INTRODUCTION

Concerns over the quality of water piped to our homes and the interest in healthy eating and nutrition have dramatically increased the demand for a higher quality of drinking water, illustrated by rapidly-increasing sales of bottled water in our supermarkets. Bottled water, however, is more expensive than tap water treated by a plumbed-in or jug filter.

In addition, in a 1998 Which? report, when a wide range of bottled waters was tested for mineral content, bacteria and taste, it was found that bottled waters are not necessarily healthier to drink than tap water. Also, the magazine’s expert tasters were unable to distinguish between bottled and filtered water in blind taste tests.

So, the availability of filtered drinking water from a dedicated tap next to the kitchen sink would appear to be a highly practical, convenient, economic and attractive alternative to bottled water.

The range and choice of domestic drinking water treatment equipment and suppliers are expanding rapidly.
THE WATER SUPPLY TO YOUR HOME

Public or mains water supplies

Most homes in the UK are supplied with mains water from a public water supply. Although only about 2% of water supplied to the home is used for drinking and cooking, it all has to be supplied as 'fit for drinking'. The quality of 'drinking water' is controlled by law under the terms of the Water Supply (Water Quality) Regulations 1989. The implementation of these regulations and the continual improvement in water treatment and supply technologies has resulted in a high quality public water supply, as is shown in the Drinking Water Inspectorate's Annual Reports. Even so, tap water varies considerably from region to region in terms of taste, appearance and chemical composition leading to many consumers choosing to change the quality of the water that they drink.

Private water supplies

A few homes have their own individual or locally shared private supply drawn from a well, spring, river or lake. These supplies need to be treated so that the water meets the quality required by the Private Water Supplies Regulations 1991 and 1994. Anyone in this situation should contact their local Environmental Health Officer and seek expert advice and an analysis of the water before taking any action. British Water can supply advice and recommend equipment suppliers. The information provided in this booklet is primarily for the treatment of mains water supplies in the home.

WHAT MAINS WATER CONTAINS

Your water will normally contain chlorine and varying amounts of dissolved minerals including calcium, magnesium and sodium, chlorides, sulphates and bicarbonates, depending on its source. It is also not uncommon to find traces of iron, manganese, copper, aluminium, nitrates, insecticides and herbicides although the maximum amounts of all these substances are strictly limited by the regulations. These are usually referred to as 'contaminants'. Most of these substances are of natural origin and are picked up as water passes round the water cycle (see diagram). Some are present due to the treatment processes which are used make the water suitable for drinking and cooking. The water will also contain a relatively low level of bacteria which is not generally a risk to health

Source: International Water Association
Chlorine
Chlorine is added at water treatment plants to destroy contaminants, disinfect the drinking water and minimise microbial growth in the distribution network. Chlorination is one of the most effective ways of disinfecting water but it can impart an unpleasant taste and odour.

THMs (trihalomethanes)
Result from the combination of chlorine with some of the organic compounds present in the water supply.

Nitrates
Occur naturally in all water draining through the ground, they come from the decay of vegetation and also from artificial and organic fertilisers used in agriculture.

Insecticides and herbicides (sometimes referred to as pesticides)
Are widely used in agriculture, industry, leisure facilities and gardens to control weeds and insect pests and may enter the water cycle in many ways.

Aluminium
Aluminium salts are added during water treatment to remove colour and suspended solids.

Lead
Lead does not usually occur naturally in water supplies but is derived from lead distribution and domestic pipework and fittings. Although water suppliers have removed most of the original lead piping from the mains distribution system, many older properties still have lead service pipes and internal lead pipework. The pipework (including the service pipe) within the boundary of the property is the responsibility of the owner of the property, not the water supplier.

Water hardness
There are two types of hardness: temporary and permanent. Temporary hardness comes out of the water when it's heated and is deposited as scale and fur on kettles, coffee makers and taps and appears as a scum or film on tea and coffee. Permanent hardness is unaffected by heating.

Cysts
These are associated with the reproductive stages of parasitic micro-organisms (protozoans) which can cause acute diarrhoea type illnesses; they come from farm animals, wild animals and people. They are very resistant to normal disinfection processes but can be removed by advanced filtration processes installed in water treatment works. Cysts are rarely present in the public water supply.

Particles and rust
These come from the gradual breakdown of the lining of concrete or iron mains water pipes or from sediment which has accumulated over the years and is disturbed in some way.
PRODUCTS YOU CAN USE TO TREAT YOUR DRINKING WATER (see factsheet 5)

There is a range of products available to treat your drinking water in the home ranging from jug filters to plumbed in combinations of filters and reverse osmosis systems. The removal capabilities can be selected according to personal needs or preferences.

It is very important that manufacturer's installation, use, maintenance and replacement recommendations are followed to ensure you safely obtain the maximum benefit from any water treatment device used in the home.

Worktop Equipment

Jug filters

These filters are available through a variety of high street retail outlets. Requiring no plumbing, they are portable, simple to use, economical and effective.

The complete unit comprises an outer jug and an inner container sitting in the top part of the jug, which is the reservoir for the tap water before it flows through the filter cartridge, which is housed in the bottom of the inner container. The majority of jug filters also have a lid and may have a cover for the spout.

The filter cartridge normally contains activated carbon, which significantly reduces chlorine, pesticides and other organic impurities, and ion-exchange resin which reduces levels of temporary hardness, lead, copper and aluminium. The filter cartridge will require changing approximately every month and many jug filters now have devices which remind the user when to change the cartridge.

The most common benefits of jug water filters are the improvement of the taste, odour and appearance of tap water. Water filter jugs are available in a variety of shapes and sizes, with larger versions for use on the kitchen worktop and slim-line units for storage in fridge doors. The jug may be glass or plastic and capacities vary between 1 and 2.2 litres.

Watchpoints

- The jug should be stored out of direct sunlight
- The component parts of the jug, except the cartridge, should be washed regularly
- For best results, the jug should be used frequently and always stored with the cartridge in contact with water in the jug to prevent it drying out
- Cartridges should be changed regularly, in accordance with the manufacturer's instructions.

Installed / Plumbed-in Systems

These systems are usually installed under the kitchen sink or worktop and supply treated drinking water through a separate or specialist 2-way tap.
The various drinking water treatment technologies described here can be used in different combinations, either in a single cartridge or in a series of cartridges, depending on which contaminants are to be removed.

A combined system is very flexible and can be tailored by a specialist supplier to meet individual requirements. A multistage unit combining ceramic, activated carbon and temporary hardness ion-exchange resin, for instance, is an effective method of removing sediment, cysts, bacteria, scum and scale while also improving the water's taste and appearance.

**Sediment filters**

Sediment filters exclude particles such as rust and silt, and are usually plumbed into the incoming main for the whole house and can also be used as a pre-filter to prevent particles from fouling other treatment systems.

**Watchpoints**

- Change filters according to manufacturer's instructions or more frequently if the filter becomes clogged.

**Activated carbon filters**

Activated carbon filters improve taste and odour and reduce chlorine, "colour" and organic substances.

**Watchpoints**

- Follow manufacturer’s recommendations and your supplier’s advice
- Plain carbon filter cartridges should not be used for longer than six months as bacteria may build up, filters which contain silver minimise bacterial growth and can be used for up to 12 months
- The lifetime and performance of any cartridge is always dependent on mains water quality and water usage levels

**Temporary hardness filters**

These filters contain a special ion-exchange resin or polyphosphate designed to remove temporary hardness. They are widely available in cartridge form and are usually used as part of a total system.

**Watchpoints**

- Usually used in combination with activated carbon, either in separate filter housings or combined in a single cartridge
- Follow the manufacturer's use and maintenance instructions
**Nitrate filters**

These devices use ion-exchange resin to reduce nitrate levels. They are available either as a replaceable cartridge system, with a choice of nitrate-removal-only or mixed-capability resins; or as a regenerable system, which recharges automatically every few days using salt. (This does not enter the drinking water).

**Watchpoints**
- Change cartridges at manufacturer's recommended frequency to guard against exhaustion of the material and bacterial build up
- With regenerable systems, salt levels must be well maintained.

**Ceramic filters**

Ceramic filters form a barrier to exclude suspended particles, bacteria and cysts and can be combined with activated carbon in the same cartridge. Ceramic filters are fragile but some can be cleaned periodically to ensure a good flow of filtered water.

**Watchpoints**
- Change filters at manufacturer's recommended frequency
- Ceramic filters do not remove viruses.

**Reverse osmosis (RO) systems**

RO systems use a process based on the natural process of osmosis used by plants to absorb water from the ground. They separate dissolved substances from water by forcing the water through a membrane and remove virtually all substances including heavy metals, bacteria, cysts and viruses. Hard water may require pretreatment to protect the membrane from clogging. Worktop systems are also available.

**Watchpoints**
- Water usage can be high
- A pump, and therefore electricity, may be required if water pressure is inadequate
- Typical membrane life is 18 months
- Automatic or manual monitoring of the treated water is important to check that the membrane is operating correctly

**Ultraviolet (UV) disinfection units**

These are commonly used for treating private rather than mains water supplies and will often be used with a pre-filter to exclude particles. They destroy a high percentage of bacteria and viruses.

**Watchpoints**
- The effectiveness of the process is reduced if the water contains particles, cloudiness or colour so it's often advisable to fit a pre-filter
- Flow limits should not be exceeded and UV lamps must be changed regularly
- Not effective on cysts at normal dose levels
- Treated water must be consumed immediately or refrigerated.

**Watch Note**

UV is harmful to the naked eye, never look at illuminated UV lamps with unprotected eyes.
Other devices
Also available, but not widely used in domestic water treatment in the UK, are distillation units which boil water to produce steam which is condensed and collected. The distilled water will contain few contaminants at low concentrations.
Tap-mounted and counter-top filters are also available in the UK, but again, these are not currently widely used here.

INSTALLATION OF A DRINKING WATER TREATMENT DEVICE
This section contains answers to the most frequently asked questions.
Q Is a plumbed-in system easy to install?
A Many suppliers can provide a full installation service. Most filtration systems, though, come with all the components necessary for DIY installation and step-by-step instructions.

Q Will the installation of a water treatment system need to comply with any Water Regulations?
A Yes, plumbed-in systems must comply with the Water Supply (Water Fittings) Regulations 1999. An approved backflow prevention device (look for the ‘approved product logo’) is required at the point of connection to the mains water supply pipe.

Q Is regular maintenance important?
A Yes, filter cartridges, membranes and UV lamps should be changed regularly in accordance with manufacturer’s instructions. Some devices may require cleaning.

FURTHER INFORMATION
Any British Water member company will be pleased to give you further information and professional advice. Not all UK suppliers of domestic filtration systems are members of British Water, however, a list of such suppliers who are members of British Water is enclosed. Further technical information is available from the 10 Factsheets which are also enclosed.

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