

Water Regulations Tutorial # 6 Conservation

Updated October 2022

The Water Regulations have many water “saving” requirements. Global warming is expected to produce climate changes, including reduced rainfall. An enormous quantity of energy is consumed in treating and pumping fresh water, which consumes fossil fuel, further adding to the greenhouse problem.

There are three ways in which water is illegally consumed -

- Waste
- Misuse
- Undue consumption

An extract from regulation 3 states –

“No water fitting shall be installed, connected, arranged or used in such a manner that it causes or is likely to cause-

(i) waste, misuse, undue consumption or contamination of water supplied by a water undertaker”

In addition to the legal issues, there is also a strong financial incentive for minimising the quantity of water consumed. Remember, sewerage charges are generally based on the water meter reading – so there is a benefit here too.

Regulation 3 continues to include the same offences through lack of maintenance (extract) -

*“No water fitting shall be installed, connected, arranged or used **which by reason of being damaged, worn or otherwise faulty, causes or is likely to cause -***

(i) waste, misuse, undue consumption or contamination of water supplied by a water undertaker”

Consulting engineers should note the “**likely to cause**” wording because this encompasses the design.

CONTAMINATION

Backflow prevention is covered in other tutorials.

ANALOGY

A useful analogy for understanding the remaining three aforementioned offences is a washing machine. If a hose is leaking, this is “**waste**” and is an offence. If the mains water is used to rotate the drum and the water is not subsequently used correctly, this is described as “**misuse**”. If the machine consumes more water than permitted, this is known as “**undue consumption**”.

The following are examples for offences under regulation 3 and are applicable to building services. The precise categorising may be open to interpretation but it matters not - each is an offence.



*Automatic Waterstop Valve
(model AWS20FM)
For protecting domestic
appliances from causing
major leaks due to a
ruptured hose.*

WASTE

Typical examples of waste in building services include –

- Hose union tap vandalised and/or left on - see tutorial 2
- Failed taps and other fittings
- Omission of self closing taps or waste plugs for wash basins
- Fractured pipes and fittings due to freezing
- Fractured pipes and fittings due to excessive pressure, e.g. water hammer
- Inadequate expansion capacity for heating or hot water circuits – see tutorial 3
- Leakage due to corrosion
- Leakage due to failed joints



MISUSE

Typical examples of misuse in building services include –

- Water used for cooling purposes (running to waste, rather than re-circulate)

UNDUE CONSUMPTION

Some examples listed below may be considered as waste.

Typical examples in building services include –

- Excessive flow from hand washbasins
- Excessive “dead-legs” for hot water taps
- Excessive quantity used for urinal or WC flushing – to be covered in tutorial 7

DESIGNER'S INFLUENCE

It is clear that the designer (consulting engineer) has an influence over much of the above. The designer will invariably be responsible for specifying fittings that must be fit for purpose. Regulation 4 requires only approved fittings to be used. At present, this means using a WRAS or Kiwa UK Reg4 or NSF Reg4 approved fitting - these are listed in the WRAS Water Fittings & Materials Directory and the “Water Regulations Approved Products” sections of the Kiwa UK and NSF websites. The use of an approved fitting does not ensure suitability. For example, a tap designed for low pressure (gravity) would be unsuitable for high pressure (mains or boosted) systems and would lead to excessive flow.

Copper is the most widely used material for commercial plumbing. Copper compression joints can blow apart, particularly on larger sizes, when incorrectly tightened. This is “waste” and the resulting damage can be enormous. Solder capillary, PressFit and push fit technologies are an alternative. A range of flat-faced valves and pipe connectors are available from Arrow Valves.

DEAD-LEGS

Having to draw off several litres of water from a “hot” tap before it becomes hot, is wasteful and this can be minimised by –

- Insulating pipes – see table G18.7
- Hot water return circuit
- Trace heating
- “Point of use” local heaters
- Situating hot water storage vessels as close as possible to hot water outlet taps

FLOW RATE

Water fittings consumption characteristics can be put into one of two categories -

- Consumption dependant on flow rate
- Consumption independent of flow rate (fixed volume)

Filling a washing machine at 0.2 l/s consumes no more water than filling at 0.1 l/s. However, a hand basin, with no plug, will consume more water under the same circumstances when opened for the same period. One method of reducing the flow is achieved by reducing the pressure with a Pressure Reducing Valve (PRV). A second method involves limiting the flow by restriction.

PRESSURE REDUCING VALVES (PRV)

PRVs aim to provide a constant downstream pressure irrespective of the upstream pressure and flow demand. A gauge should be provided on the downstream, which enables the valve to be set and indicates if the valve has failed. Isolating valves should be provided either side of the PRV, to facilitate maintenance – especially for cleaning the integral strainer or replacing the gauge (otherwise water would be wasted through excessive draining). Arrow Valves offer 4 models of PRV - all available with servicing valves and gauge. These range from 0.5 bar outlet pressure with up to 25 bar inlet pressure.



Pressure Reducing Valve with solder unions & servicing valves. (model PRV536) 15 mm – 42 mm



Automatic Flow Limiting (AFL) Valve. Servicing Valve with flow limiting cartridge. Arrow Valves AFLs have a lever and colour coded-coded identity disc indicating the flow rate of the cartridge inside



*There are 8 colour-coded AFL cartridges that are fit into valve in-situ. Cartridge fits into centre of ball via side port – **no need to isolate or drain supply**. Pliers can be used to remove cartridge. A cartridge can be fitted or changed in less than a minute*

FLOW LIMITING VALVES

A fixed orifice can reduce flow but it would need to be sized according to the supply pressure and flow rate required. The hole is so small, it often blocks.

A far better solution is to use a **variable** orifice type, such as an Automatic Flow Limiting Valve (AFL), which limits the maximum flow rate, **irrespective** of the supply pressure. AFL cartridges limit the flow by automatically varying the size of the orifice of the cartridge. As the flow approaches the specified rate, the orifice contracts – like a camera lens. The regular flexing of the cartridge material avoids build-up of scale and allows small particles to pass through. The properties have been tested over 20 years and are stable up to 60° C. The cartridge is fitted through a side port after installation and can be changed at any time **without disconnecting the pipes or draining the system**.

Many consultants use the AFL as standard for all servicing valves. The cartridge can be omitted and fitted at a later stage if required. The AFL product pages on the Arrow Valves website contain a useful specification clause, including a table indicating the recommended cartridge to be used for each terminal fitting – extracted from the Water Regulations and BS6700. AFL Valves save water and often recoup the capital cost in just **a few weeks**.

TAP RELIABILITY

Taps (faucets) with ceramic seats (obturators) are generally more reliable than traditional screw down rubber washer taps and therefore less likely to cause waste. Many of these fittings are designed for mainland Europe, which often has higher pressures. The designer should -

- Check flow rate performance when used on low pressure (gravity) systems
- Consider water hammer when supplying with high pressure -

causing high flow

- Stiction (initial high force to move) on high static pressures

Water hammer can be reduced or eliminated by limiting the flow with an AFL Servicing Valve. The automatic flow limiting cartridge will limit the maximum flow irrespective of the supply pressure up to 10 bar. This should overcome water hammer problems but it will not reduce the static pressure (pressure at no flow) and stiction problems with ceramic taps remain. Many consultants use a larger PRV to serve 1 – 4 floors and AFL Valves at points of use. This addresses both issues.

WASHROOM

The subject of WC's Urinals and hand washbasins will be covered in tutorial 7. There are many conservation requirements and guidance clauses.

OUTLETS FROM CISTERNS

Cisterns should have a servicing valve on all distributing pipes from that cistern (G16.6). This facilitates maintenance of downstream fittings without draining (wasting) the water in the cistern.

WATER CONSUMPTION LIMITS – WASHING MACHINES AND DISHWASHERS

Clothes and dish washing machines installed after 1 July 1999, must comply with schedule 2, paragraph 29 which states the maximum consumption per Kilogram of washload / place setting.

“29. - (1) Subject to paragraph (2), clothes washing machines, clothes washer-driers and dishwashers shall be economical in the use of water.

(2) The requirements of this paragraph shall be deemed to be satisfied in the case of machines having a water consumption per cycle of not greater than the following-

(a) for domestic horizontal axis washing machines, 27 litres per kilogram of washload for a standard 60°C cotton cycle;

(b) for domestic washer-driers, 48 litres per kilogram of washload for a standard 60°C cotton cycle;

(c) for domestic dishwashers, 4.5 litres per place setting.”

DRAIN TAPS

Clause G11.4 calls for sufficient draining taps. This combined with servicing valves on branches etc, will reduce the quantity of water wasted during draining for maintenance.

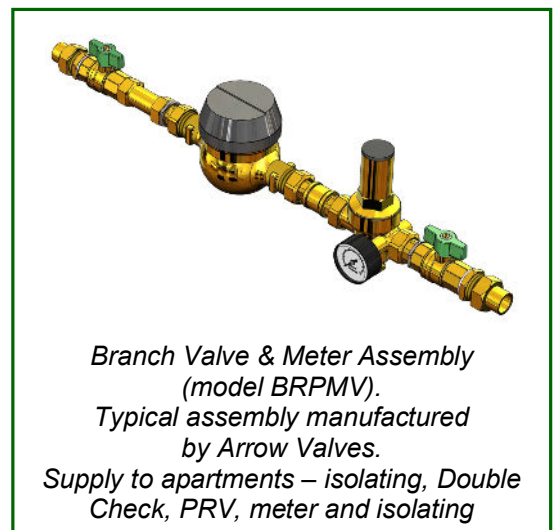
SERVICING VALVES

Servicing valves should be fitted to all appliances so they can be isolated if faulty – G11.1 & paragraph 16(2). Fitting a servicing valve, such as the AFL, to **each** fitting (e.g. a tap) enables any person to isolate the leak immediately. If a servicing valve is provided for a group (zone) of fittings it may be impractical to isolate the lot and therefore the waste continues for some time. Poor quality servicing valves should be avoided because they tend to seize and malfunction. Acceptable isolating valves will be covered in greater detail in tutorial 9.

WATER METERS

Water meters can be used to indicate leakage in a system. The water supply company will advise its requirements for whole site metering. The landlord may require secondary metering. A substantial increase in a periodic reading would flag up a leakage problem and the meter could then be used to prove a leak by isolating the downstream appliances. Where the meter is to be used for fiscal purposes (e.g. to charge an apartment tenant), class C meters should be used.

These are volumetric and have higher headloss. All water meters should have servicing valves to facilitate maintenance. Meters are available with BMS pulsed output.



Water Regulations Tutorial #6 – Conservation – Arrow Valves

REQUIREMENTS FOR PLUGS / SELF CLOSING TAPS

In the interests of conservation and preventing undue consumption, it is important that water is not allowed to run to waste during the use of an appliance. G28.1 lists the appliances that this requirement does not apply to -

“Except for the following appliances listed below, all baths, wash basins, sinks and similar appliances should be provided with a watertight and readily accessible plug or some other device capable of closing the water outlet:

(a) an appliance where the only taps provided are spray taps;

(b) a washing trough or wash basin whose waste outlet is incapable of accepting a plug and to which water is delivered at a rate not exceeding 0.06 litres per second exclusively from a fitting designed or adapted for that purpose;

(c) a wash basin or washing trough fitted with self-closing taps;

(d) a shower bath or shower tray;

(e) a drinking water fountain or similar facility; or

(f) an appliance which is used in medical, dental or veterinary premises and is designed or adapted for use with an unplugged outlet.”

HOSES

Hose pipes for house gardens and other applications should have a hand held nozzle and trigger arrangement to reduce the risk of backsiphonage into the supply pipe and conserve water.

G15.7 states –

“hand held hoses should be fitted with a self-closing mechanism at the outlet of the hose”

SWIMMING POOLS

Swimming pools supplied with water from the mains should be covered when not in use in order to avoid evaporation. Pools should be checked from time to time to ensure that they remain watertight.

G31.1 states –

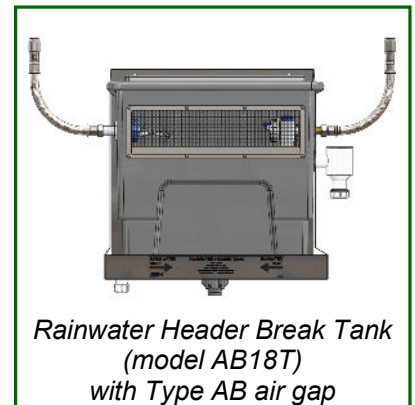
“Any pond, fountain or pool filled or supplied with water by the Water Undertaker should have an impervious lining and be watertight.”

RAIN (GREY) WATER

There is no requirement at present to use rainwater or reclaimed water. Rain and grey water is Fluid Category 5. Schedule 2, paragraph 14 lists the backflow prevention and colour coding of pipeline requirements.

SUMMARY

1. Reduce excessive pressures
2. Limit flow rates at points of use
3. Design the system with water conserving fittings
4. Prevent unauthorised use of hose union taps
5. Minimise dead legs
6. Provide point of use servicing valves, frequent zone servicing valves and drain taps.



*Rainwater Header Break Tank
(model AB18T)
with Type AB air gap*

Thank you for your interest