



**Scottish
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Developers Briefing note – Illegal lead use and drinking water

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Developers briefing note

Illegal lead use and drinking water

Recent use of illegal lead solder in new homes and home refurbishment has cost developers dearly to put right. Learn how you can avoid costly mistakes and protect your customers.



Capillary joints made with leaded and unleaded solder Can you spot the difference? See page 10

Why should home developers be concerned about lead?

Using lead solder on drinking water systems is illegal. You or your sub-contractor could face criminal prosecution.

If lead solder is found on your development, putting it right is expensive –

- you will have to remove it, replace all affected joints and make good finishes all at your own cost;
- you may have to pay to re-house residents whilst the replacement work is being done;
- there will be delays to the completion of your development project.

Utilising lead pipes and leaded solder puts your customers health at risk.

The historic use of lead

Lead has been used in drinking water and bathing systems for thousands of years and even played a key role in improving public health. In plumbing systems lead was mostly used for water pipes, in solder used to join or repair pipes, and in the manufacture of brass and copper fittings. However today when people talk about lead and plumbing, most professionals will know that for drinking water pipes and solder, lead has been prohibited for a number of years.

Why is lead still an issue?

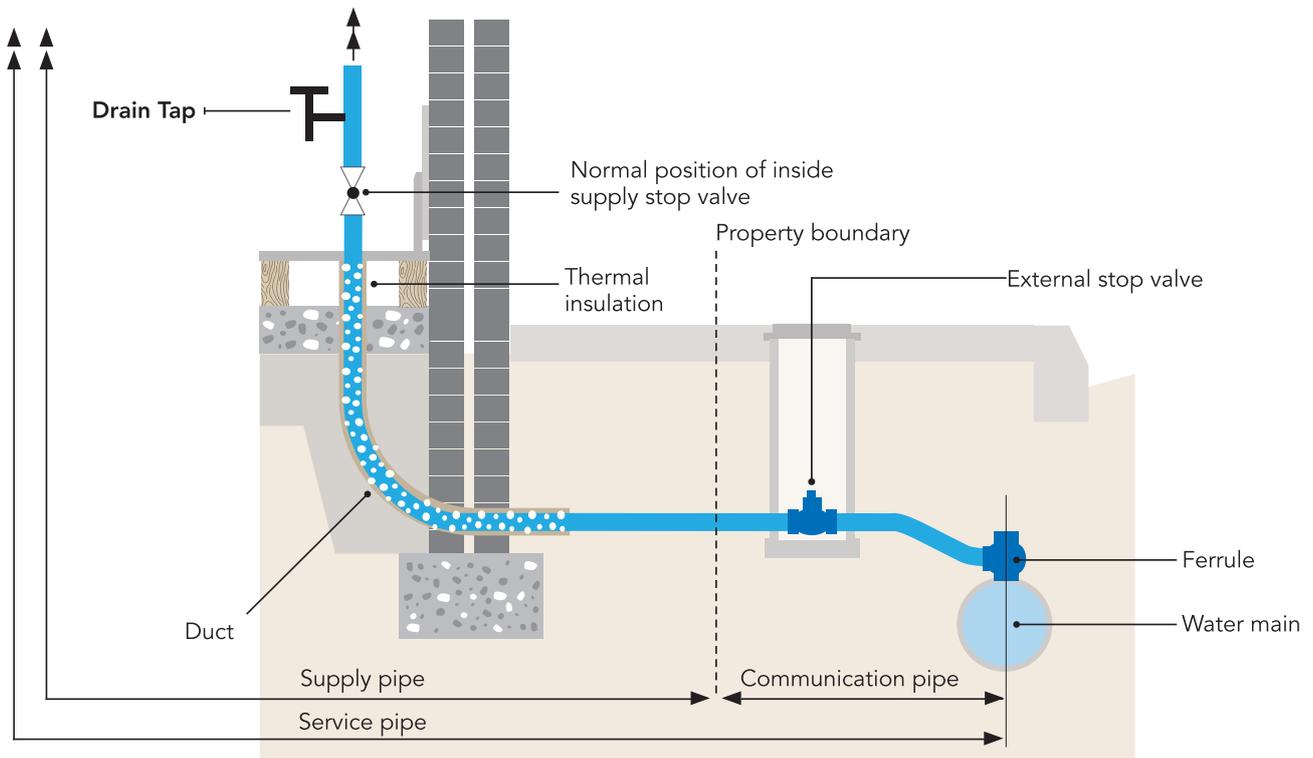
New lead pipes are no longer readily available but older premises may still have them for the supply pipe and for water distribution inside the building. Lead solder is also available and examples continue to crop up where it is being used in new drinking water systems, despite the prohibition.

There are many reasons why it is still used:

- it is permitted for certain applications such as central heating closed circuits and gas systems;
- it is also cheaper than lead free solder – approximately half the cost;
- it flows better and joints can be made more easily and at lower temperatures.

This is why you may find installers having both leaded and leadfree solder in their tool box. In the heat of installation work it can be picked up and used in error. Once installed it is difficult to tell which solder has been used without chemical testing.

Checking for lead pipes?



Typical example of the requirements for pipes entering building

In most cases the communication pipe from the main to the property boundary is the responsibility of Scottish Water. Within the property boundary, the responsibility for the supply pipe sits with the premises owner.

What's is the problem with lead?

Lead affects human health: The human body cannot get rid of all the lead it takes in, so swallowing water with high lead levels can cause lead to accumulate in the body. Over a prolonged period this build-up of lead can cause severe illness by lead poisoning. Lead is much more harmful to children than adults because it can affect children's developing nerves, brains and can permanently impair mental development. The younger the child, the more harmful lead can be. Unborn children are the most vulnerable therefore those most at risk are children, babies and pregnant women.

In some areas lead from pipes and fittings can dissolve into the water which passes through them. The amount of lead which dissolves depends on factors like the length of time the water remains standing in the pipes and fittings, the extent of any corrosion and the chemical nature of the water.

Maximum lead permitted in drinking water

From our increased understanding of these health concerns, permitted lead levels have been reduced over the years. The maximum amount of lead which is now permitted in UK drinking water is 10 micrograms per litre ($\mu\text{g}/\text{l}$), which is equivalent to 10 parts per billion.

Scottish Water carries out regulatory water sample checks on household taps throughout their supply areas. Since 2014, about 1% of regulatory samples each year are found

to exceed the permitted lead content. The Drinking Water Quality Regulators Annual Report describes instances where water has failed the lead standard due to lead pipes and lead in solder.

Modern use of lead

Before 1970, lead was used quite widely in parts of the UK for the underground service pipes connecting the water main to premises and for distributing water within premises.

Where responsibility lies

In most cases the communication pipe from the main to the property boundary is the responsibility of Scottish Water. Within the property boundary, the responsibility for the supply pipe sits with the premises owner. In the past, lead may have been used both for the communication and the supply pipes. Older houses with modern looking plumbing may still have a lead underground service pipe because it was difficult or expensive to replace it during refurbishment.

Ban on use of lead

In 1969 it became illegal to use lead for pipes and solder on pipework supplying drinking water – that is, water used for cooking, washing and drinking or food production purposes. This ban continues throughout Scotland under the Water Supply (Water Fittings) (Scotland) Byelaws 2014, which require solder to be lead-free where used for these purposes.

Refurbishing Properties



1. Lead 2. Copper 3. MDPE (Medium-density polyethylene)

Examples of supply pipes made from different materials. Lead pipe has a swollen joints compared to the others.

Refurbishing Properties

Checking for lead pipes

It should be unnecessary to check for lead pipes in properties built after 1970, unless they were built on the site of an older premises and may have used the original supply pipe or they resulted from refurbishment of older properties. The best place to check for lead pipes is where the water supply pipe enters the house. This is

usually at the internal stop-tap which may be under the kitchen sink. Another possible place to check is at the pipe connection to an underground stop valve, or water meter if present.

Unpainted lead pipes are normally dark grey or black in colour and show a silvery colour if scratched. Even if they are painted, you may be able to identify them by their larger

diameter than copper or plastic pipes and by the characteristic swollen joint where they are joined to other pipes or fittings. If they are gently tapped with a metal object, lead pipes give a dull sound rather than the clearer ringing sound from copper or iron pipes.

Replacing lead pipes

Lead pipes which had already been installed lawfully in accordance with the Water Byelaws before 1969 are allowed to remain in use provided they don't cause the amount of lead in drinking water to exceed the permitted lead content of 10 micrograms per litre. Where drinking water samples show that lead exceeds 10 micrograms per litre, the source of this lead must be traced and removed. In these cases, if premises owners replace all lead pipes which are their responsibility, Scottish Water has programs to replace any lead used in the communication pipes if owners request it. These are normally a 'like for like' replacement and there may be conditions which apply.

When upgrading the supply to existing premises or refurbishing internal plumbing, medical authorities and Scottish Water recommend removal of any lead pipe which is found as the only sure way to reduce exposure to lead in drinking water.

Repairing lead pipes

Some types of repairs to existing lead pipes are allowed provided the pipes aren't causing the amount of lead in water to exceed the prescribed limit. These should only be

considered a short term solution in response to a plumbing emergency, until a permanent pipe replacement can be arranged.

Permitted repair methods include:

- using lead-free solder to repair a small leak, on the lead pipe. This is similar to mending a nail-hole in a copper pipe with leadfree solder.
- use of a non-lead repair clamp as a temporary measure to restore the water supply pending a permanent solution. Where the clamp materials are in contact with drinking water, they must be made from suitable materials to prevent water quality problems like taste or microbial growth, and the arrangement must prevent galvanic corrosion between the repair clamp and the lead pipe.
- cutting out the damaged section of lead pipe, replacing it with an approved non metallic pipe. **Note:** No water pipe should be used for earthing purposes. All metal pipes should have equipotential bonding applied and because this type of repair may disrupt the continuity of the metallic pipe, the repairer should warn the customer to check that the equipotential bonding remains satisfactory.

Repairs to lead pipe using wiped lead joints or by replacing with a length of lead pipe are unacceptable. This is because of the prohibition on the use of new lead materials and the risk of lead being released.

Did you spot the difference?



Capillary joints made with unleaded and leaded solder

It is impossible to tell the difference just from the appearance, but Scottish Water will carry out tests to show where lead solder has been used.

Case Studies

Case Study 1

Recent replacement of plumbing system where joints were made with leaded solder

The owner of a large old house became concerned about the possible use of lead solder by the contractor as part of the extensive refurbishment being undertaken. Samples taken by the water company showed the presence of lead in drinking water. It was suspected that solder used on the new copper fittings contained lead. Samples of solder taken from pipe joints confirmed this.

As a result of the illegal use of leaded solder a Water Fittings Regulations enforcement notice was issued which required the replacement of all copper fittings throughout the extensive premises. The costs of replacing the plumbing and of making good the wall coverings, fitted units, tiling and decoration had to be paid by the developer. Although the home owner was not in residence, sorting out the plumbing severely delayed the project. The plumber and developer could have faced a criminal prosecution.

Case Study 2

Lead poisoning caused by leaded solder

After months of investigation of repeated headaches, sickness and anaemia being experienced by a four year old boy, his GP discovered he was suffering from lead poisoning. Each night he had been drinking water from a tap in the little-used en-suite bathroom of his parents' newly-built house. Examination of the pipework found that lead solder had been used on the capillary joints. The amount of lead in the tap water was more than thirty times the permitted limit of 10µg/l.

“Medium-sized house-building firms are most likely to use illegal leaded solder”

A follow-up survey in the region revealed over 15% of houses up to three years old had lead solder. The survey also found that small house-building firms were the least likely to have used leaded solder (used in 13% of houses), with medium sized firms being the most likely (used in 33% of houses)

Lead solder

Use of leaded solder

Lead poisoning (see Case Study 2) has also been caused where leadbased solder has run inside a pipe from a joint and been exposed to the water passing through the pipe (see picture right).

In cases where leaded solder has been used illegally, the installers risk criminal prosecution and the developers have borne the cost of replacing all the affected joints using the correct solder (see Case Study 1) 'Lead-free' solder should comply with the composition of Alloy Number 401 described in BS EN ISO 9453:2014 , containing no more than 0.07% lead by weight. This is being sold under alternative names such as "99C Lead free solder wire" or leadfree number 23 tin/copper alloy soft solder, referring to now-withdrawn standards. More information is given in the WRAS Leaflet No. 9-04-02 "Solders and Fluxes "1" which can be downloaded free from the WRAS website.

Brass

Some brass alloys used for water fittings contain a small percentage of lead (approximately 0.5 to 2%) to assist in the manufacturing of products. Practical studies showed that new brass fittings leached lead at concentrations that could contribute significantly towards total lead in drinking water at the tap. However lead concentrations fell over a few weeks.



Cut-away end-feed capillary T-joint showing solder run inside the pipe

It was also observed that there was often variation in the amount of lead that leached from the same type of fitting.

Advice to developers who have lead pipes

Temporary precautions

Only use water from the kitchen cold tap for drinking and cooking purposes. Water from the hot system may dissolve more metals from the plumbing materials and is not recommended for these uses. Flush the tap before you drink, as the longer water stands in lead pipes the more lead may dissolve into the water.

If it is more than 30 minutes since the tap was last used, before you take water for drinking or cooking, flush the tap first. To avoid waste you should use the water you flush out for another purpose. The amount you need to flush depends on the length of lead pipe present, but a full washing up bowl (nine litres or two gallons) should be enough. The water should be run at a brisk rate, but not fast enough to cause unnecessary splashing.

Lead pipe replacement

Flushing is only a temporary remedy. Medical authorities, Scottish Water and regulators recommend all lead pipes should be removed when upgrading the supply to existing premises or refurbishing premises internally.

Licensed plumbers and contractors

We would always recommend the use of licensed plumbers. A licensed plumber will certify that his or her work meets the requirements of Water Byelaws. If any breaches are subsequently found in the certified work, the legal responsibility would fall upon the plumber and not you, the owner or occupier. Scottish Water advises the use of professional plumbers and plumbing contractors who are members of recognised national licensing schemes. There are a number of benefits in using members of such schemes. These include:

- [Their work is certified as complying with Water Byelaws](#)
- [Properly trained and qualified personnel are available](#)
- [Members are audited/inspected on a regular basis](#)
- [They hold public liability insurance](#)
- [They must submit Financial Integrity statements annually](#)

Scottish Water supports and promotes the WaterSafe scheme. WaterSafe is a dedicated online search facility to help customers find the nearest qualified plumbing and heating professionals in their area.

The Scottish and Northern Ireland Plumbing Employers' Federation (SNIPEF) runs the Plumbing Industry Licensing Scheme and this is part of WaterSafe.

To find a licensed plumber in your area, visit **watersafe.org.uk** or **needaplumber.org**

We also support the national Water Industry Approved Plumbers' Scheme (WIAPS). For full details of the scheme and to obtain a list of registered plumbers in your area visit **wras.co.uk/plumber_scheme**.

How Scottish Water can help you

General information on Water Byelaws issues, frequently asked questions and useful links can be found by visiting our Water Byelaws webpage at

scottishwater.co.uk/byelaws. Alternatively, you can contact the Water Byelaws team by email at **byelaws@scottishwater.co.uk** or write to the Water Byelaws team at:

Scottish Water

Water Byelaws Team

The Bridge

Buchanan Gate Business Park

Cumbernauld Road

Stepps

G33 6FB

Our Water Byelaws team is responsible for the enforcement of Water Byelaws and carry out inspections of premises. They also provide an advice service to anyone seeking information or clarification on any Water Byelaws related issue. Although we cannot provide a design service for plumbing systems, we will be happy to provide information on how you can ensure compliance with Water Byelaws.

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Alternative formats of this leaflet can be made available free of charge. For information on Braille, large print, audio and a variety of languages, please call our Customer Helpline.

If you have a disability, medical condition or other reason where you may need additional assistance from Scottish Water then please contact us and we can add your name, address and requirements to our confidential Additional Support Register.

We record all calls for quality and training purposes.

* For more info and T&Cs visit www.scottishwater.co.uk/textterms