Unit 205: Cold water systems

Outcome 3
The components used in domestic cold water

Components

It is a legal requirement for plumbers in the UK to use approved materials, fittings and appliances.

Water Regulations
Back flow
Contamination
Corrosion

These are all important reasons why approved products must be used.

Components

Isolation valves
Screw down stop valve commonly used on the incoming mains. High pressure only. Flow direction.

Service valve (slotted) can be high or low pressure and is required to be fitted before a float operated valve on certain appliances. Flow direction.

Washing machine valves required to be fitted prior to the washing mashing hose.

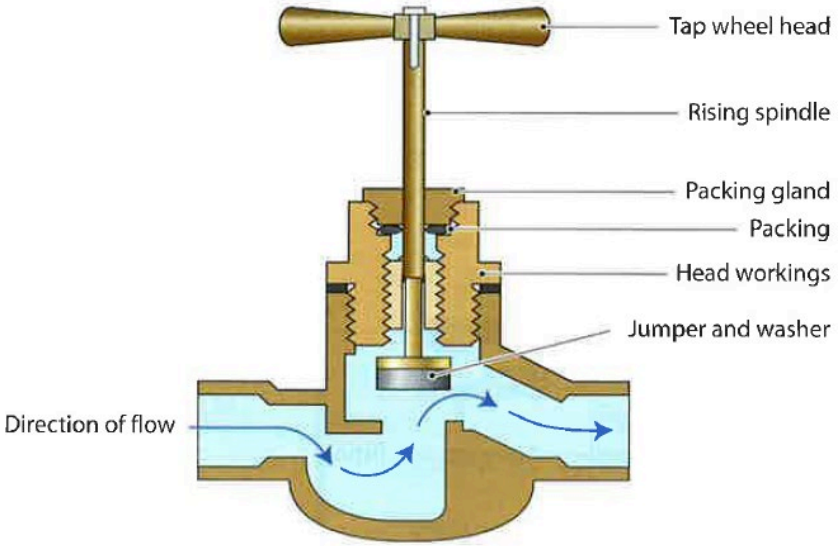
Components

Isolation valves
Lever arm spherical plug valve can be high or low pressure. Flow direction.

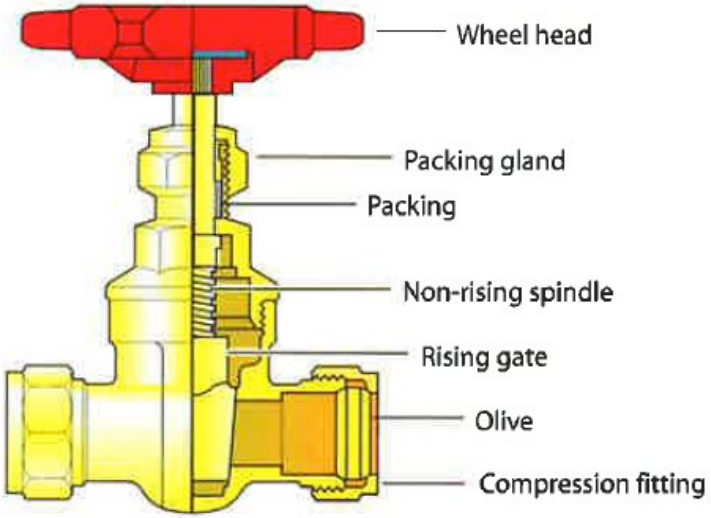
Fullway gate valve can only be used on low pressure systems. Like other valves, they can have a lock shield fitted to avoid tampering.

Components

Screw down for high pressure



Fullway for low pressure



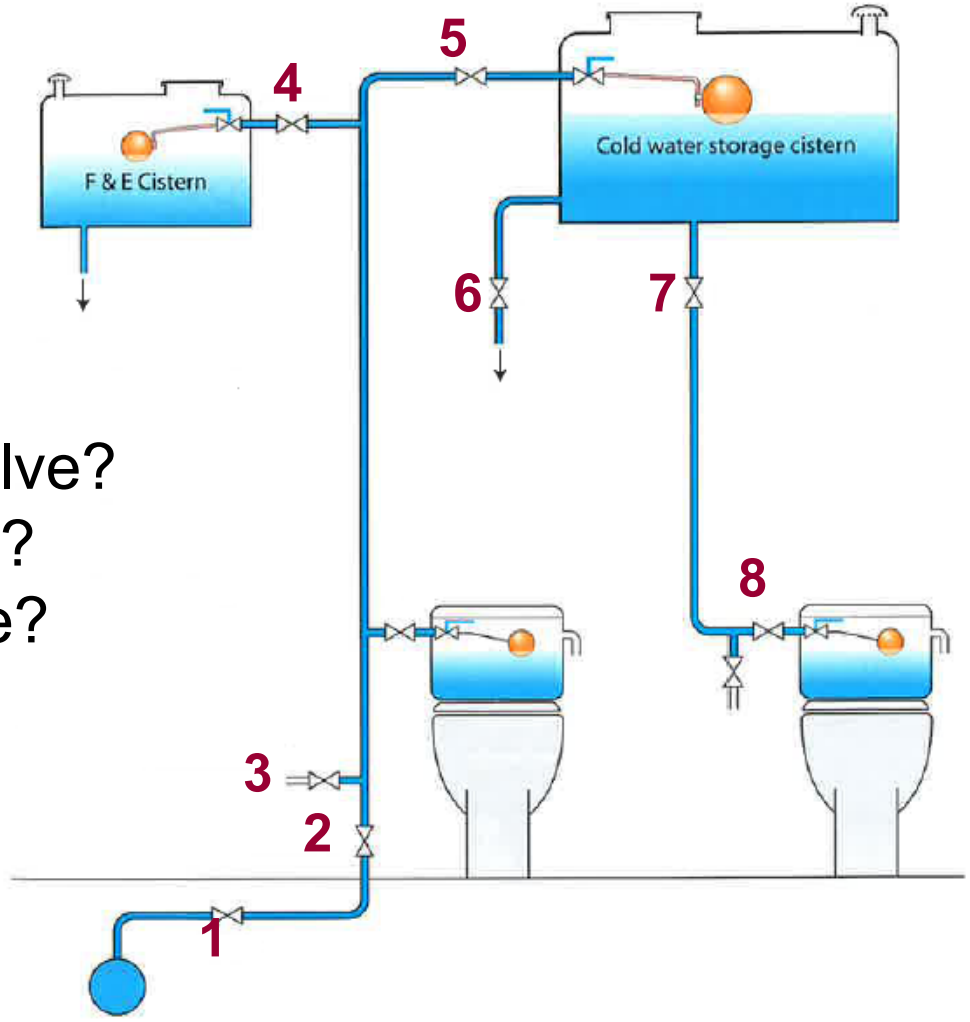
Components

Isolation valves

Surestop is a modern electronic form of mains isolation using a solonoid. This would be used for convenience and would need a screw down stop valve.

Drain off valve is required to be installed at every low point in a system and immediately above the incoming stop valve, to allow the water to be drained out.

Components



Isolation valves

- Screw down stop valve?
- Spherical plug valve?
- Slotted service valve?
- Gate valve?

Components

Taps

Pillar taps:

- Used on baths, basins and bidets
- Baths = ¾” BSP tails with 22mm pipe
- Basins and Bidets = ½” BSP tails with 15mm pipe

Components

Taps

High neck pillar taps:

- Used on kitchen sinks
- Similar look to a standard pillar tap but longer neck to allow a larger air gap
- ½” tail with 15mm pipe

Components

Taps

Bi-flow mixer tap:

- Also called a mono-block
- Two taps in one body
- Single spout that is divided down the middle so water does not mix until it has left the tap
- Not a true mixer tap
- Used on baths, basins and bidets

Components

Taps

Mixer tap:

- True mixer tap allows the hot and cold water to mix inside the body of the tap before it exits
- Care is needed, as these can only be fitted on equal pressure systems
- Used on sinks and baths

Components

Bi-flow mixer tap

Mixer tap

Components

Taps

Bib taps:

- Require a back plate elbow to attach them to a wall
- Fitted above a cleaner's sink or as a hose union tap (outside tap)

Components

Taps

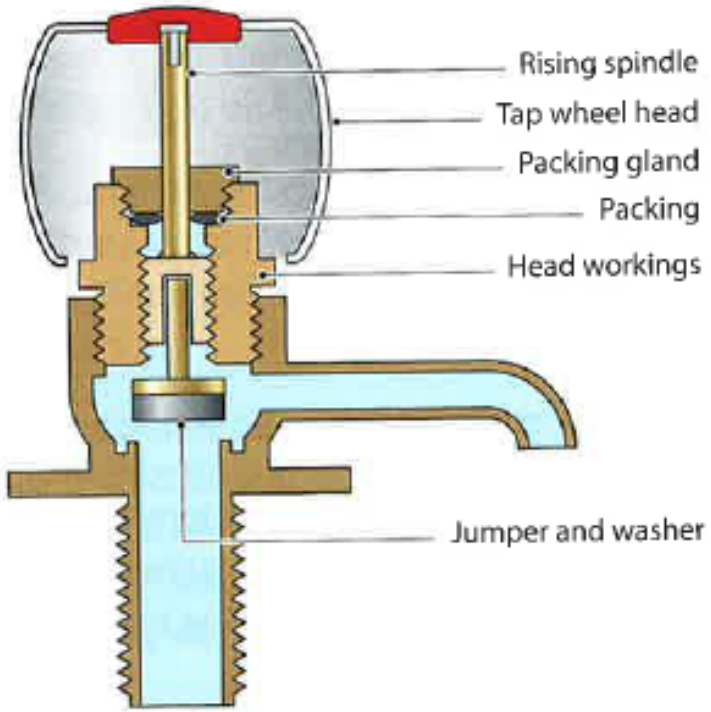
All taps can come in three basic types:

- Rising spindle tap
- Non-rising spindle tap
- Quarter turn tap (Ceramic disc)

Components

Taps

Rising spindle tap:
Tap washer attached to a jumper.
The watertight seal is maintained by the packing gland around the spindle and a fibre washer,
or O ring, at the body of the tap.



The tap is dismantled using an adjustable spanner and grips.

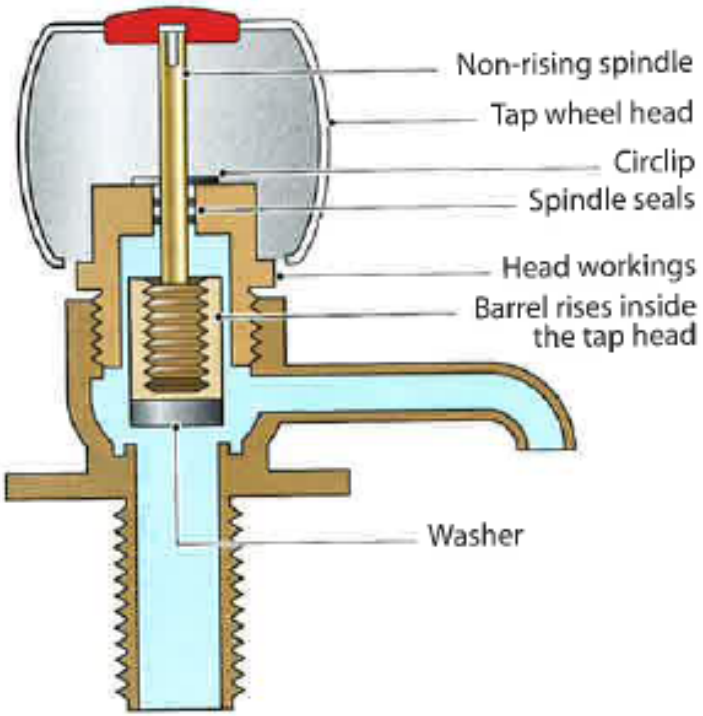
Components

Taps

Non-rising spindle tap:

Tap washer attached to a barrel which lifts and lowers internally when the handle is turned.

The watertight seal on the spindle and body are maintained by O rings.



The tap is dismantled by using a circlip spanner, adjustable spanner and grips.

Components

Taps

Quarter turn tap (ceramic disc):
Rely on two ceramic disc plates turning against each other. The tap handle is turned a quarter of a turn, lining up the holes on the ceramic disc. The watertight seal is maintained by a series of O rings.

The tap is dismantled using a circlip spanner, adjustable spanner and grips (each cartridge is sided). Good style of tap for less abled people.

Components

Cold water storage cistern

The Water Regulations state that a CWSC supplying cold water to appliances, or the hot water system, should be capable of supplying wholesome water. This means certain protection measures must be included so that the water does not become contaminated.

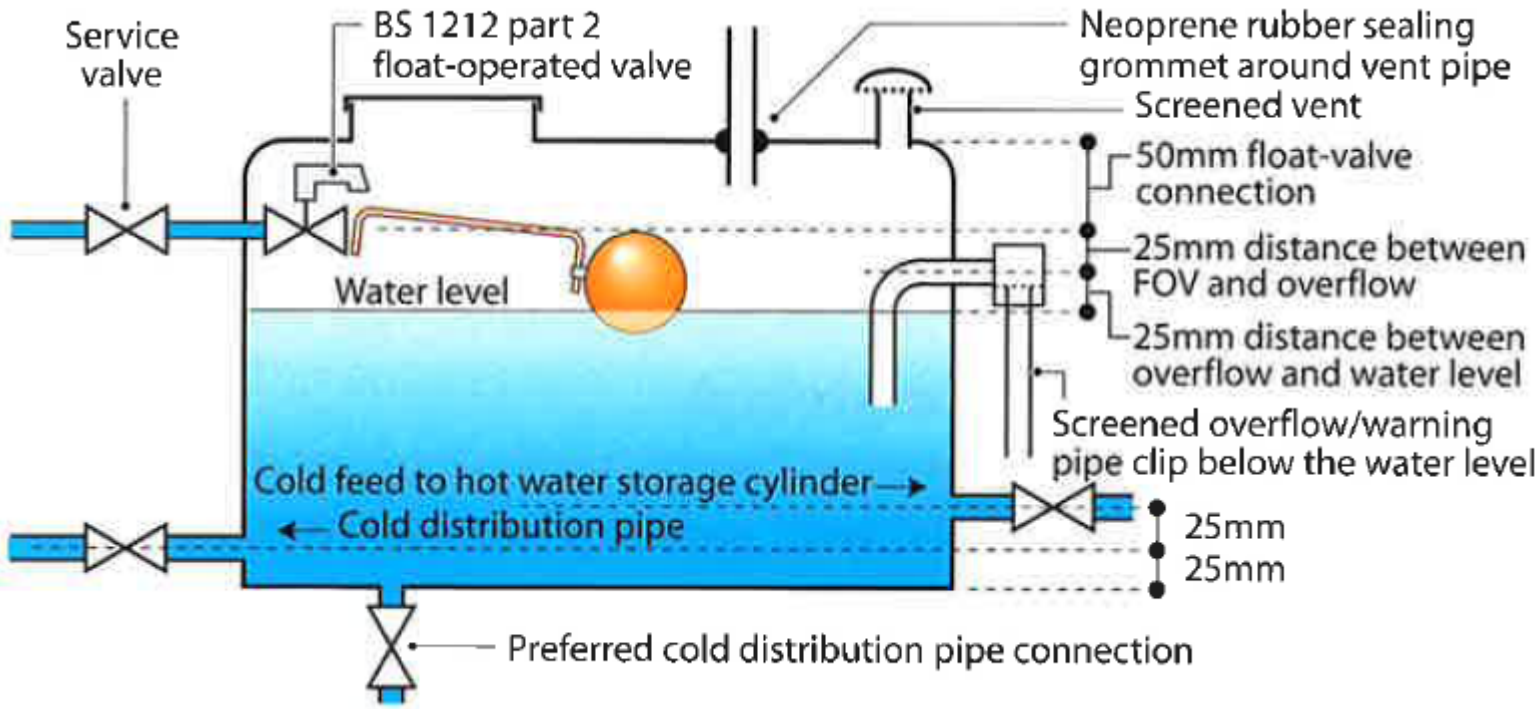
Components

Cold water storage cistern

- Be fitted with effective inlet control to maintain the correct water level
- Be fitted with a service valve on inlet and outlet to allow maintenance
- Be fitted with a screened warning/overflow pipe
- Be covered with a rigid, close-fitting lid (not airtight but excludes light and insects)
- Be insulated against freezing and warming
- Be installed so risk of contamination is minimised
- Be installed to prevent stagnation (water can circulate)
- Be supported over the whole base to avoid distortion
- Be accessible for maintenance and cleaning

Components

Cold water storage cistern



Components

Cold water storage cistern

Cold feed: supplies cold water to the hot water cylinder. Minimum size is 22mm, is low pressure and can be isolated by a fullway gate valve. It is installed 25mm higher than the cold distribution for safety.

Cold distribution: supplies cold water to various outlets. Minimum size is 22mm, is low pressure and can be isolated by a fullway gate valve. It is installed 25mm lower than the cold feed for safety.

Components

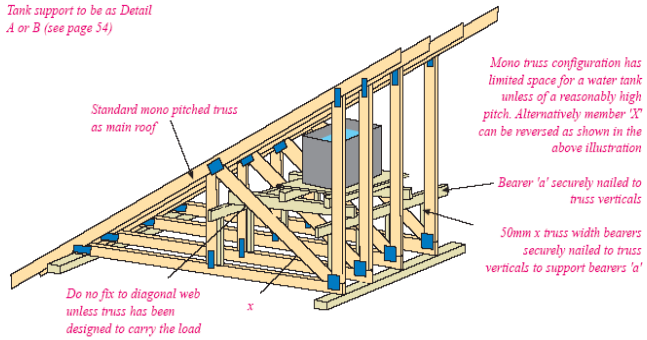
Cold water storage cistern

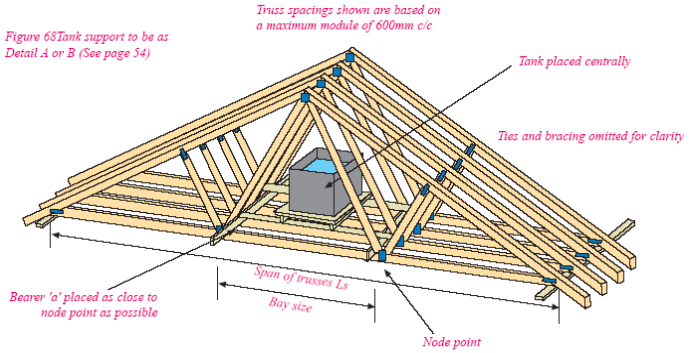
Materials:

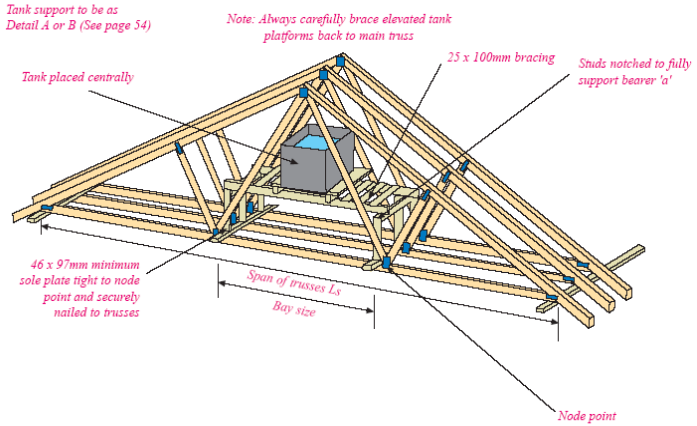
- Plastic
- Fibre glass
- Asbetsos
- Galvanised steel

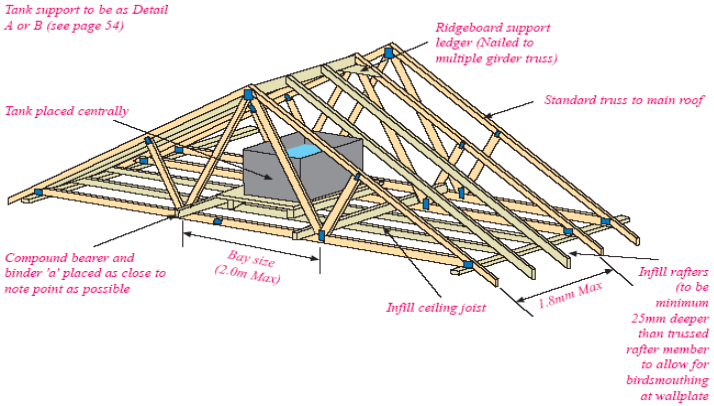
Components

Cold water storage cistern



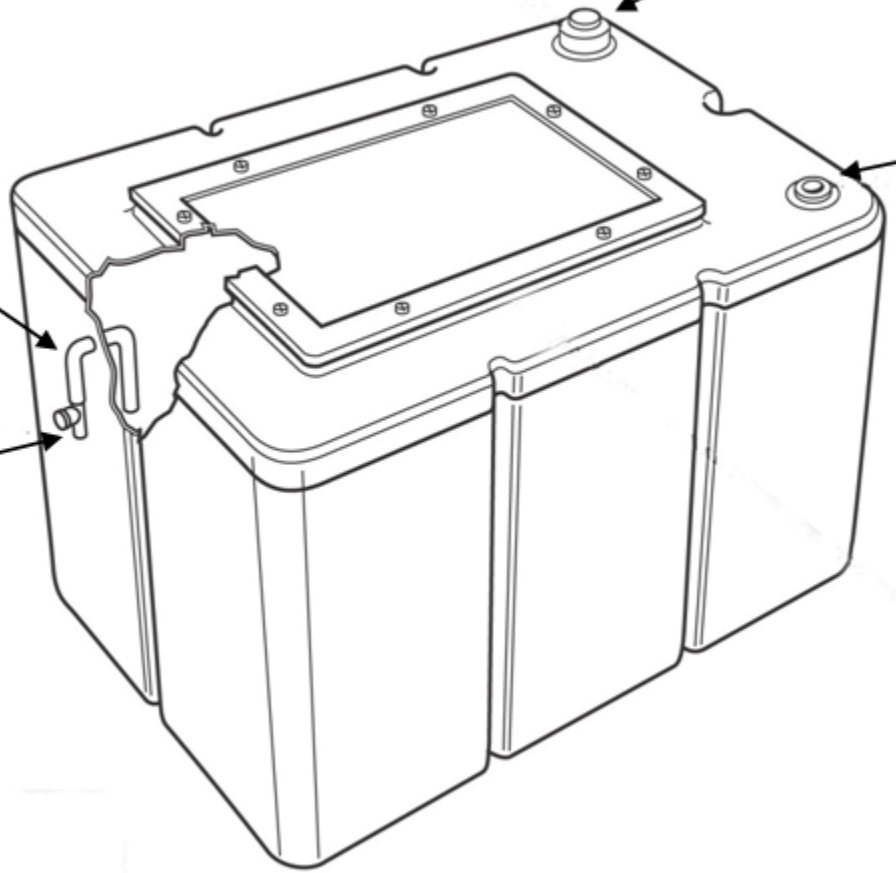


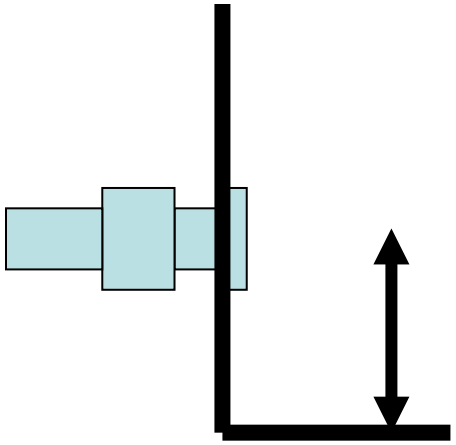




Components

Cold water storage cistern

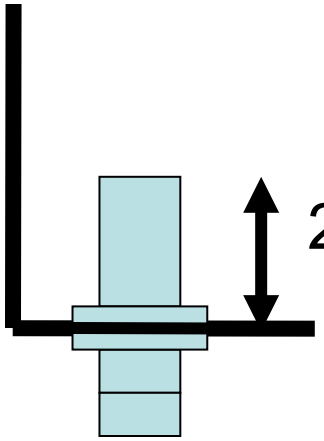




Side outlets

25mm to prevent debris entering pipework

No oil-based compounds on plastic cisterns



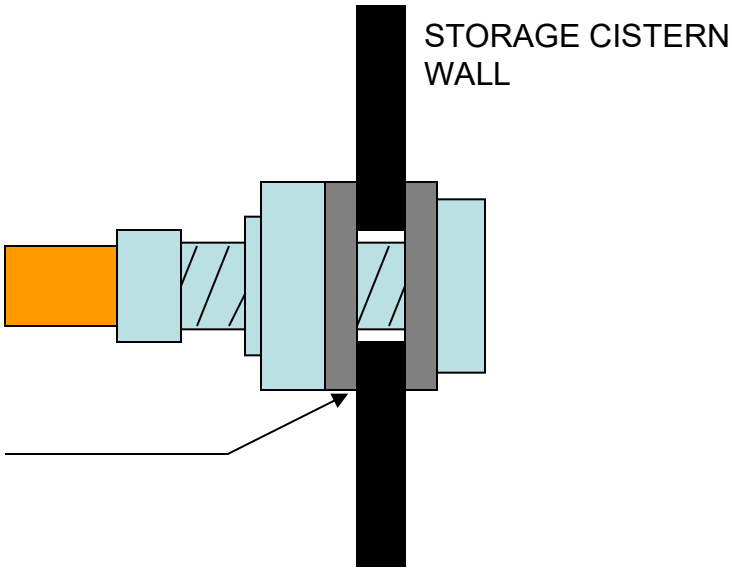
Bottom outlets

25mm to prevent debris entering pipework

Compression tank connector, available in various sizes.

Rubber washer for watertight seal on inside, and neoprene washer for additional seal on outside.

Two neoprene plastic washers can be used to seal the outlet connector to the cistern.



Straight or cranked/bent service valve fitted prior to a float operated valve, as per the Water Regulations 1999.

Fullway gate valve fitted to the cistern cold feed or distribution for pipework isolation.

Components

Cold water storage cistern

Byelaw 30 kit:

- Suitable insulation for the cistern
- Screened warning pipe assembly with dip tube
- Grommet for vent pipe entry
- Screened air inlet or breather
- A tight-fitting lid
- In some cases a float operated valve stiffener
- Insulation for cisterns can vary from fibreglass inside black plastic, to polystyrene slabs. Some old galvanised cisterns have straw boarding or sawdust

Components

Warning pipes

A warning pipe is a smaller diameter overflow pipe. As its name suggests, it acts as a warning to the customer that there is a problem with the cistern.

Cisterns below 1,000 litres capacity only require a warning pipe. This will act as the warning to the customer as well as the overflow to the cistern.

Cisterns over 1,000 litres capacity require separate warning and overflow pipes.

Drilling cisterns

A flexible cistern should be drilled with a hole saw. Heating copper pipe and melting a hole through the cistern should be avoided; this breaks down the polymers of the plastic and it may start to leak at a later stage.

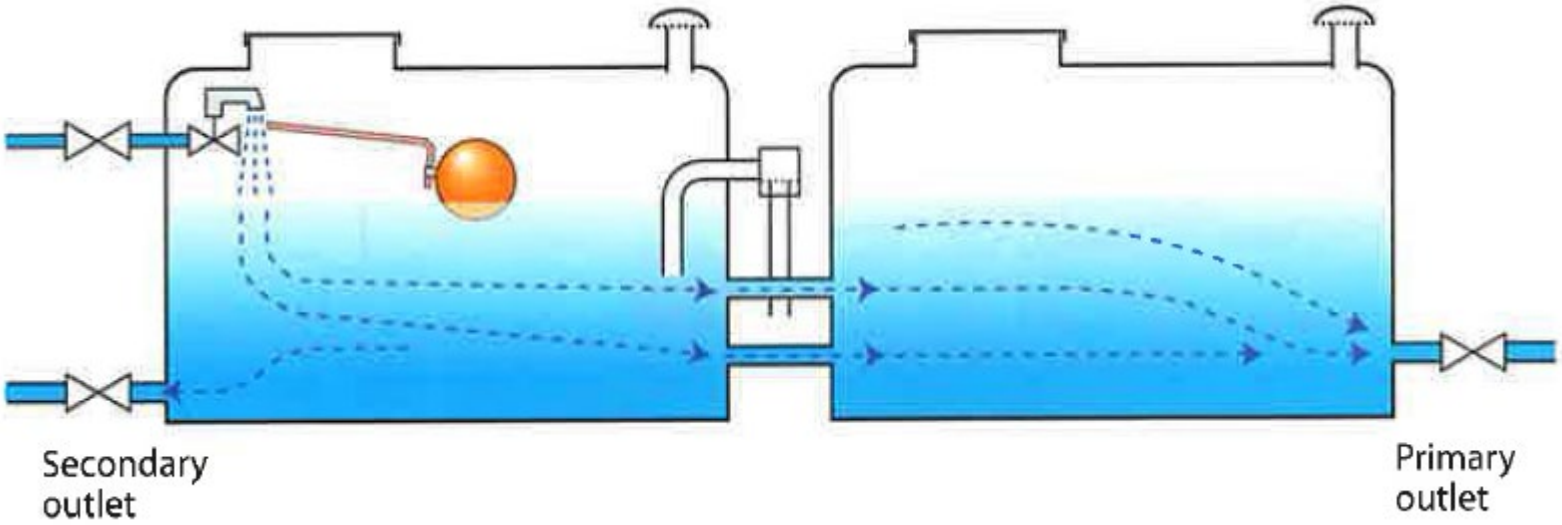
Jointing materials containing oil should also be avoided, as these can affect the plastic also.

Rigid cisterns can be cut with a hole saw, or a hole cutter can be used. Swarf should always be removed.

Components

Cold water storage cisterns

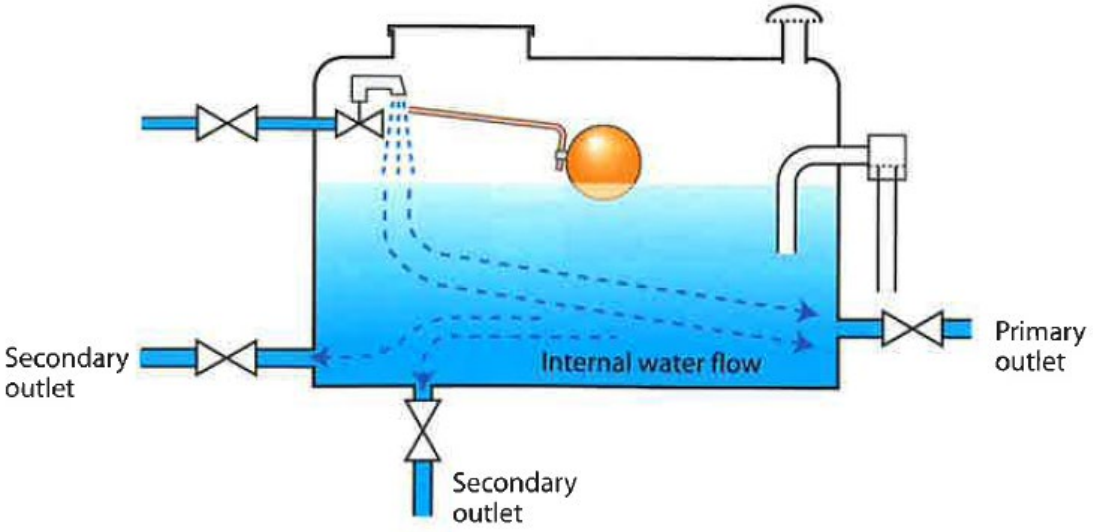
Where two or more cisterns are linked together, BS6700 and the Water Regulations state that the float operated valve and warning pipe should be in the same cistern. Avoidance of stagnation is important: if two or more cisterns are linked, the distribution pipe(s) should come off the second cistern. A connecting pipe will need to be installed.



Components

Cold water storage cisterns

Stagnation can also be a problem in a single cistern, so it is always good practice to install the primary outlet opposite to the float operated valve.



Components

Cold water storage cisterns

An incorrect installation of a cistern.

Components

Cold water storage cisterns

The consequence of an incorrect installation of a cistern.

Components

Cold water storage cisterns

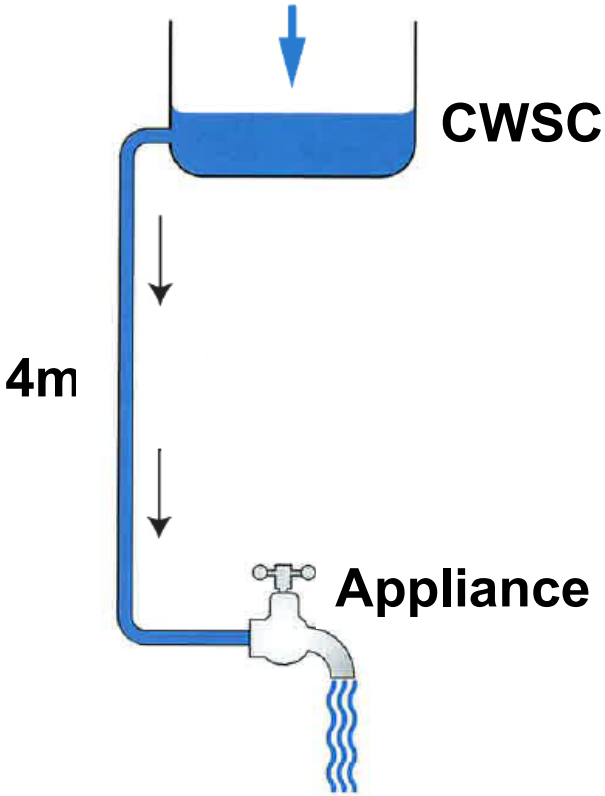
A correct installation of a cistern.

Components

Components

Cold water storage cistern

The pressure is gained by positioning the CWSC as high as possible.



The force produced by a 1kg mass = 9.81N/m^2

A cistern of water 1m x 1m x 1m, holding 1,000 litres if water, would exert: 1,000 x 9.81N/m2

If it was 1m high, it would exert: 9.81kN/m2

If it was 4m high it would exert: 4 x 9.81 = 39.24kN/m2

Components

Float operated valves

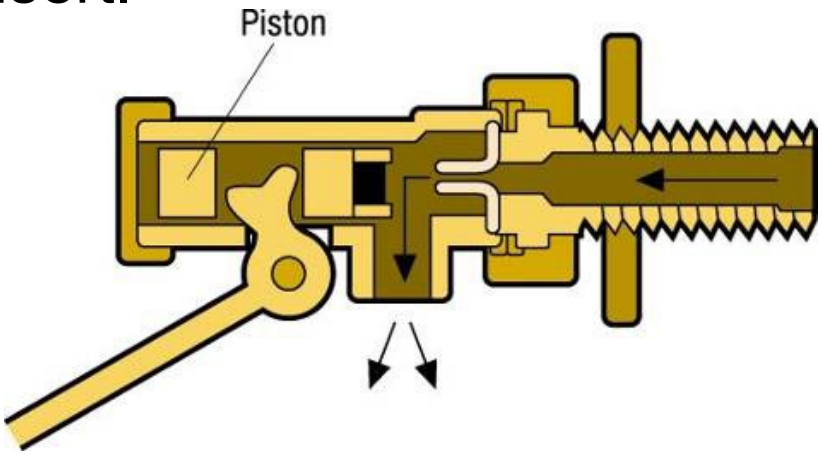
A valve to shut off the supply of water in a cistern at a predetermined level. It works on the principle of a lever: the valve is open when the float in in the lower position. As the cistern fills, so the float becomes buoyant and rises with the water level, slowly closing off the valve.

Float operated valves BS1212			
Part 1	Bottom outlet	Portsmouth	Brass
Part 2	Top outlet	Diaphragm	Brass
Part 3	Top outlet	Diaphragm	Plastic
Part 4	Top outlet	Equilibrium diaphragm	Brass or plastic

Components

Float operated valves (BS 1212 Part 1)
Water discharges from the bottom of this type of float operated valve. The arm has to be bent to adjust the water level and care taken not to break the arm when bending.

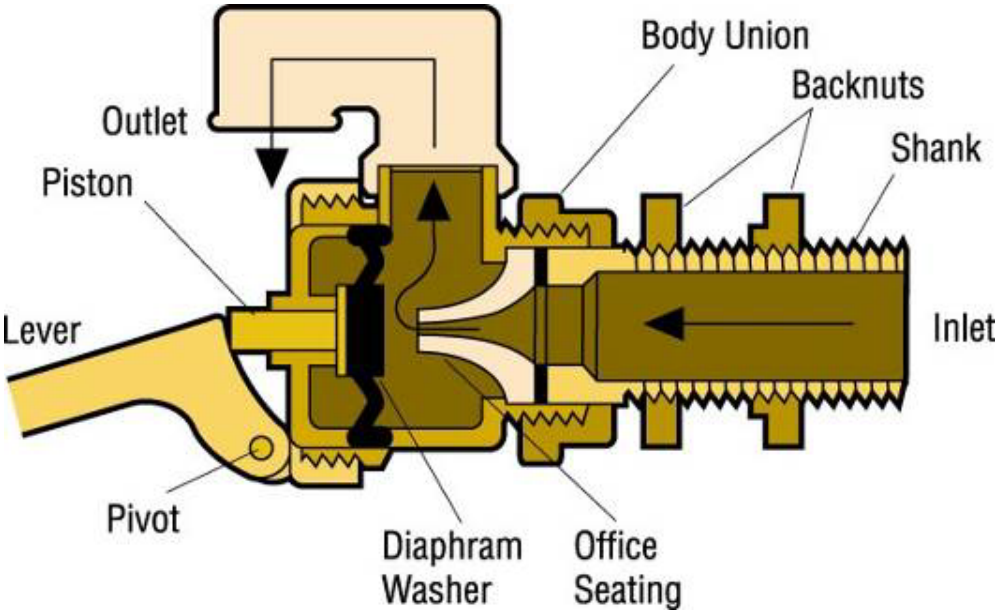
This type of valve is no longer fitted, as the type AG air gap cannot be maintained. Also known as a Portsmouth Valve, it operates via a piston action. The valve seating can be replaced by replacing the plastic insert.
No solid silencers are allowed.



Components

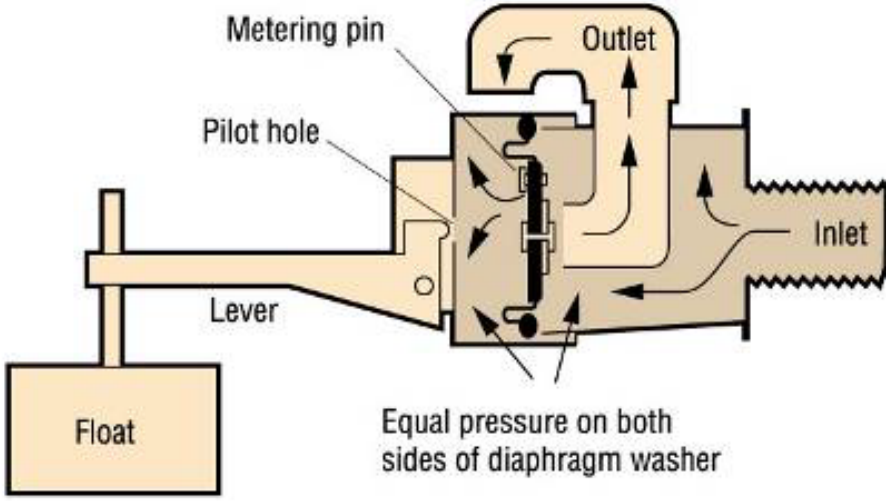
Float operated valves (BS 1212 Parts 2 & 3)
Water discharges form the top of this type of float operated valve. Part 2 is brass and part 3 is plastic.

The water level is adjusted by moving the float up or down the bent arm. Non-rigid silencers are allowed.



Components

Float operated valves (BS 1212 Part 4)
Water discharges from the top of this type of valve. Also a diaphragm operated valve by allowing water pressure to equalise on both sides of the diaphragm, giving less resistance on the lever arm and aiding the valve to shut off slowly, preventing water hammer or murmur. Pressure and flow restrictors can be used.



Video link:
http://www.youtube.com/watch?v=eKoeHtICzvM&feature=related

Components

Float operated valves

Water hammer occurs in a high pressure water pipe.
It is often caused by:

- Loose jumper in a stopcock (if heard when tap turned on)
- Pipes that are not fixed correctly (clipping distance)
- Partial blocked float operated valve (check seating or fit a stiffening plate)

Ball murmur is a type of water hammer, caused by the float operated valve opening and closing quickly. Ripples at the cistern water level cause the float to bounce. Overcome by:

- Installing an equilibrium valve BS1212pt4
- Strengthening the side of the cistern
- Reduce the incoming flow at the service valve

Components

The correct choice and positioning of valves is important for the efficient working of the system.

Ongoing maintenance of these valves ensures that water levels are correct and that the flow of water can be regulated when necessary.