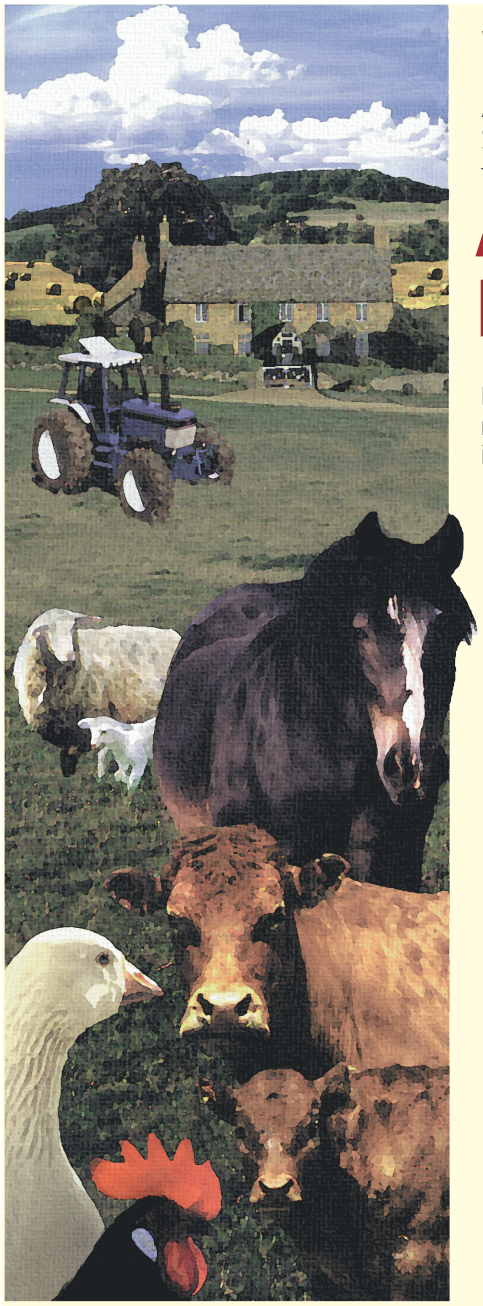

WATER SUPPLY SYSTEMS:
PREVENTION OF CONTAMINATION
AND WASTE OF DRINKING WATER
SUPPLIES

Agricultural Premises

Information for anyone installing, modifying or maintaining plumbing installations

A WATER SUPPLY INDUSTRY INSTALLATION GUIDE

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Introduction

Farmers, like all other owners or occupiers of premises with a public water supply, have a duty to comply with the Water Supply (Water Fittings) Regulations 1999, the Scottish Water Byelaws 2004 and the Water Supply (Water Fittings) Regulations (Northern Ireland) 2009. These are referred to collectively as the 'regulations' in this booklet.

By following these requirements, farmers will protect the water supply from contamination, prevent waste of water (thereby avoiding a waste of money where supplies are paid for by means of a water meter) and ensure they have reliable and robust plumbing systems which will give good service.

This information guide has been produced with the co-operation of the farming industry and endorsed by the UK Water Industry as an aid to installing and maintaining water systems in accordance with the 'regulations'.

WRAS
Water Regulations Advisory Scheme

Scope

The aim of this information guide is to summarise the requirements of the regulations as they affect agricultural premises, to prevent waste of water and contamination by backflow or cross-connection. It provides advice on a range of issues for anyone who is carrying out maintenance to or modifying an existing system as well as those considering the installation of new systems in agricultural premises.

This booklet encourages good practice and water conservation, it also supports efforts to establish common procedures and installation criteria for water supplies in the farming industry.

Responsibilities

The objectives of the regulations are to prevent waste, misuse, undue consumption and, most importantly, contamination of the public drinking water supply.

The regulations apply to all domestic, commercial, industrial and agricultural premises that receive or will receive water provided from the public mains water supply. They also apply to premises which have a dual supply – plumbing systems that are supplied by or have a connection to both the public mains and a private source such as a spring or borehole. If any of the water in a system could be supplied from the public mains then the regulations apply and that water should not be wasted, misused, unduly consumed or contaminated by means of backflow, cross connection or contact with unsuitable materials.

If water for domestic or food production purposes in agricultural premises is supplied solely from a private supply and there is no mains water connection or back up supply, the Private Water Supply Regulations apply. However, the advice given in this publication will still be of use in use in describing best practice and illustrating how to avoid waste and contamination of the water source supplying the properties.

Plumbing systems which were installed prior to the introduction of the regulations should have complied with the requirements in force at the time, many of which also form part of the current regulations. The regulations are not retrospective, but if there is a significant risk of contamination or waste of water from a fitting installed prior to the introduction of the current regulations, even if it complied at the time of the installation, the Water Supplier can, using the Water Industry Acts, insist on improvements or rectification.

The Water Industry Act, 1991 and comparable Scottish and Northern Ireland Acts, define the responsibilities and penalties placed on both Water Suppliers and customers. They may be summarised as follows:

The Water Supplier

It is the duty of the Water Supplier to supply water which is wholesome. The regulations provide the means of ensuring that water remains safe to drink once it has entered the customers plumbing system. The duty for enforcing these regulations has been given to the Water Suppliers by Government. Water suppliers do this by granting consent for proposed installations and inspecting new and existing premises.

Note the above requirements should not be confused with those set out in the Private Water Supply Regulations 2009. Any agricultural premises with mains water supply regardless of whether it is the primary source or a back up supply will be subject to the requirements of the regulations and as such may be subject to inspection by the water supplier.

Notification

The regulations require that Water Suppliers be given prior notification of all new installations, certain specified items of equipment and in non-domestic premises, including agricultural premises, extensions or alterations of plumbing systems.

The supplier has ten working days from receipt of a notification in which to refuse or grant consent, with or without conditions. If no response is made after ten working days, consent is deemed to have been granted and the work can start. However, the installation must still comply with the requirements of the regulations.

Approved Plumbers do not have to notify some types of work in advance although a copy of the compliance certificate must be sent to the local water supplier.

Inspection

Water suppliers will arrange appointments to inspect new and existing premises to check that water systems comply with the regulations. Premises where there are higher risks of contamination will have higher priority for inspection. Many situations which are regarded as being of higher risk are commonly found on agricultural premises, but all other types of premises where there are high risks will be included in the water suppliers inspection programme.

The Customer

The regulations specify that the customer (owner or occupier) must ensure that there is no risk of deterioration or contamination in the quality of the water arising from any water fitting for which they are responsible and must take responsibility for installing and maintaining fittings to ensure that mains supplied water is not contaminated, wasted, misused or unduly consumed.

Requirements for Water Fittings

The regulations require that all water fittings are of an appropriate quality and standard and are suitable for the circumstances in which they are used. Fittings must be made of corrosion resistant materials and will not contaminate the water supply. They must be designed and manufactured to ensure an adequate service life, without leaking or failing prematurely. To satisfy the requirements of the regulations water fittings must be manufactured to meet relevant European or British Standards (where these exist) or the Regulator's (Government's) Specification. WRAS approves fittings for their compliance with the Regulators' Specification – see below.

The regulations do not prohibit the sale of water fittings that do not comply, but in most cases it is illegal to install or use them. Both the installer and user will be liable if fittings do not comply.

Fittings that have been assessed and approved by the Water Supply Industry are listed in the WRAS Water Fittings and Materials Directory. Where used appropriately WRAS Approved Products fitted in accordance with any installation requirements (IRNs) will comply with the regulations and therefore be accepted by the Water Suppliers. The Directory can be viewed free of charge on the WRAS website www.wras.co.uk/directory.

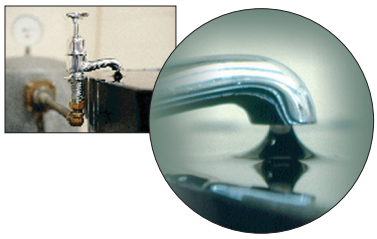
Contamination

Contamination occurs when there is a change in the quality of water supplied by the water supplier whether it is harmful to health or not. If the water supply to agricultural premises were to become contaminated it would pose a risk to not only those living or working on site but could, if it entered the mains supply, potentially affect public health in the wider community.

Causes of Contamination

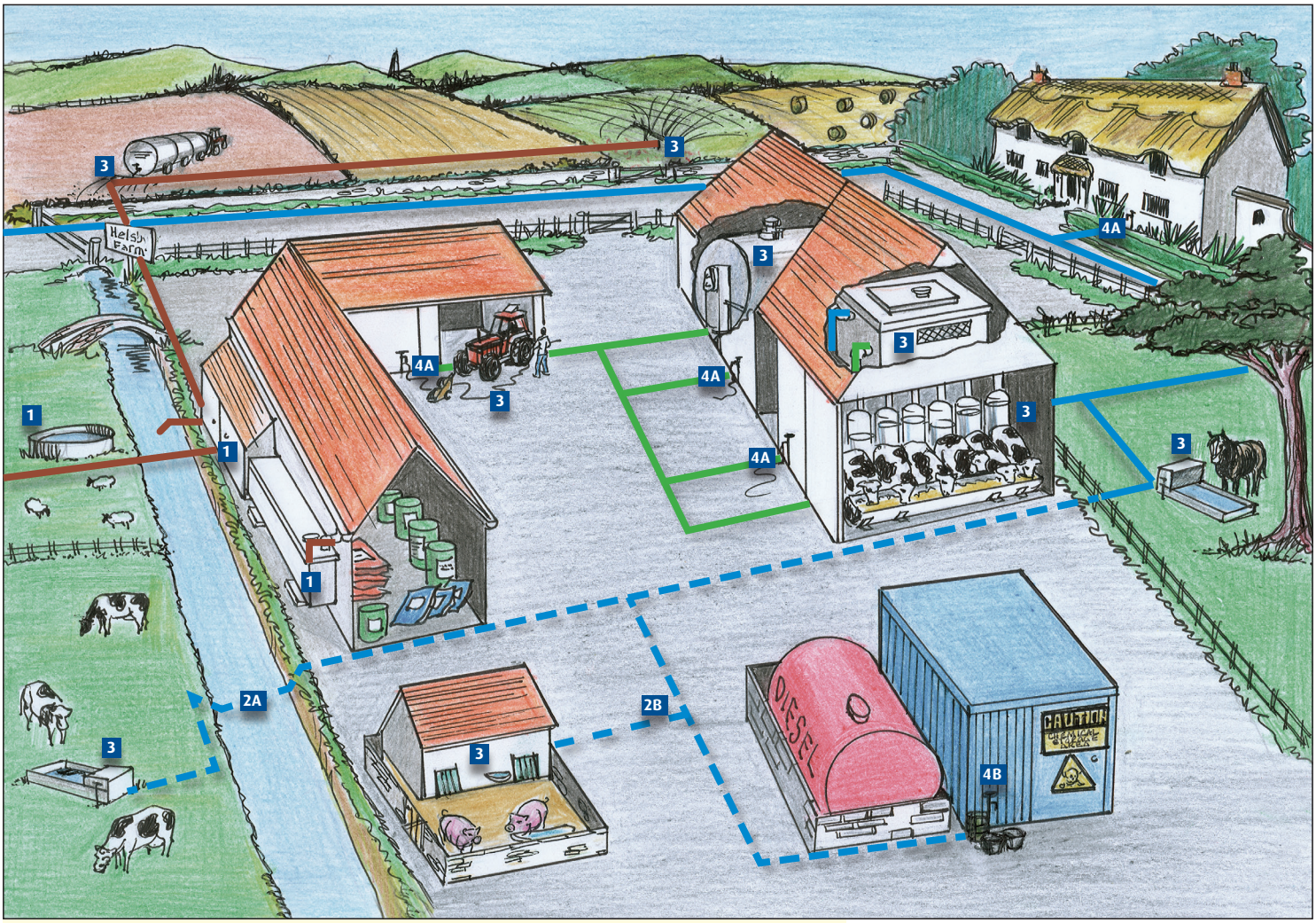
Drinking water can become contaminated by:

Backflow: this occurs when contaminated water flows in the opposite direction to the intended or normal direction of flow. This can happen by 'backsiphonage' – where the water typically siphons from a higher to a lower level via pipes or fittings, or by 'backpressure' – where water is forced in the 'wrong' direction by a downstream pressure which is greater than that upstream.



Ingress: contaminants entering the plumbing system through poorly installed or inadequately maintained fittings or by permeation, especially of hydrocarbons, such as diesel or pesticides, through plastic pipes.

Leaching: this occurs when contaminants from unsuitable materials dissolve into the water with which they are in contact.



1 **Other water supplies:**

To ensure that drinking water remains safe it is essential that it does not become contaminated with water from another source. Potential contamination risks include inadequate backflow protection arrangements where water sources combine and direct cross or inter-connections between mains water and other water sources such as rainwater, recycled water, river water or borehole supplies.

Permeation:

2A No fitting should be installed so that it passes through or comes into contact with any contaminated environment such as a sewer, cesspool, muck heap or slurry pit.

2B Plastic pipes and fittings installed both above and below ground are at risk of permeation by diesel or heating fuel, pesticides, insecticides and similar organic substances or fluids. As a result such fittings should never be installed where they could come into contact directly with these or with soil contaminated with them.

3 **Fittings:**

Fittings which are incorrectly installed or inadequately maintained pose a risk. Blue MDPE pipe should only be installed where light is excluded as exposure to light can result the plastic material becoming brittle and breaking down. Incorrectly installed or poorly maintained air gap arrangements may fail to protect against backflow from appliances such as drinking bowls, troughs and farm processes such as mixing chemicals.

Taps:

4A Hoses attached to hose union taps are a high contamination risk. Backflow via a hosepipe outlet left submerged in a bucket, drinking trough, puddle, drain, animal manure or slurry is a very real possibility. Hoses fitted with a self closing trigger attached to hose union taps in domestic properties including the farm house are in a lower category of risk.

4B Bib taps, taps to which a hose cannot be connected, are a lower risk providing that an appropriate air gap between the spout outlet and the spillover level of any receiving vessel is maintained at all times.

Mains water PE pipe

Mains water barrier pipe

Stored water

Alternative source water

Contamination by Backflow

Water can become contaminated in a number of ways and whilst good design and regular maintenance can eliminate many potential causes such is the concern of contamination as a result of backflow that the regulations include the requirement that all plumbing systems must incorporate adequate backflow protection.

The regulations identify a number of acceptable backflow prevention arrangements and devices, each of which is given a fluid category rating, which indicates the highest degree or level of protection they provide.

To establish the risk associated with a plumbing system a backflow risk assessment is required for every water fitting or appliance that is or will be connected to, or form part of that system. Having identified the category of risk associated with a system each point of use must be protected by a backflow prevention arrangement or device which has a fluid category rating equal to, or greater than, that identified in the risk assessment.

Fluid Categories

The regulations list five fluid categories (below) which reflect the impact and risk to public health should a fluid of this category contaminate the drinking water supply.

FLUID CATEGORY 1

Wholesome water supplied by the water undertaker and meeting the requirements for drinking water.

FLUID CATEGORY 2

Water which would be in fluid category 1 except that its aesthetic quality is impaired owing to a change in its temperature, or the presence of a substance or organisms causing a change in its taste, odour or appearance, including water in hot water distribution systems.

FLUID CATEGORY 3

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 (chloros and common disinfectants).

FLUID CATEGORY 4

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

FLUID CATEGORY 5

Fluid representing 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.

Where the risks are

Some typical contamination risks with their associated Fluid Categories are given in the list of examples below. The list is only representative and should not be regarded as exhaustive.

Equipment and location	Fluid category
Hose union taps	
Domestic gardens	3
Other areas	5/4/3*
Power/jet washers – without internal storage incorporating storage – refer to page 6	
Drain jetting units	5
Permanently plumbed units	5
Portable/mobile units	5
Dairy/milking parlours	
Cleaning/sterilising equipment	5/4*
Pasteurising equipment	5
Milk cooling equipment	3
Udder washer	5
Boot washer	5/4/3*
Chemical mixing	
Crop spray/liquid fertiliser	5/4*
Crop Spraying	5
Sheep dips	5
Irrigation equipment	
Fixed/permanent plumbed	5/4/3*
Mobile	5/4/3*
Miscellaneous	
Drinking troughs/bowls/nipple feeds	5
Recycled water and water from alternative sources e.g. springs, bore holes	5
Produce washeries/packing stations	5
Washing machines non-domestic use	5/4*
Washing machines –domestic use	3
Showers	5/4/3/2*
Water softeners/battery charger/de-ioniser	3/2*
Water heaters	5/4*
Steam raising plant	3/2*

* the fluid category is depended upon local assessment of risks and should be confirmed by the water supplier.

Examples of Backflow Prevention Arrangements

The suitability of backflow protection arrangements is dependent upon many factors. As some have operational limitations it is recommended that you always check with the local water supplier to make sure that the arrangement is suitable for the intended application.

Fluid category 5

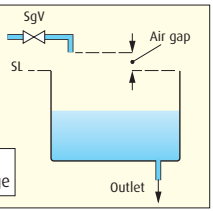
For example a Type AA, Type AB, Type AUK1 air gap (i.e. fed from a storage cistern) or a Type DC arrangement.

In the case of airgaps the backflow protection is achieved by a suitably sized vertical airgap between the discharge point on the water inlet (e.g. a float valve) and the maximum water level which can occur in the cistern. Air gaps must be a minimum of 20 mm or twice the diameter of the inlet pipe, whichever is the greater. The three most common types of air gap arrangements giving fluid category 5 protection are types AA, AB and AUK1.

TYPE AA air gap with unrestricted discharge above spill-over level.

Suitable for protection against fluid category:

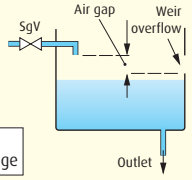
5	Back Pressure	5	Back Siphonage



TYPE AB air gap with weir overflow.

Suitable for protection against fluid category:

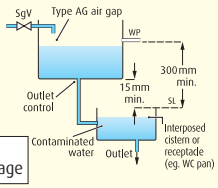
5	Back Pressure	5	Back Siphonage



TYPE AUK1 air gap with interposed cistern.

Suitable for protection against fluid category:

3	Back Pressure	5	Back Siphonage

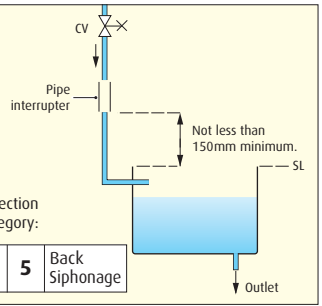


To achieve a Type DC arrangement a pipe interrupter must be fitted so that the lowest point of the air aperture is not less than 150mm above the free discharge point or spillover level of an appliance, and no valve, flow restrictor or tap is connected to the outlet.

TYPE DC In-line pipe interrupter.

Suitable for protection against fluid category:

–	Back Pressure	5	Back Siphonage



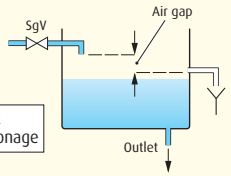
Fluid category 4

For example, a Type AF air gap or a reduced pressure zone valve (Type BA) mechanical backflow prevention device.

TYPE AF air gap with circular overflow.

Suitable for protection against fluid category:

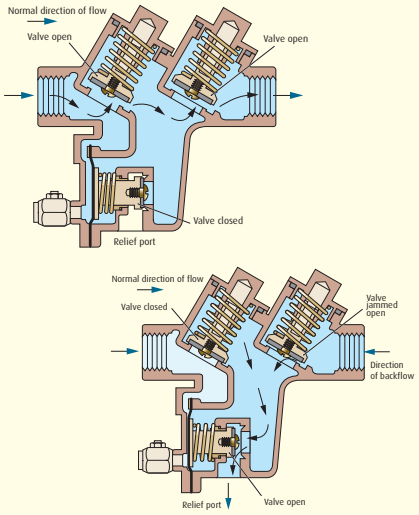
4	Back Pressure	4	Back Siphonage



TYPE BA or reduced pressure zone valve (RPZ valve).

Suitable for protection against fluid category:

4	Back Pressure	4	Back Siphonage



Fluid category 3

For example, a double check valve (Type EC or ED) mechanical backflow prevention device.

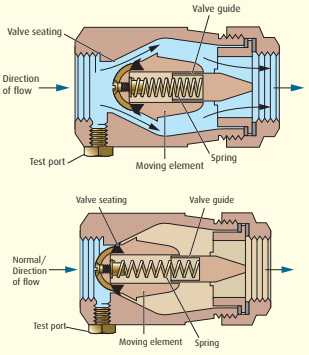
Fluid category 2

For example, a single check valve (Type EA or EB) mechanical backflow prevention device.

TYPE EA or single check valve.

Suitable for protection against fluid category:

Type EA/EB single check valve			
2	Back Pressure	2	Back Siphonage



Note: All mechanical backflow prevention devices can fail and therefore need planned inspection and maintenance or replacement.

Typical Backflow Prevention Arrangements and Devices

Animal drinking bowls and troughs

Water drinkers which are directly connected to the mains water supply must have fluid category 5 backflow protection. For example a minimum air gap between the inlet point and the overflow level of 20 mm or twice the diameter of the inlet pipe, whichever is the greater (see Figure 1). The air gap is measured between the spill over level (rim of the feeder) and the lowest discharge point of the water inlet.

If the water level shown in Figure 2 rises in the bowl the air gap will disappear. However if the bowl was supplied by gravity from a dedicated storage cistern fed via a Type AG air gap such an arrangement would be accepted as being equivalent to an AUK1 air gap.

When a gravity fed cistern or header tank is used, for example to supply an individual drinking bowl, it must be fitted with a float operated valve which conforms to BS 1212 Part 2 or 3 or one listed by the Water Regulations Advisory Scheme (WRAS Approved). There must also be a servicing valve, upstream of the float-operated valve, to isolate the supply. It is important to carry out maintenance especially to float operated valves to prevent them from leaking, sticking in the closed position or wasting water. Above ground pipes and fittings must be adequately protected against damage by freezing and physical damage that could cause leaks or allow the ingress of contaminants. An 'Insulation Calculator' is available on the WRAS website to assist in finding suitable thicknesses of insulation material to protect pipes of different sizes and materials.

Troughs should comply with the general requirements indicated in Figure 3.

Note: All troughs must be adequately supported at their base, and secured against movement by livestock. If the trough is not installed level there is a risk that the air gap could be compromised (see picture opposite). Galvanised troughs should not sit directly on the ground. They should be sited on concrete or block pillars with a waterproof membrane between the base of the trough and its support. This will help prevent premature rusting to the base of the trough.

Hose Union Taps

Hose union taps in agricultural premises are considered to be a fluid category 5 risk whether a hose is connected or not and regardless of when the tap was installed.

The appropriate level of backflow protection for a system, including a hose union tap, is determined by the potential use and contamination risk. Hose union taps are considered a serious contamination risk because of the potential for back siphonage of contaminants via an attached hose. All hose union taps installed in agricultural premises are categorised as a fluid category 5 backflow risk.

Subject to their location and likely use, individual hose union taps installed outside high risk areas in agricultural premises may however, following a water supplier's risk assessment, be categorised as being a lower than a fluid category 5 backflow

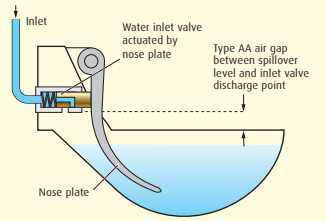


Figure 1. Bowl incorporating a type AA air gap which can be supplied directly from the mains supply pipe.

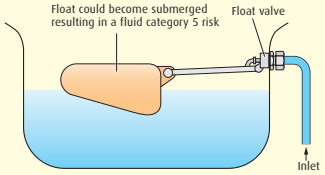


Figure 2. Bowl requiring additional backflow protection because there is no air gap above the spill-over level.

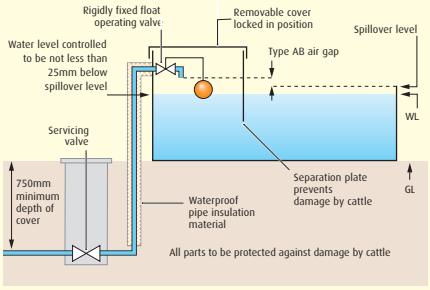
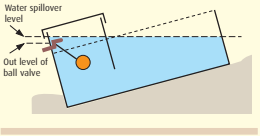


Figure 3. Typical trough installation



Backflow prevention devices – approximate costs

For information, an indication of the purchase price of different backflow prevention devices is given below, based upon February 2012 prices. The cost of installation is not included.

(a) Break tank and booster pump.
For small flow rates, combined break tank and booster pump packages are commercially available, costing from £648 for 50 litres storage. For larger installations, there are many companies who provide design and installation services for bespoke systems.

(b) Restrained hose.
The cost of providing this arrangement is from just a few pence.

(c) In-line pipe interrupter.
Cost from £36 depending on pipe size.

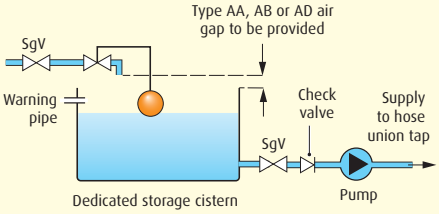


Figure 4. Pumped water to a hose union tap

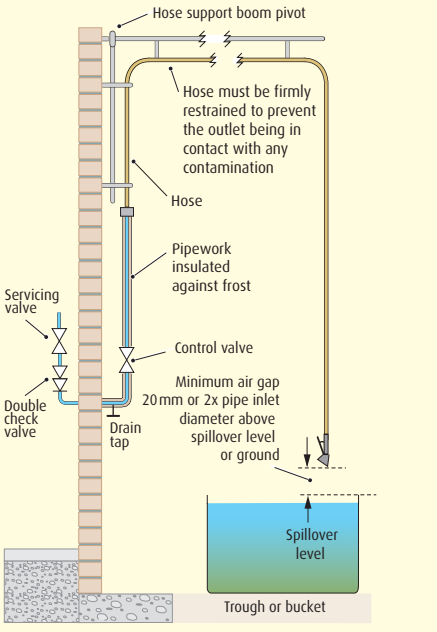


Figure 5. Restraining a hose to maintain an air gap.

risk. For example hoses fitted with a self-closing trigger attached to hose union taps at the farm house used for typical domestic and recreational activities may be considered lower a lower level of risk.

Where a fluid category 5 risk has been identified, the only acceptable method of protection is via an air gap. As other fittings fed from the same distributing pipe are at risk from cross contamination a suitable air gap should be maintained at all outlets, including hose outlets, at all times and hoses never submerged in buckets, troughs etc or in drains nor left lying on the ground. All hoses should be disconnected and stored safely after use.

The provision of a suitable air gap can be achieved in a numbers of ways:

a) Break tank

The hose tap/s can be fed from a storage cistern (also known as a break tank), where the cistern inlet provides typically either a type AA or AB air gap (see page 4 for further information).

b) Break tank and booster pump

Where gravity-fed flow from a break tank is inadequate for the required use, a booster pump can be installed on the outlet of the cistern (see Figure 4).

If you intend to install a pump capable of delivering more than 12 litres per minute, the Water Supplier's consent is required. This is so that checks can be made to ensure that the pump will not create suction in the supply pipework, which could induce back siphonage.

Multiple hose outlets can be fed from a single storage cistern, however, where a pump is used on the outlet from the cistern, the cistern must not supply water which is, or can be, used for drinking, cooking, bathing etc. (domestic purposes). This will ensure that in the event that the pump reverses direction, contaminants are not pumped into the cistern contaminating water being used for domestic purposes.

c) Restrained hose

Where acceptable, it may be possible to restrain a hose in such a way that an appropriate air gap can be maintained whilst the hose is in use.

Where this is allowed, the hose must be robustly restrained so that its outlet cannot be placed into troughs, buckets, or other sources of contamination. An air gap of 20 mm, or twice the internal diameter of the hose pipe, whichever is the greater, above the ground or spillover level of any receptacle (e.g. trough, bucket etc) must be maintained at all times.

If required, the hose can be suspended from an overhead arm which can swing out to provide a greater 'reach' without compromising the air gap. The hose must be restrained robustly enough to prevent it being withdrawn, unhooked or pulled down to a level which would remove the air gap (please refer to Figure 5).

d) In-line pipe interrupter

A DC device (pipe interrupter) can be attached to the hose tap outlet prior to the hose (please see Figure 6). There must be no restriction on

Type DC
Pipe interrupter, this device must be fitted with the lowest point of the air aperture not less than 150 mm above the free discharge or spillover level of an appliance and have no valve, flow restrictor or tap on its outlet.

Suitable for protection against fluid category:

–	Back Pressure	5	Back Siphonage

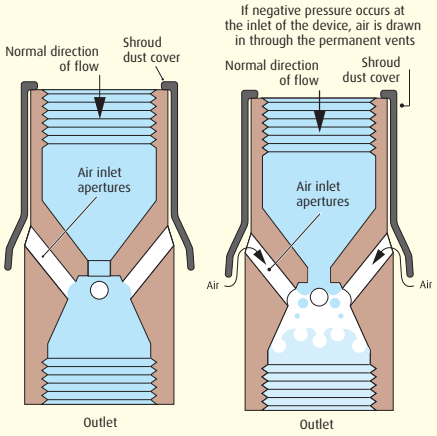


Figure 6. In-line pipe interrupter.

the hose outlet, that is to say no trigger flow control, spray head or valve, as these will create backpressure within the device, resulting in water discharging through the vents in the pipe interrupter.

The outlet of the device must be least 150 mm above any vessel or container which can be supplied or filled using the hose. Ideally the pipework downstream of the DC device should be one bore size larger than the inlet bore.

Using such a device will affect the available pressure at the hose outlet. This makes it unsuitable for applications where a strong jet of water is required, e.g. sluicing floors.

Pressure washers

Some types of heavy-duty pressure washers include a small break tank inside them, which may give adequate backflow protection for the highest risks. Only those which incorporate a fluid category 5 break tank can be connected to any hose union tap. Models made more for the 'domestic' market typically do not incorporate this level of protection therefore in agricultural premises they must be supplied from a storage cistern with fluid category 5 protection. As other fittings fed from the same distributing pipe are at risk from cross contamination, a suitable air gap should be maintained at all outlets at all times, including hose outlets. Hoses must never be submerged in buckets, troughs, drains nor left lying on the ground.

Irrigation systems

An irrigation system, without insecticide or fertiliser additives, which has sprinkler heads fixed not less than 150 mm above the ground, is normally assessed as a Fluid Category 3 risk. Where this is the case it can be protected against backflow by a double check valve or some other no less effective device.

All other non-domestic irrigation systems, including permeable (porous) pipes, irrespective of whether or not chemical additives are used, are assessed as Fluid Category 5. As such they require Fluid Category 5 backflow protection.

Separation of public water supplies from other supplies

Pipes carrying water from the public water supply must never be directly connected to pipes or fittings carrying other water, such as a spring, river or rainwater. Where other sources of water are to be used with mains water, the mains water must be discharged into a cistern with backflow prevention arrangements that provide Fluid Category 5 protection (see Figure 7).

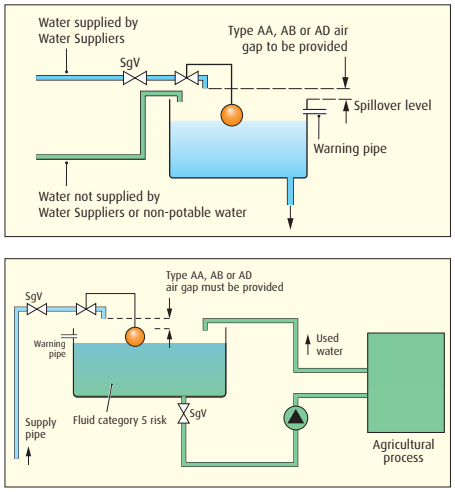
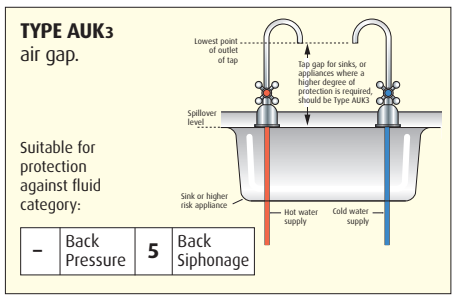


Figure 7. Separation of wholesome mains water supplies from other water sources.

Mains water inlets to such cisterns should terminate at a higher level and be separated both vertically and horizontally, by at least twice the largest inlet bore, from other supply inlets.

Sinks/basins

Where taps supply water to any sinks or basins in agricultural premises, there must be an air gap between the tap outlet and the spillover level of the sink or basin of 20 mm or twice the inlet pipe diameter, whichever is the greater. Short lengths of flexible hose attached to the taps for example to direct the water flow around the sink or basin, with their outlets below the spillover level, are a common cause of the air gap being compromised and these must not be used.



Contamination by Ingress, Permeation and Leaching

Ingress and permeation

Water supplies can be contaminated as a result of ingress or permeation of contaminants. Contaminants can enter water supplies through poorly installed or inadequately maintained fittings for example through storage cisterns with no or poorly fitting lids, or inadequate screening of vents or overflows, and through cracks in pipes or fittings.

Contamination can occur as a result of permeation. Pipes and fittings should not be installed where they would or might come into contact with materials or substances which could permeate through the wall of the fitting contaminating the water within. Plastic pipework in particular is prone to permeation by hydrocarbons such as oil, diesel or petrol and should not be laid across areas where farm machinery is normally parked or adjacent to fuel storage. It can also be permeated by pesticide, insecticide or fertiliser additives if they are made from organic compounds. Areas where any of these are stored or mixed should be avoided or barrier pipe used.

Leaching

Contaminants can dissolve into the water with which they are in contact, causing unpleasant taste and odour, or supporting bacterial growth. Some leached materials can, if in sufficient concentration, be harmful to health. Non-metallic materials must comply with BS 6920 the standard for non-metallic materials in contact with drinking water.

The installation of lead pipes or fittings and use of lead solder for drinking water installations is prohibited.

Waste and Undue Consumption

General plumbing issue

Each agricultural building or site with a water supply should have a separate stop valve controlling the supply, so that if a burst or leak occurs in one location the supply can be isolated without affecting other buildings or sites.

Knowing the precise location of stop valves, to isolate the water supply in the event of an emergency, and carrying out regular inspections and maintenance will help ensure that water is not wasted or contaminated. It is prudent to check water meter readings regularly, as unexplained increases in consumption could indicate a burst pipe or other wastage.

Pipelines crossing water courses

When fitting animal drinking troughs it may sometimes be necessary to lay pipes across a river or ditch. How this is done is dependent upon who is responsible for or owns the water course. Where it is the Environmental Agency or local drainage board, to prevent the pipe being damaged during dredging, it is likely that they will insist on the method shown in Figure 8. In such cases the body responsible should be contacted prior to starting any work. The local water supplier must also be informed as the work is subject to Notification under Regulation 5 of the Regulations.

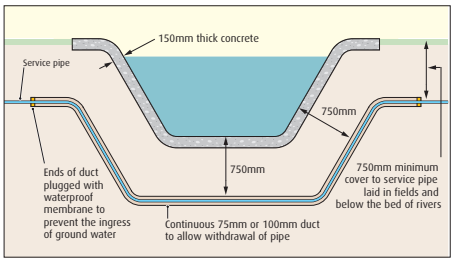


Figure 8. Environment Agency or local drainage board responsible for water course.

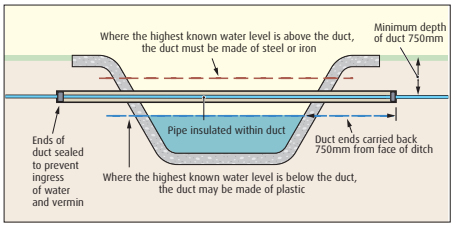


Figure 9. Privately owned water course.

Where the ditch belongs to the land owner the method shown in Fig 9 may be adopted, however the possibility of damage during dredging/cleaning, together with the risk of freezing should be considered, particularly if maintaining a constant supply of water is needed, such as for, animal drinking or household use.

Common causes of water wastage and undue consumption risks in agricultural premises

Common causes of wastage of water include:

- leaking underground pipes caused by poor installation or maintenance, accidental damage, corrosion or inadequate depth of ground cover;
- poorly maintained taps, float valves etc., dripping or overfilling which results in water running to waste
- inadequate protection against freezing leading to burst pipes and even damaged fittings.

Ways to prevent waste and conserve water

Troughs

Regular checks and maintenance can save water and money. Incorrectly set, leaking or damaged float operated valves can waste significant amounts of water. For example, a leaking or fractured ball valve in a water trough can waste up to 2,000m^3 of water a year, costing from £1,000.

It is advisable to isolate and drain sections of pipe work or troughs that are not in use over the winter to prevent frost damage that could result in a leak when refilled.

Hosepipes

By adopting dry cleaning techniques, such as using scrapers and brushes to remove solid waste prior to cleaning with water, the amount of water

used and the quantity of dirty water for treatment is reduced.

A spray gun with self-closing trigger will help to control the flow of the water, direct the flow more accurately to where it is needed and eliminate wastage when the hose is not in use. Check the nozzle on a regular basis to make sure it is free from blockage and damage. In winter remove spray guns when not in use as they are prone to freezing and frost damage.

Underground pipe leaks

All underground pipes should be laid at a minimum depth of cover of 750 mm. Pipes may only be installed at a shallower depth with the written permission of the water supplier and provided that they are suitably insulated to prevent damage – particularly by freezing.

There are two main ways to check for underground leaks – visual checks and flow monitoring. Visual signs of leakage include unusually damp ground, lusher than expected vegetation (symptom of a recent leak) and reduced vegetation (symptom of a long term leak). For flow monitoring, check meter readings over a period of time when you would expect water use to be minimal, such as overnight. If the reading is higher than expected then it may indicate a leak.

Rainwater use

Rainwater collected from roofs can be reused for a variety of activities, including washing down yards and irrigation. The principles set out in British Standard Code of Practice, BS 8515, give valuable installation advice. Remember that all pipes carrying non-wholesome water need to be readily identified; refer to WRAS Guidance Note IGN 9-02-05. For further information see the WRAS and Environment Agency's websites www.wras.co.uk and www.environment-agency.gov.uk/save water.

Irrigation

The condition of all irrigation equipment should be checked regularly. Save water by monitoring weather forecasts; avoid watering when it is windy or water at night to reduce the amount of water lost through evaporation.

Toilets

Toilets (WCs) installed in premises since January 2001 must comply with the Government's Performance Specification and have a maximum flush volume of six litres. Dual flush toilets are permitted, offering the potential for substantial water saving. It is permitted to fit water efficiency devices to WC cisterns installed prior to July 1999 to reduce the flush volume.

Taps

Dripping taps waste water and money; where water supplies are metered, the wastewater charge also depends upon the volume of water supplied, resulting in leaks being charged for twice! Any leak should be fixed promptly. Where a tap is used regularly consider fitting a self-closing spray tap or an automatic shut-off valve.

Points to Remember

- If you want to alter or repair your plumbing system remember:-
  - *Use approved materials and fittings only.*
  - *You are legally obliged, (Regulation 5) to tell your Water Supplier in advance of any work you intend to carry out on your plumbing system except for repairs and like-for-like replacements.*
  - *Use an approved plumber to ensure that the work will comply with the regulations.*
  - *Remember it is hazardous and unacceptable to earth electrical appliances or installations to your water pipes. If in doubt, get your electrician to check your installation.*
- With very few exceptions, the regulations require that notification be given before installing or modifying plumbing systems, work must not commence without the water supplier's consent.
- Buy only approved fittings. Suppliers are not required by law to sell fittings that comply with the regulations, but both the installer and user will be responsible if fittings are used which do not comply. Be safe by insisting that your supplier confirms that fittings are of an appropriate quality and standard. See the free on line Water Fittings and Materials Directory www.wras.co.uk/directory.
- Pipes located in roof spaces and any other unheated space need to be insulated for frost protection. (Please refer to the Water Industry insulation calculator found on the publication page of the WRAS website www.wras.co.uk). Insulation is not designed to prevent freezing, only to delay it. In extreme conditions or prolonged exposure to low temperatures insulation alone will not prevent freezing therefore other methods of protection such as trace heating will be necessary.
- Always use an approved plumber. Approved plumbers are exempt from having to notify some types of work and their plumbing is subject to audit rather than routine inspection. They provide clients with a certificate of compliance which can be used as a legal defence if the certified work is subsequently found to be in breach of the regulations. Many water suppliers now maintain a register of approved plumbers – if you undertake plumbing work yourself make sure that you know the requirements of the regulations. Ensure that the clean water supply is never connected to alternative or recycled water supplies.
- Pipework downstream of the water supplier's meter and stop tap is the responsibility of the owner or occupier of the premises. If any pipework servicing your property is made of lead and you wish to renew it, consult your local water supplier for current advice regarding replacement.
- Whilst the repair of legally installed lead pipe and fittings is permitted the installation of new lead pipe or fittings and the use of lead solder is prohibited. Care should be taken to ensure that only approved solders marked 'lead free' are used for drinking water installations. In some older premises water pipes were sometimes used for electrical earthing. Consequently if you repair a metallic pipe using a non-metallic fitting or insert a section of non-metallic pipe you should ask your electrician to check the earthing continuity.
- If you intend to use equipment that requires a higher water pressure for it to operate than the incoming mains pressure or if you are planning to install a booster pump which draws more than 12 litres per minute you must first notify your local water supplier.

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WRAS®
Water Regulations Advisory Scheme

Water Regulations Advisory Scheme,
Fern Close, Pen-y-Fan Industrial Estate,
Oakdale, Gwent, NP11 3EH.
Tel: 01495 248454.
Fax: 01495 249234.
e-mail: info@wras.co.uk
www.wras.co.uk

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