

# Information for Operating Plumbing Systems for the Supply of Water for Domestic Purposes to Boats in Marinas

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## 1. Introduction

The Water Supply (Water Fittings) Regulations 1999 in England and Wales, the Scottish Water Byelaws 2004 and the Northern Ireland Water Regulations, (collectively referred to in this Note as 'the regulations') are intended to prevent the waste, misuse, undue consumption, contamination or erroneous measurement of the public water supplies. All who install or use plumbing systems have a legal duty to comply with the regulations.

This Information and Guidance Note gives advice to owners, operators and users of inland and coastal marinas on suitable methods for filling boats (pleasure craft and similar small boats) with water to be used for drinking and domestic purposes. By using one of the methods described, marina operators will fulfil their legal duty to avoid contamination of

the mains water supplies and will ensure the safety of drinking water supplies in marinas and their surroundings.

Advice regarding supplying water to larger ships (such as ferries, passenger liners and freighters) in ports and harbours is given in a separate WRAS Information and Guidance Note (9-06-01, 2006; see Section 9 'Further Information').

## 2. Scope

The specific aim of this Information and Guidance Note is to prevent contamination of drinking water supplies. Other aspects of complying with the regulations, such as notification of the installation or alteration of plumbing systems, are not covered in this Note, but information is available in the Water Regulations Guide and on the WRAS website (see Section 9 'Further Information').

Serious contamination of water supplies can occur by backflow or cross connection with other sources of water.

Backflow means the flow of water in a direction opposite to the intended normal direction and can occur either by:

**backpressure** – where the water in the plumbing system is subjected to a greater pressure at a 'downstream' point than that upstream, allowing it to flow backwards, or by

**backsiphonage** – where the downstream end of a pipe or device is only at atmospheric pressure, but the pressure upstream is less, effectively sucking water back upstream.

Backflow is particularly relevant when considering the use and storage of hosepipes and access to them. Backflow could cause drinking water

supplies on boats, elsewhere in the marina or in the surrounding neighbourhood to be contaminated with toxic chemicals or disease-causing micro-organisms (bacteria or viruses) from other water e.g. sewage, puddles, river or sea water. There have been a number of incidents in the United Kingdom where the public water supply has been contaminated due to backflow at marinas. A common cause is hosepipes being left submerged in river or seawater.

### 3. Duties of Water Suppliers and their Customers

#### 3.1 The duties of the Water Supplier

The local Water Supplier has a duty to ensure that the water it supplies to premises for domestic purposes (for drinking, washing and cooking) is 'wholesome' at the time it is supplied. 'Wholesome water' complies with the national water quality requirements in the Water Supply (Water Quality) Regulations 2000. Water Suppliers regularly monitor the wholesomeness of the supplies they provide by sampling at points throughout the treatment and distribution system.

Water Suppliers also have the duty to enforce the regulations. They do this mainly by a combination of issuing consent for plumbing work to be carried out and by inspection of new and existing premises for their compliance.

#### 3.2 The duties of marina operators and users regarding the prevention of contamination.

After water has been supplied to premises it can become contaminated by being in contact with unsuitable materials in the plumbing system, by ingress of contaminants, for example from an uncovered storage cistern, or by backflow of contaminated water from fittings or appliances.

Under health and safety legislation, marina operators must ensure that employees and visitors to their premises are not put at risk, and berth holders and boat users visiting marinas also have a responsibility to ensure they do not create health and safety risks. This legal duty is reinforced by the Water Industry Acts and the Water Fittings Regulations (or equivalent legislation in Scotland and Northern Ireland), which require marina operators and users to ensure that water supplies within the premises are adequately safeguarded against contamination. Operators and users also have responsibility for ensuring that water fittings are installed and maintained in compliance with the regulations. The Water Supplier has the power to prosecute those who infringe the regulations, and can disconnect supplies that pose a serious risk to health. A water supplier may take action to recover from marina operators the costs incurred in responding to a water contamination incident, which can be significant.

### 4. Risk Areas for Contamination

#### 4.1 High risk areas

Some activities and equipment in marinas have a particularly high risk of backflow because of the types and quantities of possible contaminants or the likelihood of conditions occurring which allow backflow. These include:

- Filling of boats' drinking water tanks;
- Refuelling and general water loading points;
- Dry docks, especially those involving maintenance work on plumbing systems;
- Facilities used for emptying and cleaning chemical toilets;
- Emptying and cleaning of on-board sewage storage tanks;
- Water supply standpipes and hoses, especially on pontoons;
- Pressurised water wash systems and equipment;
- Fire hose reels and below-ground fire hydrants outlets.

#### 4.2 Other Contamination Risk Areas

Water supplies can become contaminated through other means. Water pipes must not be installed in ground which is contaminated. Possible contaminants in marinas include fuel and lubricating oils, paint thinners, toxic chemicals (e.g. anti-corrosion or anti-fouling compounds) and sewage (*see section 7*).

Hydrocarbons such as fuel oil and other organic chemicals like paint thinners or brush cleaners can permeate through plastic pipes and leakage or disposal of these must be safeguarded. Care must be taken where above or below-ground pipes may be subject to contamination after installation, avoiding for example, installation of pipes close to fuel storage tanks or outlets.

Cross connection can occur between water supply pipes and pipes containing other liquids (such as pressurised seawater, river water or foul water), and the regulations require that pipes should be clearly identified to distinguish between them.

### 5. Backflow Prevention

The seriousness of the risk of contamination by backflow is assessed using one of five fluid categories. Examples of these include:

**Fluid category 5:** contaminants, which are a serious health risk. Fluid containing pathogenic organisms, radioactive or very toxic substances.

**Fluid category 4:** contaminants with a significant health hazard. Fluid containing toxic substances including chemicals, carcinogenic substances, pesticides and environmental organisms of potential health significance.

**Fluid category 1:** wholesome drinking water, as supplied by the Water Supplier.

The degree of backflow risk is dependent on local circumstances. Risk assessments, if not carried out by your local water supplier, should be confirmed by it.

The regulations require that plumbing systems, fittings and appliances are protected by suitable backflow prevention devices rated to provide protection to at least the same fluid category as indicated by the risk assessment. The Water Regulations Guide provides information on the fluid category rating of different types of backflow device.

## 6. Filling Procedures: Boats' Water Tanks

### 6.1 Using a storage cistern with fluid category five backflow protection

When filling a boat's water-holding tank, it is essential that the quality of water entering the tank is wholesome and that backflow of contaminants into the supply mains pipework is prevented. It must be considered that water already stored on board the boat may not be wholesome.

The recommended method is to supply the hoses used for filling water tanks from a storage cistern incorporating an air gap. (See Figures 1a and b). Without this protection in place, if the mains pressure dropped whilst the hose outlets were submerged in marina water, drains or puddles, backflow could cause contamination of mains water.

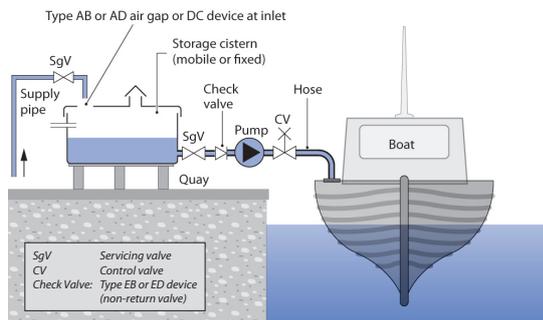


Figure 1a. Water supply pumped from a storage cistern incorporating a fluid category 5 air gap for backflow protection.

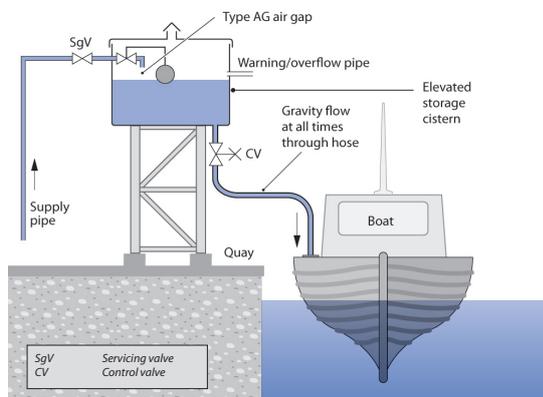


Figure 1b. Water supply taken by gravity from a storage cistern in an arrangement which provides fluid category 5 backflow protection (an interposed cistern).

### 6.2 Requirements for a storage cistern

The cistern, whether fixed or mobile, must be of a suitable size to encourage good turnover of stored water and the inlets and outlets must be designed and located to minimise stagnation. The cistern must be protected against the ingress of environmental contaminants.

Every cistern storing water for wholesome purposes must be designed manufactured and installed to ensure:

- all materials in contact with the stored water are suitable and do not cause deterioration of water quality; non-metallic materials must comply with British Standard BS 6920;

- a suitable air gap to provide fluid category five backflow protection. If using a type AB air gap, there must be a slot type weir conforming to the requirements for a type AB air gap, sized to suit the maximum inflow and screened to prevent ingress of insects or other contaminants. A spreadsheet to assist in designing a type AB air gap is given on the WRAS website.
- a screened warning pipe (or no less effective warning device)
- a securely fitted lid and/or access cover to enable internal inspection and cleaning of the cistern;
- thermal insulation to minimise freezing or undue warming;
- a booster pump, where the gravity-fed water pressure is insufficient to supply the required flow. If the pump is capable of drawing more than 12 litres/min, the pump must not be installed without the water supplier's written consent, which should be sought by means of prior notification.

Marina owners have the responsibility to see that regular cistern maintenance is undertaken to ensure the water quality is wholesome.

### 6.3 Alternative using a mains-fed hose union tap

Subject to the terms and conditions required by the Water Supplier, and with its consent, an alternative arrangement for filling boats' water tanks is a mains-fed hose union tap. The hose tap must be installed with an in-line double check valve (type EC or ED device) and be protected against damage by freezing by insulation or other means (see Figure 2). A method statement for the inspection, maintenance or replacement of the backflow device must be agreed with the Water Supplier and implemented by the marina operator.

This arrangement is subject to the terms and conditions of the local Water Supplier.

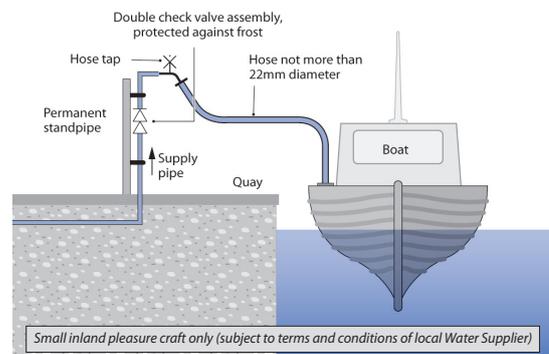


Figure 2. Water supply taken from mains-fed hose union via a double check valve

- Hoses for use with mains-fed hose union taps must not exceed 22mm internal diameter.
- All hoses left unattended on bank sides and pontoons must be removed by marina staff.
- Hoses used by the marina operator should be of the retractable lay flat type, removed and securely stored after use.
- Berth holders and visiting craft must provide their own hoses, preferably of the lay-flat type, to encourage removal after use.
- The use of hose union taps and hoses should be restricted to authorised users by means of locked

cabinets or other restrictions on access to them. Additional measures should be considered where vandalism is likely to result in interference with the equipment.

- At sewage tank pump-out points, the outlets of mains-fed hoses must never be placed in the sewage tanks.

#### 6.4 Other contamination risks

These include:

- Water supply pipes must not be installed where they could be immersed in seawater or river water or exposed to sunlight.
- Power washers must incorporate an air gap and cistern for backflow protection.
- Unless fed by gravity from a storage cistern, hose union taps used with chemical toilet disposal points must be fitted with a permanent DC type pipe interrupter (see Figure 3), an air-gap to drain or a tundish.
- Below ground hydrants are accepted only for fire-fighting purposes and must be capped when not in use.

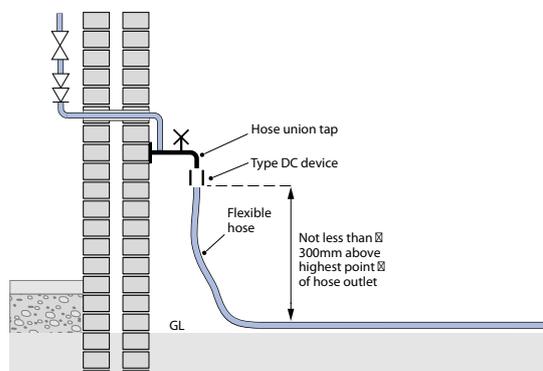


Figure 3. Picture hose union tap with DC device.

### 7. Pipes Laid in Ground that may be Contaminated

Water pipes or fittings must not be laid or installed in any contaminated environment such as drains, sewers, foul soil or refuse regardless of any protection to the pipe or fittings. Fittings and pipes made of plastics or other materials, which are likely to be damaged by oil, petrol or similar contaminants should not be laid in contaminated ground, or should be suitably protected. Advice is given on the selection of materials for pipes in land that may become contaminated in the WRAS Information and Guidance Note 9-04-03 (The Selection of Materials for Water Supply Pipes to be Laid in Contaminated Land). Other advice is given in 'Pipeline Selection For Use In Contaminated Land - Best Practice Manual', published by UKWIR (See Section 9 Further Information).

### 8. Whole-site and Zone Backflow Protection

Zone and/or whole-site protection may be required at marinas for a number of reasons including:

- as an interim measure, until full compliance with the Water Fittings Regulations for point of use backflow protection has been obtained;

- where there has been compliance for point of use, but there is a risk that future modification to the system and/or inadequate control of the water system might compromise compliance.

The decision to permit the installation of a temporary device, and the level of protection required of that device, is at the discretion of the water supplier and depends on the risk assessment for the installation. Further details and advice are given in the WRAS Information and Guidance Note 9-04-5 'Report of the Expert Group on the Risk of Contamination of the Public Water Supply by Backflow'.

### 9. Further Information

The Water Supply (Water Fittings) Regulations 1999: Statutory Instruments SI 1999 No. 1148 and 1506. The text is available from the Government website.

Government Guidance Document relating to Schedules 1 and 2 of the Water Fittings Regulations, available from the Government website.

The Government website is

[www.defra.gov.uk/environment/water/industry/wsregs99/index.htm](http://www.defra.gov.uk/environment/water/industry/wsregs99/index.htm)

Scottish Water Byelaws 2004: Copies available from Scottish Water.

The Water Regulations Guide gives the text of the Water Fittings Regulations, Scottish Water Byelaws, Government Guidance to the Regulations and the Water Industry's recommendations for complying with the regulations. It is published by and available from WRAS.

The Water Fittings and Materials Directory lists products which have been tested and approved by the Water Suppliers for their compliance with the regulations and is available on-line via the WRAS website.

Information and Guidance Notes are available on the WRAS website ([www.wras.co.uk](http://www.wras.co.uk)).

### 10. Addresses

#### Water Regulations Advisory Scheme

30 Fern Close, Pen-y-Fan Industrial Estate, Oakdale, Gwent, NP11 3EH

Tel: 01495 248454.

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