

Water

Water at work

First, a word of warning. You are not the only one to be phased by the world of plumbing! So are many who call themselves plumbers. Modern water fittings are much more efficient than the traditional systems but they do need proper installation which is often very different from the old ways! It is therefore worth checking that your contractor is using professionally certified plumbers. It's surprising how often even reputable firms do not consider this important and how rarely architects or clerks of works check credentials. The key here is to check that plumbers actually working for you are certified. Too often the plumbing firm will present accreditation which refers to someone else in the company, under whom all operatives, good or bad, shelter. Increasingly, manufacturers are being encouraged to void warranties where their products have been installed by those without the requisite qualifications. Under its Royal Charter, the Chartered Institute of Plumbing and Heating Engineering (CIPHE) maintains a register of qualified individuals and their members should be able to produce a valid current certificate. The CIPHE has a disciplinary procedure which enforces standards of workmanship and behaviour. See www.ciphe.org.uk for further details.

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The cost of water

Cost to the School

Just because water comes out of the sky – and in Britain often too freely – we ignore the real cost. Yet the water rates are already a significant expense and they are bound to increase as standards improve and the cost of delivery increases. Everywhere saving hot water is more than doubly worthwhile.

Cost to the Environment

Water, delivered to the school or home, is energy intensive. Pumping water round the system and maintaining the pressure demands a significant energy input. We clean 100% of the water in our pipes to potable standards and yet only 8% of it is actually drunk. Indeed, in the loo, water is used almost entirely for carriage – not even for cleaning. The environmental cost of piped water means that our carbon footprint and our water footprint are inextricably interlinked.

Water shortage

Even in Britain, climate change is affecting our water resources and there are now parts of the country which are officially classified as semi-arid! In some places in the South East development is restricted because of water shortages. Moving water long distances to overcome this problem is just too costly in energy terms.

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The bathroom

We start with the most practical and basic matters and nowhere better than in the lavatory. It is precisely because these are such mundane places that they are often not given the attention they deserve. Yet they use more than 35% of the water in school and home so there are real savings to be made.

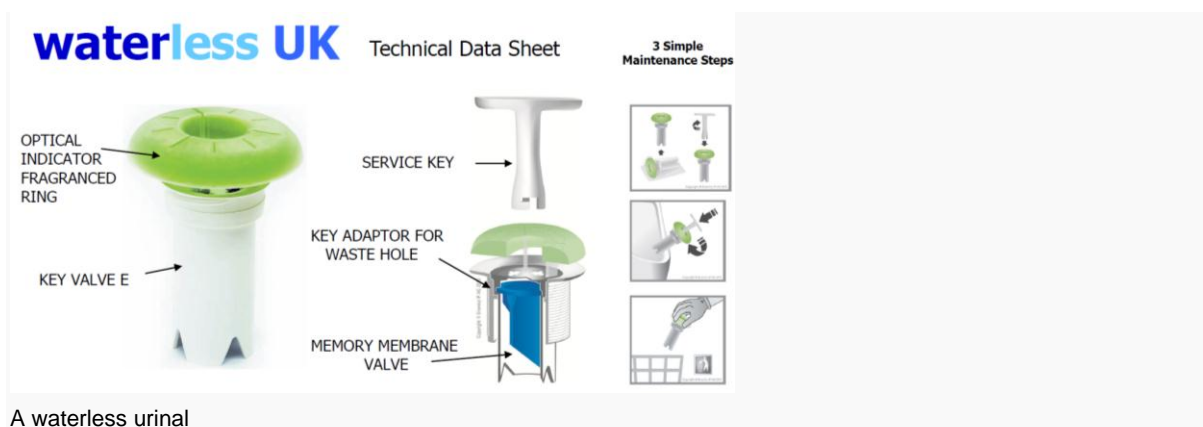
Sitting down

The Victorians were sensible about loos. They put the cistern high up on the wall and used gravity to good effect. 4 litres was all they needed for a full flush. Later, we decided that it looked better if the cistern and the pan were linked together and we produced the 'close-coupled' installation which used 9 litres instead of 4. It was years before anyone bothered and suggested we might put a brick in the cistern to reduce water use; install dual flush arrangements; or improve 'close-coupled' lavatories so that they use about 6 litres and therefore conform to new building regulations. However gravity comes free and a high level is still the best solution. If high level cisterns offend – although quite why some people dislike them is a mystery – they can always be placed behind a panel which gives a smooth and easily cleaned finish.

A dual flush lavatory is a high efficiency toilet (HET) that conserves water by offering a choice of two different flush volumes – a low volume flush for liquids and a full volume flush for solids, a high efficiency lavatory is 1.28 gpf (gallons per flush)/ 4.84l on average (If you have a single flush lavatory, for it to be considered high efficiency by US WaterSense standards, it has to use no more than 1.28 gallons/6.06l of water per flush. If you have a dual flush lavatory, the full flush option must use no more than 1.6 gallons per flush and the low flush option must use no more than 1.1 gallons/4.16 per flush.)

Dual flushes – both new and retrofitted systems can be installed at minimal cost. However clear instructions are required to ensure people know how and are confident in using them, rather than flushing twice “just in case” to avoid embarrassment. If the lavatories are pre 2001 with a capacity of 9 litres or more, consider installing a cistern displacement device (CDD) such as a 'Save a flush' bag or a Hippo. These are available for free from most water companies. These devices are easy to install and are placed in the lavatory cistern to displace approximately one litre of water every time you flush.

Standing up



A waterless urinal

Modern urinals need no water at all. Waterless systems are in use all over the country in places with as large a throughput as Manchester Airport. Businesses that really care about their margins, like cash and carry operators Costco, install these urinals to cut their water bills significantly. This Key Valve System does not rely on harsh chemicals and is 100% recyclable, they don't smell and only need changing 2-4 time a year or 7.500 uses. Waterless UK Ltd – www.waterlessuk.com – UK sole distributor - Victoria Kendrew - 01404 823682 or 07966550260.

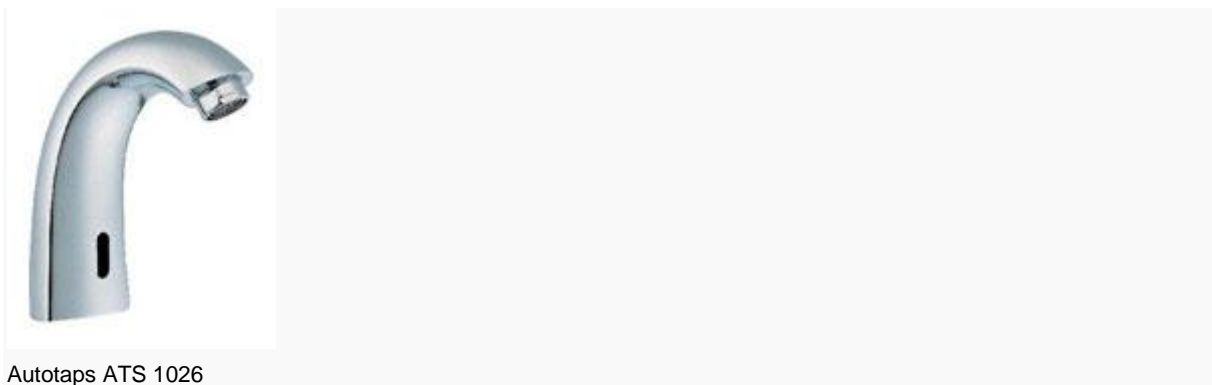
(www.falconwaterfree.com – UK distributor Ideal Standard tel: 01482 346 461) and Duravit (www.duravit.co.uk – McDry urinal), utilise a trap insert filled with a sealant liquid instead of water. The lighter-than-water sealant floats on top of the urine collected in the U-bend, preventing odours from being released into the air.

Although the cartridge and sealant must be periodically replaced, the system saves anywhere between 55,000 and 170,000 litres of water per urinal per year. Further savings are made in terms of maintenance and sewerage. The majority of blockages are caused by the hard scale that builds in layers on the inside of pipe which is caused by the mixing of water and urine. When adding facilities to an existing or new building on school grounds, it is usually preferable to use existing drainage systems to avoid significant cost and disruption. By using waterless urinals, the extra capacity required from the drainage system is dramatically reduced. Depending on the site, pumping fees for septic tanks could also be a factor.

Note: We've seen some schools that have been encouraged to do without urinals in the name of 'flexibility' and they have installed only pans. This is an expensive choice which ought to be avoided.

Hand washing

Getting the young to wash their hands is not easy but getting them to do so inexpensively is perfectly possible. Yet the common fitting – two taps or a single spout with two taps – is surprisingly wasteful. Just watch a child use them. He turns on the hot and it's too hot so he turns on the cold and, inevitably, it's too cold – so he turns on more hot. While performing this manoeuvre he uses 30% more water which all goes to waste. The alternative – a modern mixer tap with a single action – releases water at roughly the right temperature and the simple up and down movement means that it's more likely that the water is turned off fully. There's also the alternative of electronically controlled taps which obviate the problem entirely. It also resolves the issue of wasted water – a tap left running for 10 minutes can use nearly 100 litres of water.



Autotaps ATS 1026

Infra-red motion sensitive activated taps also have the added benefit of being more hygienic. At least 0.7 bar of equal pressure (both hot and cold) is needed for the sensor tap to work efficiently, however it is possible to install boosters or pumps to achieve the necessary levels if required. Autotaps [www.autotaps.com] has a range of infra-red motion sensitive taps and particularly recommend their ATS series, which has proved particularly robust and suitable for school environments. Sensor taps either have the temperature control built in, or the water is premixed to the required temperature, or a blending valve or thermostatic valve is used. The recommended option for a number of taps is for the water to be mixed as it comes from the mains and then distributed to the individual taps. It is important to confirm with the plumber installing the equipment whether an access panel will be installed, allowing the school maintenance team to alter the temperature if necessary or whether any changes will need to be undertaken by a plumber.

It is also important to check that there's an aerator valve in the tap. It reduces the density of the water flow and, surprisingly, shortens washing time. These taps can reduce water usage by up to 80% and half of that reduction will be in water which the school has paid to heat.

Hand drying

Just one of the things in life which is taken for granted. Drying is rarely considered as a subject in itself! Instead it is something someone outsources and gets the best deal they can. Thinking about it is, itself, a revelation.

- Linen is expensive, unhygienic, and environmentally costly. Manufacture and washing with its detergent and water use makes the carbon bill significant. The outsourcing cost is considerable.
- Paper is unpopular, ineffectual, makes a mess, and, even if made from recycled material, environmentally expensive.
- Traditional air dryers are unhygienic and they don't work. How many of us, after a frustrating and noisy period holding our hands under a pathetic current of warm air, have finished the process off on the seat of the pants! No wonder that so many of these apologies for dryers are supplemented by paper towels.



Dyson Airblade AB03. Image courtesy of Dyson.

A Dyson Airblade™ machine costs more to purchase but works effectively drying hands in just 10 seconds. It is claimed that for the cost of just one paper towel, the Dyson Airblade™ hand dryer can dry 19 pairs of hands. That means immediate savings, and it can help to reduce your school's carbon footprint. It is robust and energy efficient (using up to 80% less energy than most warm air hand dryers), and reduces the carbon footprint of drying significantly. There are now competing machines but you may well find that this British development remains the best bet. (<http://www.dysonairblade.co.uk>)

There is, however, an important choice to make even within the Dyson range:-

The **AB01** has a casing made from robust, impact-resistant aluminium for tolerating high levels of use and abuse at places such as airports, nightclubs and sports stadiums.

The **AB03** is designed for regular washrooms. It has the same patented technology as AB01 but it's made from PC-ABS – a lightweight yet durable compound. Its manufacturing process is over 50% less carbon intensive than AB01.

Alternatives include the Mitsubishi jet towel.

Showers and baths

Baths use 2.5 times as much water (85l v 30l) as a normal shower. In general, young people prefer showers and they should be the installation of choice. The nature of the shower head is important; aerated showerheads can reduce water consumption by up to 80% whilst maintaining the same sense of pressure for the user. Power showers use over twice as much water (80l v 35l) and up to 5.5 times more electricity (depending on the heating method). Consider installing automatic timers for the showers to discourage lengthy ablutions.

Rainwater and greywater

The installation of rainwater and or greywater harvesting systems should be considered when undertaking new build or major renovation projects. Rainwater harvesting involves the use of captured rainwater, usually from a roof catchment, which otherwise would have either soaked into the ground, evaporated or entered the drainage system. Greywater is defined as water from the bath, shower or hand basin. Greywater harvesting systems are more expensive than rainwater systems due to its more technical nature.

Properly installed, they are a major saving but it is essential to use an experienced specifically qualified professional to do the installation. Tales of malfunctioning systems are generally as a result of poor installation. It is also important that the system is based on water demands and not necessarily on maximising the collection of water unless there is sufficient storage capacity, in which case any surplus water is used for landscaping and gardening purposes.

These systems can provide over 50% of the water usually supplied by mains water. Once captured, the rainwater can be drawn on for a variety of uses from irrigating crops or gardens, for use as toilet flush water or even for water features. A water butt collecting rainfall from a downpipe for garden irrigation purposes is a basic system of rainwater harvesting.

Rainwater harvesting systems can also work in conjunction with SUDS (Sustainable Drainage Systems) to capture the rainwater which infiltrates through permeable paving surfaces. An oil trap needs to be added to the system to remove any oils (eg from cars) from entering the network.

In the UK there are corporation tax incentives available to help with the cost of rainwater system investments.

General information: <http://www.yougen.co.uk/renewable-energy/Rain+Harvesting/> and Rainwater Harvesting Association: <http://www.ukrha.org/home>

Cost benefit analysis tool for Rainwater Harvesting: <http://www.sudsolutions.co.uk/freeware.htm>

Freewater UK [www.freewateruk.co.uk] has a long track record of working in this field. By using high quality products and pre-assembling as much of the equipment as feasible, they have resolved the installation issues that plague so many systems, so the system can be viewed as close to “fit and forget” technology as possible. They have undertaken a range of projects for schools.

Boreholes

Irrigation is an expensive activity. You may want to consider investing in a bore hole for your water needs, for the grounds and for the non-drinking water needs. The first port of call is the British Geological Survey (BGS) (<http://www.bgs.ac.uk/>) who, for a reasonable fee, will compile a report confirming whether there is water on site for a borehole to access. They will also confirm the level of purity of the water. Once a supplier has been selected, it is a relatively fast process to bore the hole and the equipment should be up and running within a week or two. Once running, the water is pumped into a storage tank at a gradual rate, to accumulate and await use. It travels via sand filter and UV filters as necessary to ensure the correct level of purity; the degree of filtration required will be highlighted by the BGS report. The more filtering required, the greater the installation cost. The

pump that brings the water to the surface requires little power; the energy cost is in the subsequent pumping around the irrigation system. Attaching a hydrobar slow start valve can save 60% of the energy required. You are allowed to extract up to 20 000 litre of water a day from an aquifer without requiring a licence. This amount will adequately provide the necessary irrigation for two good quality sports pitches. There is something to be said for establishing this use now as additional restrictions are likely in the near future.

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Questions to ask

- Are the plumbers certified professionals according to the Chartered Institute of Plumbing and Heating Engineering?
- How much water is used to flush each lavatory?
- Which waterless urinals are being considered?
- How are the taps operated and do they have aerator valves?
- Which hand drying options are being considered?
- What are the options, costs and returns for greywater and rainwater harvesting systems?
- How large a rainwater catchment area can we utilise?
- How can you ensure that the potential of the rainwater and greywater catchment and management systems are maximised?
- Is a bore hole a feasible option for this school, given its location?