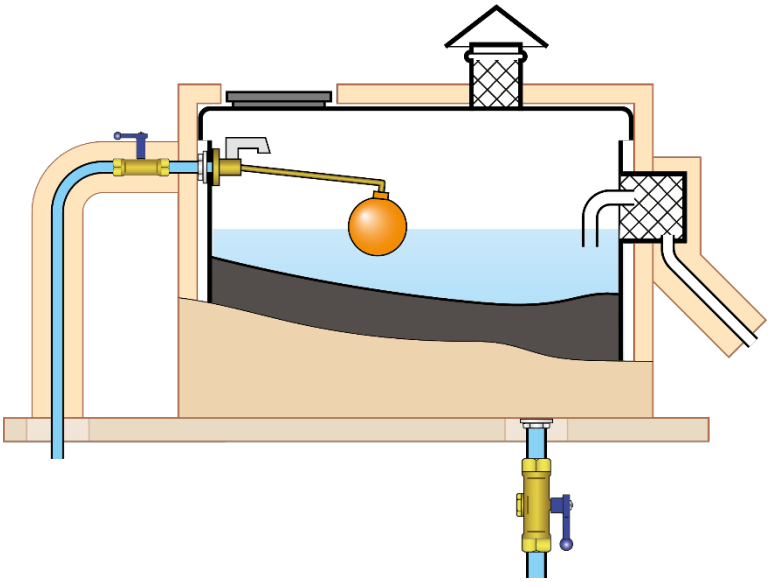

Cold water storage cisterns

The water fittings regulations in England, Wales and Northern Ireland, byelaws in Scotland are legal requirements which apply to all premises which have, or will have, a mains water supply, even it is only a backup supply.

An important item of public health legislation, their purpose is to protect drinking water supplies. Their objective is to prevent contamination, misuse, waste, undue consumption or erroneous measurement of water. They do this by setting legal requirements for the design, installation, operation and maintenance of water fittings, including water-using appliances.

The booklet provides information about the design, installation and maintenance of cisterns storing mains supplied cold water which is intended to be used for drinking, washing or bathing or other purposes requiring wholesome water.

A cold water storage cistern may be installed for various reasons including:

1. To provide backflow protection
2. To provide a reserve supply in the event of any disruption to the incoming cold water supply
3. To reduce the maximum demand on the cold water supply
4. To reduce the supply pressure

Although the water in the cistern is intended to remain wholesome as a condition of consent it is likely the local water supplier will require backflow protection to be installed. This is typically achieved by suitable air gap arrangement; in some circumstances a double check valve may also be required.

In many cases the local water undertaker will need to be given advanced notice of the proposed installation of any cold water cistern. This is an important simple and essential check to minimise the risk to water supplies.

For further information about these requirements please refer to the Water Reg UK website www.waterregsuk.co.uk. or contact the local water undertaker.

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Correctly sizing cisterns storing wholesome cold water

Where the water stored in a cistern has to remain wholesome it is important to minimise the risk of contamination. Key to this is making sure the water is stored for as short a period as possible. This is achieved through a combination of design and maintenance features and correctly sizing the cistern to ensure the regular turnover of the stored water and avoid stagnation as well as any deterioration of water quality.

Factors which should be considered when sizing a cistern include occupancy (intended and actual) and usage. Suggestions for storage capacity are given in BS EN 806-2.

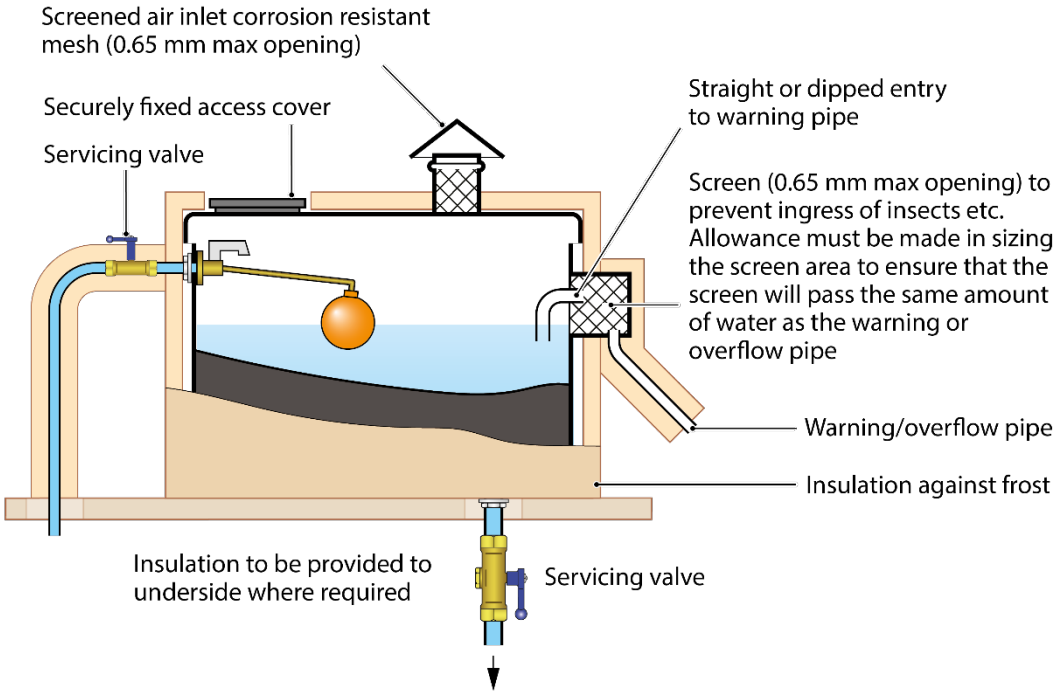
What are the design requirements for cold water storage cisterns?

All components making up and used within a cold water storage cistern must be of an appropriate quality and standard

All non-metallic materials in contact with water, including any surface where condensate forms, must conform with the current version of BS 6920 (or an equivalent).

Cisterns should be watertight and where appropriate lined or coated with suitable impermeable materials.

In addition to an inlet, outlet, overflow pipe and warning arrangement a cistern should have a rigid close fitting and securely fixed lid or cover. Cisterns, and their lids, should be made of materials which do not shatter or fragment when broken.



Specific requirements for cold water storage inlet valves?

An inlet valve must be fitted. This should be securely and rigidly fixed and must shut off the flow at a set level within the cistern. Typically, this level is a minimum of 25 mm below the overflow but should be increased to a minimum of 50 mm if there is no warning pipe. Where a float operated valve is to be used, this must be capable of being adjusted to ensure that the inlet valve closes at a defined level.

Where the inlet forms part of an air gap arrangement intended to prevent backflow, the inlet valve should not come into contact with the contents of the cistern as a result of splashing or foaming. If this occurs the inlet valve should be adjusted to increase the air gap.

Float operated valves are generally, but not always used for controlling the flow of water into a cistern. Electrically or pneumatically operated valves are also an acceptable form of valve for controlling the inlet flow. In all cases the method of installation must be suitable for the specific installation and comply with all aspects of the appropriate water fittings regulations/byelaws.

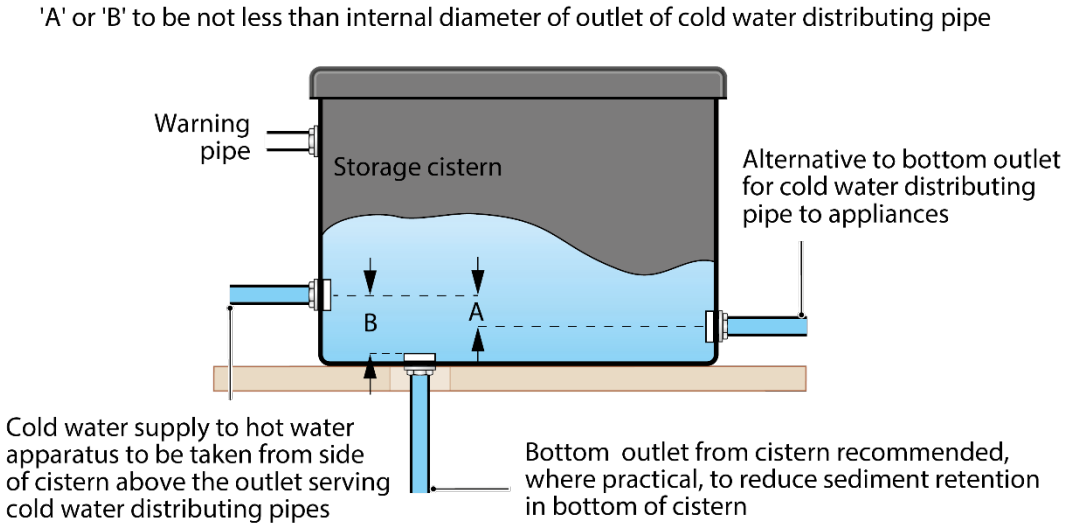
Transient pressure increases or surges (water hammer) may be caused by the rapid closure of valves, resulting in a sudden stop or change of water flow. To keep pressure surges within reasonable limits and prevent damage to water fittings hydro-pneumatic accumulators, surge arrestors or pressure reducing valve can be installed.

In addition to any backflow protection required by the local water undertaker a servicing valve must be installed on the inlet adjacent to the cistern and outlet to facilitate maintenance and minimise waste.

To encourage mixing and prevent areas of stagnation or ‘short circuiting’ within the cistern where practical the cistern inlet and outlet should be on opposite sides of an appropriately sized cistern. Where multiple cisterns are linked; inlets and outlets need to be carefully balanced to promote a good turnover of water in each cistern.

Specific requirements for cold water storage outlet valves?

Where practicable all outlets from a storage cistern should be located at the bottom of the cistern and to encourage mixing and prevent areas of stagnation or ‘short circuiting’ within the cistern on the opposite side to the inlet.



All outlets from cold water storage cisterns, except vent pipes, overflow pipes and warning pipes, should be fitted with a servicing valve as close to the cistern as is reasonably practicable.

Specific requirements for cold water storage overflow and warning arrangements

Every cold water storage cistern must be fitted with an overflow pipe.

To help minimise waste a suitable means of warning of an impending overflow must also be installed. A warning pipe is commonly used for this purpose, but with the local water undertaker’s agreement alternatives may be fitted. Although usually separate a combined overflow/warning pipe may be accepted on cisterns with a capacity of 1,000 litres or less.

Overflow and warning pipes must be positioned so as to exclude light and insects. A screen with a mesh size no greater than 0.65 mm (opening) is typically used to prevent the ingress of insects and other foreign bodies. If an insect screen is installed it should be vertically and removable.

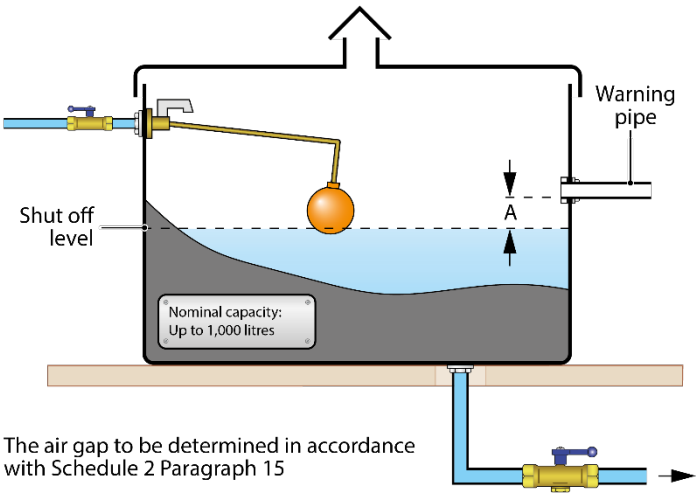
Overflow and warning pipes should be installed on a downward inclined plane and not discharge into any other cistern.

The discharge from the overflow and/or warning pipe should be safe and conspicuous. If discharging to drain a visible air brake, giving fluid category 5 backflow protection in the form of an air break to drain conforming to the design specification given in EN 1717 must be installed.

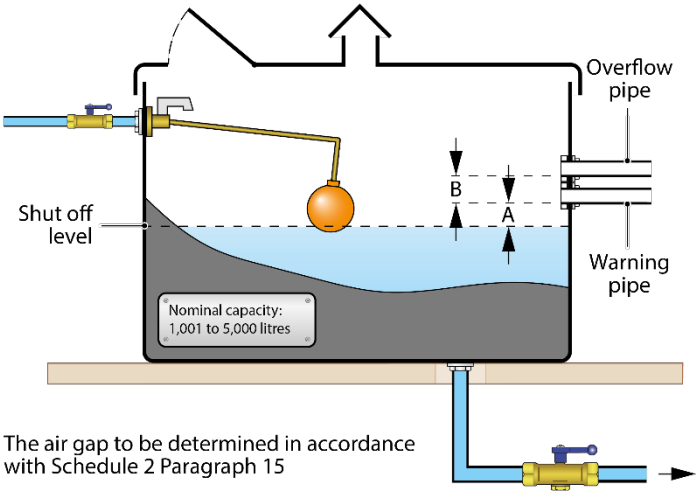
If a common warning pipe is used the location of the cistern overflowing must be readily identifiable.

A warning/overflow pipe should be at least 19 mm (internal diameter) and capable of accommodating all possible flow rates i.e. the maximum inflow under fault conditions. The effect of any screen on the nominal flow capacity must be taken into account when determining the size of an overflow.

'A' is not less than 25 mm

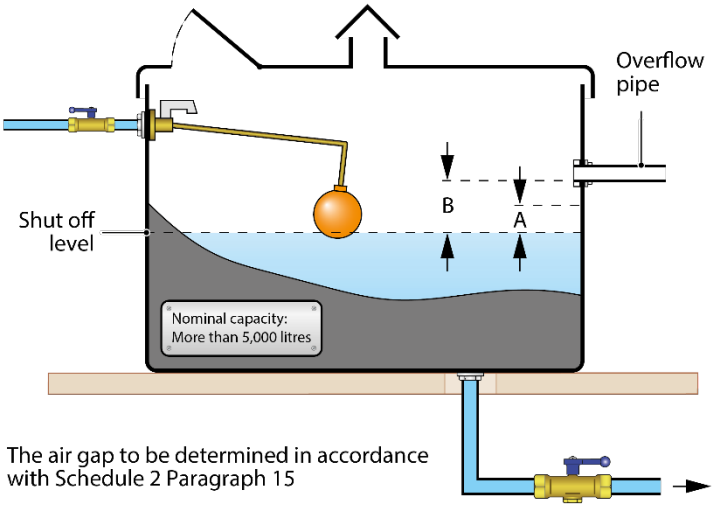


'A' and 'B' are not less than 25 mm



'A' is 25 mm and is the level at which audible or visible alarm is activated

'B' is not less than 50 mm between invert of overflow pipe and shut off level

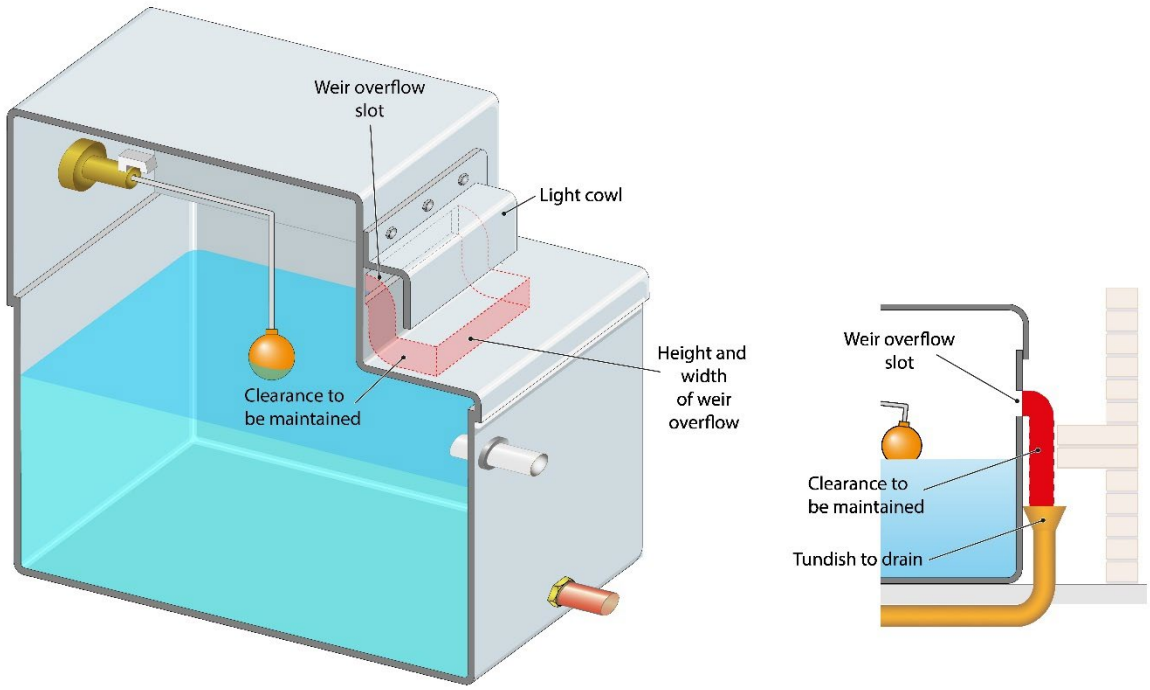


Specific requirements for cold water storage cisterns incorporating a Type AB air gap

A cold water storage cistern can sometime incorporate a Type AB air gap. Where this is the case it is important to minimise any light penetration through the weir overflow. This is because light is known to promote the growth of algae which could lead to not only taste and odour concerns but also provide nutrients which could support the growth of bacteria. The most common way of addressing this issue is to fit a cowl or shroud that covers the weir slot.

To demonstrate the cowl or shroud arrangement does not impede any discharge it should mirror the overflow weir in size and shape to at least below the lowest point of the weir and any surfaces below or to the side of the cistern as shown below. Information can also be found here

Please note: cold water storage cisterns incorporating a Type AB air gap are sometimes being used as backflow protection arrangements for high risk installation downstream and should not be removed or altered without the agreement of the local water undertaker.



Things to take into account when installing a cold water storage cistern

Factors to consider when deciding where and how cold water storage cisterns are installed include but are not limited to:

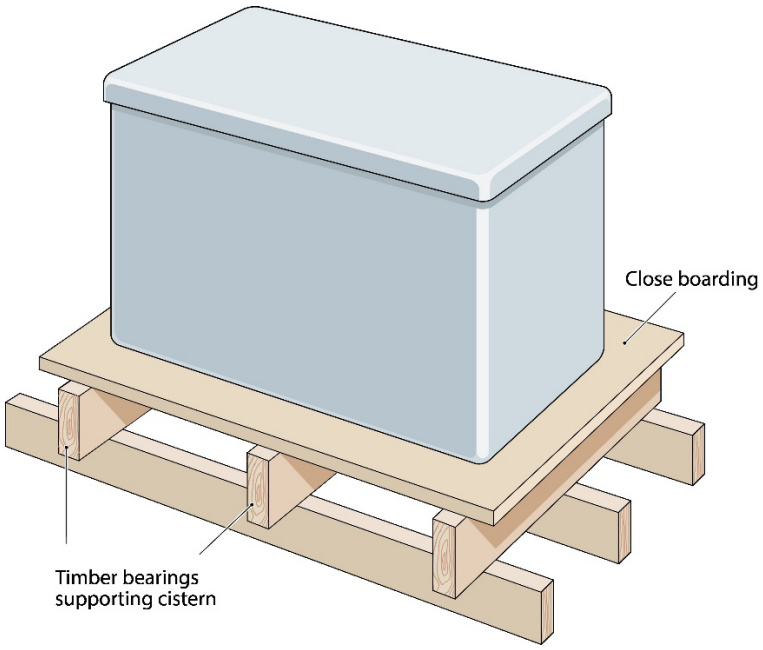
- whether the distributing pipework (system) is pumped or supplied by gravity
- the need to allow for ease of access for maintenance
- inspection (both internally and externally)
- cleaning requirements
- environmental factors which might affect water quality such as excessive heat gain or the likelihood of flooding.

Float operated valves and other controls should be readily accessible. There should be sufficient clearance to allow for inspection, cleaning of internal surfaces and maintenance.

Cisterns with a capacity greater than 1,000 litres should be capable of being inspected and cleansed without having to be wholly uncovered.

To avoid distortion cold water storage cisterns should be adequately supported. Advice on how to do this can be found in Part G of the Building Regulations.

Please note: In many cases the local water undertaker will need to be given advanced notice of the proposed installation of any cold water cistern. This is an important simple and essential check to minimise the risk to water supplies.

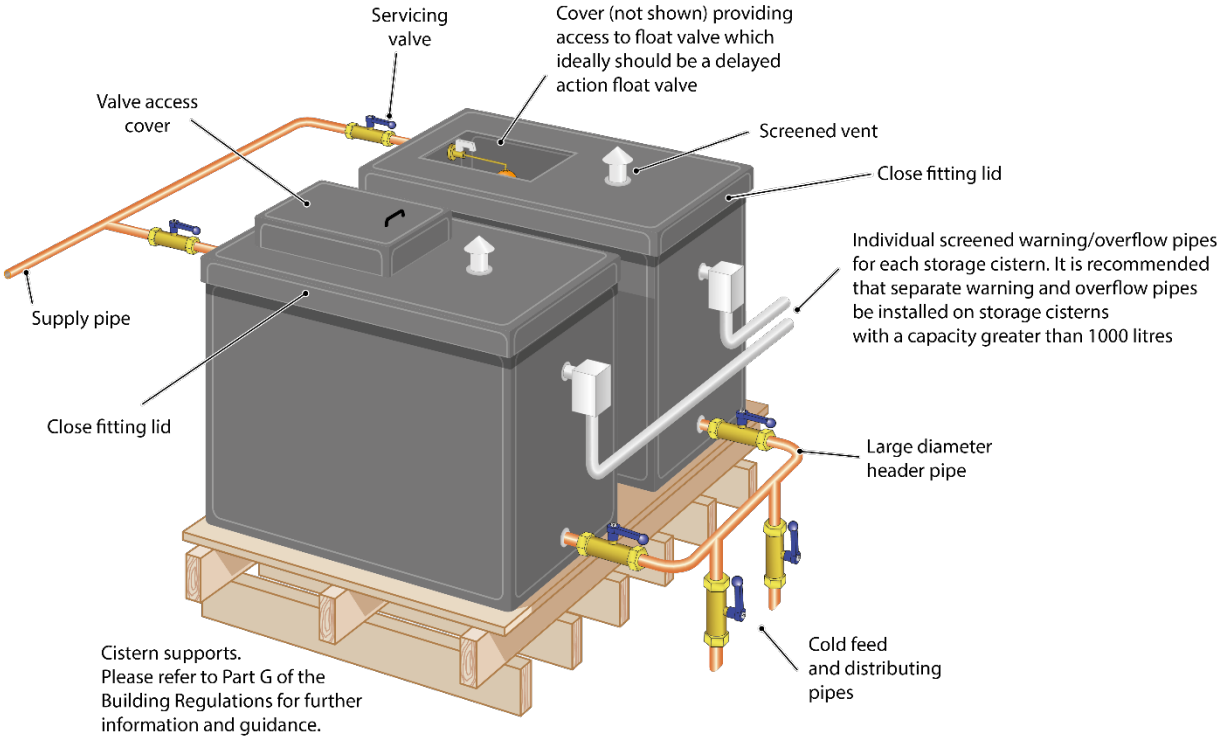


How do you link cold water storage cisterns?

Due to concerns about water stagnation which might cause the quality of the water to deteriorate the installation of inter-linked storage cisterns should be avoided wherever possible. Where it is unavoidable, the number of inter-linked cisterns should be minimised.

To minimise the risk of stagnation

- The storage volume should be kept to a minimum
- Cisterns should be connected in parallel
- Any demand should create water flow throughout each cistern
- Inlet and outlets should be installed at opposite ends of the cistern
- Delayed action float valves should be used.
- Metering of inlets may assist with balancing of turnover.



Protecting a cold water storage cistern from frost damage

To minimise the risk of damage due to freezing all cold water storage cisterns, including any associated pipework which may be at risk, should be protected. The type and level of protection will be dependent on the environment in which the installation is located.

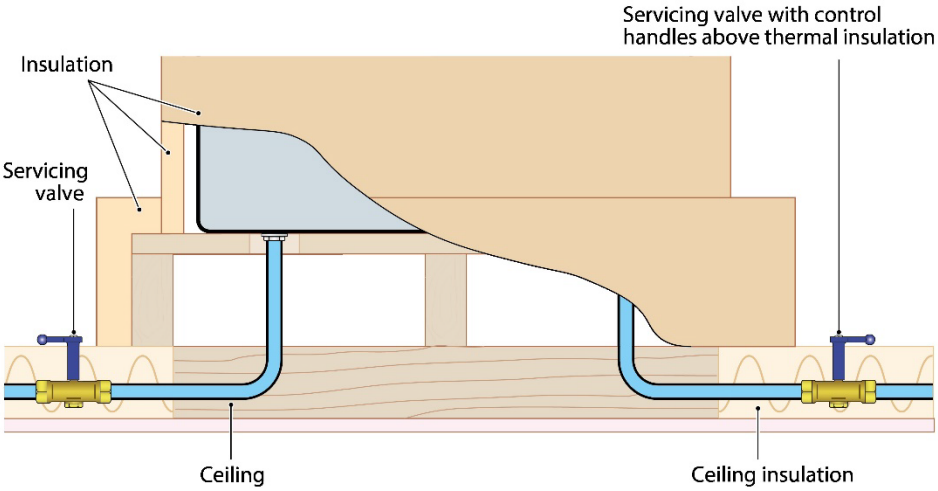
In premises where there will be water demand or a positive change to the ambient temperature within 12 hours, the insulator calculator can be used to give an indication of insulation requirements. Where this is not likely to be the case the local water undertaker should be consulted as insulation alone may not be suitable.

Protecting the contents of a cold water storage cistern from undue warming

Undue warming is of concern for two reasons. It can potentially cause a deterioration of water quality and often result in customers leaving taps to run to waste.

Cold water storage cisterns and associated pipework should be sited away from heat sources and insulated.

Systems supplying cold water should be ideally designed to ensure that they distribute water at temperatures no greater than 20°C. This requirement may also apply under other legislation and code of practices, such as those relating to legionella control.



Additional sources of information:

- Installation Guidance
- Backflow Protection Guidance
- Notification Guidance
- Checklists