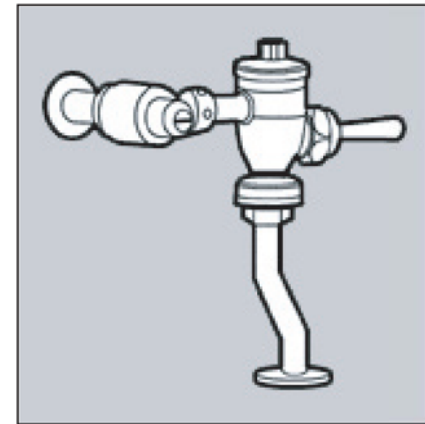
- No pumps needed
- Once installed with push button model, very little maintenance. No plumber needed for regular maintenance
- Supplier guarantees 5 years
- The sensor version is motorized and not through a troublesome solenoid valve
- Zero vandalism
- Specifically designed for very heavy traffic usage; robustly built



1. Piston Flush-valves

This type of flush-valve differs from the above “membrane” flush-valves for the following reasons:

- The piston flush-valve requires at least 20 psi of pressure to operate. It therefore requires a pump to generate pressure.
- Piston flush-valves require two rubber gaskets to prevent leakages. These two rubber gaskets are in constant need of maintenance. Also, these gaskets are generally not available and retro fitting is impossible. Suppliers will recommend a total replacement of the entire flush-valve; a costly affair. Generally, this valve will need attention after one year, and a replacement within 2 years.
- Because of the vulnerability of gaskets, it is recommended that any maintenance be done by highly qualified plumbers. Leakages are the common problem of this valve.
- The sensor version uses a solenoid valve set-up. This again requires constant replacement.
- This sensor version is generally hot-wired rather than battery operated.



Conclusions:

Though the actual flush-valve is cheaper than the “membrane” counterpart, few realise the pump system will add to the original cost. Further, the economics of maintenance and replacement will make this product much more costly within a 2-year timeframe. Finally, the piston flush-valve is prone to leakage.

GBH Zurn membrane flush-valve

GBH Piston flush-valve

Performance	Discharge 6 litres of flush water at flow rate of 1.8 litres per second (given water pressure at 5psi)	Discharge 5 litres of flush water at flow rate of 1.8 litres per second (given water pressure at 20psi)
Practicality	Can be used without a pump; requires only gravity for water pressure.	Can only be used in conjunction with a pump to generate at least 20psi.
Use of pumps	No need.	Use of pumps requires pressure-rated pipes. Uneven distribution of water must be considered when more than one flush valve is used. When pumps are out of order, all flush valves cannot be used.
Longevity	GBH Zurn flush-valves are diaphragm based and have long life spans. GBH provides a 5 year guarantee Out of about 20,000 valves installed in the country, we have had a zero-failure record over last 9 years.	Piston flush-valves have tendency to get clogged by accumulation of grime. Once it is clogged, the valve becomes unbalanced and cannot reliably discharge 6 litres of flush. Once unbalanced, the faulty valve cannot be repaired and must be replaced with a new flush valve. Lifespan is 3 to 5 years.
Dual flush	6/3 litre dual-flush is available.	Not capable of dual-flush.