THE WATER MANAGEMENT SOCIETY

TOOLBOX TALKS

What are Water Fluid Categories?

Fluid Category

Means a category of fluid described in Schedule 1 of the Water Supply (Water Fittings) Regulations and/or Scottish Water Byelaws. Contamination can occur when there is a change in water quality irrespective of whether it is harmful to health. To help define contamination the Water Regulations identify five categories of risk. They are called Fluid Categories.

Also see Toolbox Talk "What are Water Regulations"

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Fluid Category 1 (CAT1)

Wholesome water supplied by the undertaker and complying with the requirements made under section 67 of the Water industry Act 1991 in England and Wales, or the public drinking water quality regulations in Scotland and Northern Ireland.

Fluid Category 2 (CAT2)

Water in fluid category 1 whose aesthetic (look and taste) quality is impaired owing to – a change in its temperature, or the presence of substances or organisms causing a change in its taste, odour or appearance, including water in hot water distribution systems.

Fluid Category 3 (CAT3)

Fluid which represents a slight health hazard because of the concentration of substances of low toxicity, including any fluid which contains – ethylene glycol, copper sulphate solution or similar chemical additives, or sodium hypochlorite.

Fluid category 4 (CAT4)

Fluid which represents a significant health hazard because of the concentration of toxic substances, including any fluid which contains – chemical, carcinogenic substances or pesticides (including insecticides and herbicides), or environmental organisms of potential health significance (pathogens).

Fluid Category 5 (CAT5)

Fluid which represents a serious health hazard because of the concentration of pathogenic organisms, radioactive or very toxic substances, including any fluid which contains – faecal material or other human waste: butchery or other animal waste: or pathogens from any other source.

The fluid categories are defined to state the level of potential risk to the water supply. The appropriate backflow prevention device must be fitted which is 'adequate' for the risk, to prevent backflow occurring into the water supply. The Regulators' Specification for backflow defines 'adequate' backflow prevention devices and arrangements for each fluid category.

- **Backflow** in simple terms is water being sucked or pushed in the wrong direction within a plumbing system against the normal direction of flow. This could be caused by either Back Siphonage or Backpressure – *(see Water Regs UK's short video https://www.youtube.com/watch?v=Bi3YxegXLyU&t=97s*.
- **Back siphonage** is backflow caused by reduced upstream pressure or vacuum occurring in the pipework. For back siphonage to occur two things are needed: (1) a change in pressure and (2) a system with inadequate backflow protection. A change in pressure can be caused by the water being turned off, a burst or a water being used in another part of the premises. A common example of back-siphonage is associated with a hose attached to tap, where the hose is submerged in contaminated water with no backflow prevention device fitted.
- **Back Pressure** is where water is pushed back due to a difference of pressures or thermal expansion of water. An example is an unprotected mixer tap where the cold water is supplied under mains pressure and the hot water is from storage cistern.

These can be a health risk to consumers if the wholesome water system allows foul, stagnant, warm or contaminated water as shown in the fluid categories list 2-5 to backflow into it.

All water systems must be designed to prevent backflow at point of use. Taps and float valves in storage & W.C. cisterns, must have the adequate air gap suitable for the risk.

Some hose taps may have built in protection, such as check valves, but this must be checked to see it is suitable for the risk that it will be subjected to in use.

We can use mechanical means to protect supplies up to CAT4 but it should be noted that mechanical devices can fail. Therefore, all CAT5 supplies must have an air gap that is adequate for the risk. Please note that the level of protection against back siphonage and back pressure risks can be different for backflow devices. For example a type DB Pipe interrupter will not protect against back pressure but will be suitable to protect against back siphonage for up to category 4 fluids.

With each of the categories there is guidance on the protection that is required:

- CAT1 does not need any backflow prevention
- CAT2 can be protected by a single check valve
- CAT 3 can be protected by a double check valve
- CAT4 can be protected by an RPZ (Reduced Pressure Zone) valve or an air gap
- CAT5 can only be protected by a suitable air gap due to the potential risk.

Under the Water Fittings Regulations or Scottish Water Byelaws, the

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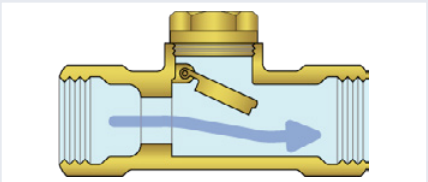
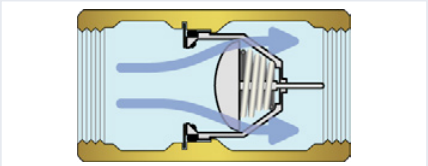
'check valve' is a device legally permitted to be used to prevent backflow in defined circumstances. A non-return valve, while useful for stopping some reverse flow in pipes in many situations, is not a recognised backflow prevention device and will allow some water to backflow. Check valves that are verifiable means that they can be tested in place, usually by various ports either side of the mechanical elements of the device. In some cases cartridges within the valve can be changed via inspection covers on the valve.

- A non-return valve has a flap, ball or plate which moves forward when water flows and closes when water flow stops.

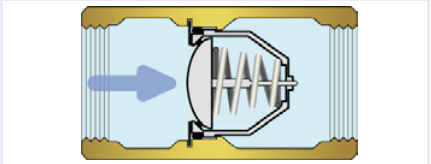


Non-return valve (open flow)

- A check valve is more robust and must close and seal tight when there is no fluid movement. An additional spring or mechanical device pushing back the flap, ball or plate, so it is not reliant on back pressure or backflow to it shut off. These should be tested to demonstrate that backflow cannot occur.



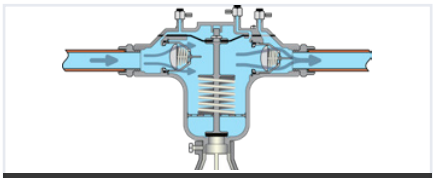
Single check valve 15mm (open flow)



Single check valve 15mm (closed flow)

- A double check valve is a single unit but has two check valves in series.

- An RPZ valve consists of two check valves, one is fitted either side of a relief valve, which discharges water to waste. In the event of a drop in pressure or the water going off, both check valves close and the relief valve opens emptying the water from the centre section of the valve, so causing an air break in the supply. Note these valves are required to have consent from the local water company before they are fitted and must be tested at least annually with the results sent to the water company. (see WaterSafe.org.uk to find RPZ Valve Testers).



RPZ valve cross section (open flow)

- 'An air gap' means a visible, unobstructed and complete physical air break between the lowest level of water discharge and the level of potentially contaminated fluid downstream, within a receptacle (cistern, vessel or appliance).
- An air gap should be not less than 20mm or twice the internal diameter of the supply pipe whatever is the greater.
- Water discharge should be at not more than 15° from the vertical centre line of the water stream

There are various types of air gap defined in the Regulators Specification – *see section 6.3 of Defra Guidance on the water regulations: https://webarchive.nationalarchives.gov.uk/ukgwa/20141204041510/http://archive.defra.gov.uk/environment/quality/water/industry/wsregs99/index.htm*.

EXAMPLES:

Fluid Category 1
Wholesome water supplied directly from a Water Undertaker's main.

Fluid Category 2
Mixing of hot and cold water supplies Hot water service

Domestic softening plant (common salt regeneration only)

Drink vending machines (No ingredients or carbon dioxide)

Fluid Category 3
Water in primary circuits and heating systems in a house

Domestic wash basins, baths and showers, clothes and dishwashing machines

Commercial softening plant (common salt regeneration only)

Drink vending machines (ingredients or carbon dioxide are injected)

Fluid Category 4
Pressurised fire-fighting systems and fire sprinkler systems using anti-freeze solutions

Commercial food preparation and dishwashing machines

Irrigation points/outlets Brewery and distillation plants

Printing and photography equipment Car washing and de-greasing plants

Water treatment plant or softeners using other than salt

Commercial primary circuits and general heating systems

Domestic clothes & washing machines when used in commercial premises

Fluid Category 5
WC pans, urinals, bidets, bedpan washers, healthcare washing machines and dishwashers

Hospital dialysis machines

Vegetable washing Laboratories

Grey water-recycling systems, such as rainwater harvesting

Sewage treatment and sewage cleansing

Water storage for fire-fighting purposes or agricultural purposes

Mortuary and embalming equipment

Medical or dental equipment with submerged inlets

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