

## preventing bath water scalds using thermostatic mixing valves

This factsheet presents background information mainly for people working with children and families, and students undertaking projects.

More advice on bath water burn prevention can be found in the **capt** factsheet *bath water scalds* ([www.capt.org.uk/pdfs/factsheet Bath Water Scalds.pdf](http://www.capt.org.uk/pdfs/factsheet Bath Water Scalds.pdf)) and on burns prevention more generally in **capt's** leaflet *How safe is your child from burns and scalds?* written for parents and carers. A sample of this leaflet can be downloaded from **capt's** website [www.capt.org.uk](http://www.capt.org.uk), where you can also find out how to purchase bulk supplies.

Child Accident Prevention Trust publishes a range of resources for parents, carers and older children, containing comprehensive safety advice. A complete list of these resources – leaflets, booklets, posters, guides, etc – can be found at [www.capt.org.uk](http://www.capt.org.uk) together with details of how to obtain them.

### 1. Why are bath water scalds a problem?

Hot bath water is responsible for the highest number of fatal and severe scalding injuries among young children.

Every year around 500 children are **admitted** to hospital (the great majority are under five years old) and a further 2000 **attend** their local accident and emergency department as a result of bath water scalds. Over two thirds of those admitted to hospital stay there for five or more days, or transfer to a specialist hospital or burns unit. In a handful of cases, the child dies.

While the numbers suffering bath water scalds are relatively low compared with some other types of injuries, there are long-term repercussions for the children, their families and the health service. Children may require skin grafts until they stop growing 15 or 20 years later. Even after this long and painful treatment, the child may still be permanently disfigured – leaving a lifetime burden of guilt on their parents.

Bath water scalds can be very expensive injuries to treat – a severe injury can cost the NHS as much as £250,000.

Young children are most at risk from bath water scalds because their skin is far thinner and more vulnerable than that of adults. As a result they sustain scalds more quickly and at lower temperatures, and often to a greater depth.

The degree of scalding depends on the temperature and volume of hot water, and the length of time a child's body is exposed to it. It can take only seconds for a severe scald to occur.

Deprivation increases the likelihood of a child suffering severe scald injuries. Research indicates that children from the poorest families are more likely to be admitted to hospital with scald injuries and to be admitted with more severe scald injuries than children from wealthier homes.

People with a reduced ability to perceive risk or react to hazardous situations (e.g. those with sensory, motor or learning difficulties) are also at a greater risk of injury. Elderly people make up three quarters of all deaths from bath water scalds – around 20 fatalities each year.

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## 2. How do these accidents happen?

Young children learn by experimenting but are unaware of what will hurt them. There are two common scenarios that result in young children and babies being scalded:

- ♦ there is a toddler and a younger brother or sister in the bath. The parent or carer briefly goes out of the room, for example to answer the door or phone or to get a towel. The toddler plays with the hot tap. While the toddler may be able to climb out, the baby cannot and is severely scalded. Leaving a child unattended in the bath is something that parents do – not everyone realises the hazards associated with doing this.
- ♦ the bath contains very hot water that needs cold water to be added to make it suitable for bathing. The adult who was going to bathe is out of the room. The toddler drops a toy in the bath and climbs in to retrieve it. He or she is instantly and extensively scalded.

Despite recommendations to the contrary, most people still fill baths by first running hot water and then adding cold water to regulate the temperature. The unstable gait and poor co-ordination of a toddler can easily turn experimentation into a serious accident.

## 3. How can I prevent bath water scalds?

The best solution is to ensure that the water coming out of the hot tap is not so hot that it will immediately cause severe scalding. This can be achieved using a thermostatic mixing valve (TMV) or by turning down the temperature of the water in your boiler or water heater. However, there are strong arguments against turning the water temperature down (see question 13).

Putting cold water in the bath first then adding hot water can reduce the risk of severe scalding, but it is not a completely reliable solution. As explained in question 2, one of the most common scenarios that lead to these injuries is when a toddler plays with the hot tap when left briefly unattended. This results in very hot water being added and, if the children in the bath cannot escape immediately, they can suffer very serious injuries.

Bath plugs that change colour when the water is above normal bathing temperature are available but Child Accident Prevention Trust does not regard these as safety devices. Children may not realise the significance of the colour change, or may play with the taps just to see the plug change colour. Also, some plugs do not distinguish between water that is just too hot to be comfortable and water that is so hot that it may scald immediately.

## 4. What is a thermostatic mixing valve?

A thermostatic mixing valve (TMV) is a device that mixes hot water from the boiler / water heater with cold water and delivers it through the hot tap at a preset temperature. This is done automatically by a thermally sensitive mechanism within the valve that controls the amounts of hot and cold water entering, so as to achieve the required blend.

The mechanism automatically compensates for any variations in the pressures or temperatures of the water supply to maintain a safe temperature. If the cold water supply fails, the thermostatic mixing mechanism will automatically shut down to restrict the flow of hot water being discharged from the tap.

By allowing water to be stored and distributed at a high temperature the risk of legionella bacteria growth is reduced. (See question 13).

## 4. I understand that TMVs have been available for a long time. What is new now?

TMVs have been used for several years in hospitals, care homes and other similar establishments. The valves used in these places meet a higher specification than is needed in the home and also require more maintenance. A new generation of TMVs have now been designed that are suitable for the home. They are known as TMV2 valves.

### 5. Where can I get a TMV?

The market for TMV2 valves is very new and at this stage the valves will not be available through ordinary DIY retailers. The main reason for this is that manufacturers recommend that they are fitted by qualified plumbers. The valves will therefore, initially at least, only be available through plumbers' and builders' merchants. **TMVs do require annual servicing / checks, just like a gas boiler, to ensure they are continuing to function properly.** This is one reason why purchasers should have them installed by a qualified plumber.

### 6. How do I know that my TMV has been certified?

Thermostatic mixing valves are manufactured to conform to British Standard BS EN 1111 or BS EN 1287. To ensure that they conform with these standards, an independent certification scheme is run by BuildCert, an organisation that checks plumbing and building products. Valves conforming to these standards and the BuildCert scheme are capable of maintaining a flow of water at a steady temperature at all times and will shut down to restrict the flow of hot water being discharged from the tap, protecting the consumer from scalding by unmixed hot water.

### 7. Can I fit a TMV myself?

Manufacturers recommend that they are fitted by qualified plumbers. (See question 6).

### 8. Should I fit a TMV to my bathroom wash basin and kitchen sink?

The most serious scalds occur in the bath, not basins and sinks, so while you could fit them to these outlets there is less need for them. In the kitchen, you may need water that is hotter than you use for bathing or hand washing to ensure that grease is removed from dishes, cutlery and pots and pans.

### 9. How much does a TMV cost?

Thermostatic mixing valves for the home are available from £50 rising to over £100 depending on a number of factors including size, finish and specific design. Also, because the valves need to be fitted by a qualified plumber, the cost can vary considerably depending on whether it is fitted as part of other plumbing work or commissioned as a separate installation.

### 9. Can I adjust the water temperature from the TMV?

No, TMV2 valves are preset at a temperature that will not cause rapid and severe scalds. The water coming out of the hot tap should be at 44°C, but because of manufacturing tolerances could be as low as 42°C or as high as 46°C. At the top of this range, it will be uncomfortably hot although it will not scald you or your child immediately.

### 10. Will the water be the right temperature for me to bathe?

Adults typically bathe at a temperature around 38-40°C and the British Burns Association recommends 37-37.5°C as a comfortable bathing temperature for children.

When water in the range 42-46°C goes into a metal bath in a cold bathroom it will cool very quickly. If the preset temperature of the valve was set any lower than 44°C, remembering that there is a plus or minus 2°C tolerance, the water in your bath may be too cool for a comfortable bath in some circumstances. For adults, bathing temperature is a very personal thing – some people like baths to be really hot, while others like cooler water.

Remember that the TMV only controls the temperature of the water coming out of the tap. This is not the bathing temperature. It is essential that you check the temperature of the water in the bath with your elbow before you put your child into the water.

### 11. Why can't I just turn the thermostat on my boiler / water heater down?

There are two reasons why this is not the preferred solution:

- You need water at different temperatures at different taps throughout the house – hotter at the kitchen sink and cooler in the bath. Changing the boiler / water heater thermostat does not allow for this.
- A bacterium that causes a pneumonia-like illness, known as Legionnaire's disease, can exist in water systems. For some people, especially young babies, older people and people with certain medical conditions, this can be a very serious illness. The bacterium is destroyed in minutes at 60°C or above so keeping your boiler / water heater thermostat set to this temperature reduces the risk of the disease. However, water at this temperature can cause immediate and severe scalding.

The significance of Legionnaire's disease in the home should not be overstated. It is mainly associated with water and air-conditioning systems in institutional settings such as hospitals, nursing homes, large offices and factories.

### 12. I live in private rented accommodation. What should I do?

There is no obligation on private landlords to fit TMVs to existing or new properties.

If the landlord is undertaking improvement work that is being funded through government grants, it may be possible to include the installation of a TMV within the work programme.

### 13. I rent my home from a housing association. What should I do?

Your housing association may have a programme of housing improvements that include fitting TMVs.

The Housing Corporation has funding schemes for housing associations in England. Their *Scheme Development Standards*, which have to be met for a housing association to obtain certain grants, recommend that, for general housing, hot bath taps should have a thermostatically controlled supply. (For housing for older people, the Standards regard this as essential). You should speak to your housing association, either directly or through your tenants' association, and ask them whether they have plans to fit TMVs.

You could also measure the temperature of the water at the bath tap and, if it is very high, point out the scalding risk to your children. Again, working with other tenants may help.

### 14. I rent my home from my local council. What should I do?

There is no obligation on councils to fit TMVs to existing or new properties. However, their willingness to do so may vary from one council to another, so it is worth speaking to your housing department. You could also measure the temperature of the water at the bath tap and, if it is very high, point out the scalding risk to your children. Again, working with other tenants may help.

### 15. Are the requirements for TMVs the same in all parts of the UK?

No. Different regulations with regard to the fitting of thermostatic mixing valves apply in different parts of the United Kingdom. In Scotland, the Building Standards require their fitment in new properties and when a major refurbishment is being undertaken. This is not currently the case elsewhere although work is in progress to get the Building Regulations that apply in the rest of the UK changed.

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