

Unit 206: Domestic hot water systems

Outcome 5

Basic maintenance requirements of hot water systems

Maintenance

Indicators

Poor flow rate: If the flow rate is less than the required manufacturer's instructions, or the customer notices a drop in the flow rate, an inspection will need to take place.

- Temperature settings on thermostat
- Limescale blockages
- Filters cleaned
- Valves are fully operational
- Lubrication of parts
- Pipe size too small



Maintenance

Indicators

Unbalanced pressure: Manually controlled showers rely on balanced pressure. Sometimes debris can partially block or a piece of the feed pipework is damaged or squashed and this can effect the flow rate and therefore the temperature.

- Temperature settings on thermostat
- Limescale blockages
- Filters cleaned/pipework inspected
- Valves are fully operational
- Lubrication of parts



Maintenance

Indicators

Valves passing water: If an isolation valve is old or hasn't been closed for a period of time it may not close fully and therefore **pass water**. This can be caused by a build-up of limescale, debris, de-zincification, or a damaged O ring.

- Dismantle valve
- Remove debris or lime scale
- Check seals on shower body
- Inspect parts
- Lubrication of parts
- Replace if necessary



Maintenance

Indicators

Leaks: These will occur when components are not joined together properly due to poor installation; components have corroded; components have not been insulated and have been damaged when frozen; or when components have worked loose over time.

- Tighten compression fitting nut
- Repack glands/O rings
- Replace part
- Lubricate parts



Maintenance

Indicators

Expansion noise: This occurs in hot water or central heating pipework. As heated water passes through the pipes, it expands and the pipework creaks. The same happens as the pipes cool.

- Inspect clips/brackets
- Inspect notching
- Inspect insulation and padding

Maintenance

Indicators

Flow noise: If the flow of water (velocity) is above 3m/s the noise can become audible, so systems should be designed to operate below this velocity – BS6700.

Sometimes noise can be heard as cisterns refill. In this case, collapsible silencers can be used.

- Increase the pipe diameter
- Install a pressure reducing valve

Maintenance

Indicators

Water hammer: This can be a common complaint when the CWSC is refilling after hot water has been used. Either a juddering sound is vibrated in the pipework as the FOV shuts off, or the FOV shuts off suddenly sending a shock wave down the pipework.

- Inspect FOV and tap washer
- Install flow restrictor
- Change to an equilibrium valve
- Inspect clipping distances

Maintenance

Faults

Thermostat failure: The hot water temperature will be affected. If the stat fails open, the customer will have no hot water; if it fails closed, the temperature will continue to rise, potentially to dangerous levels.

The customer will notice both faults but these will need to be inspected carefully.

Indicator: No hot water; hot water too hot; cold water warming up; steam in loft area; open vent discharging.

- Replace cylinder stat

Maintenance

Faults

Immersion element failure: In a direct cylinder the customer will have no hot water, in an indirect cylinder the customer may not know until they need a back-up heat source.

Indicator: No hot water; fuse blowing; MCB tripping

- Replace immersion, complying with Building Regulations Part P



Maintenance

Faults

Failure of heat source: The primary heat source is commonly a boiler or immersion heater but could also include a green energy source. This would result in no hot water. Always check the basics first like the fuse and time clock settings and on/off switch.

- Arrange for a Gas Safe engineer to rectify boiler
- Replace immersion, complying with Building Regulations part P

Maintenance

Faults

Failure of coil: If the coil fails, the pressure from the CWSC is slightly greater than the pressure from the F&E cistern. This means water is forced into the primary system and will cause the warning pipe on the F&E to discharge. Also the hot water may be slightly discoloured when drawn off.

Indicator: F&E overflow dripping; hot water discoloured.

- Replace cylinder with a current approved part L cylinder



Maintenance

Faults

Loss of air bubble: This will only occur in a single feed cylinder or certain unvented cylinders. With the single feed cylinder the hot water will be discoloured when drawn off. With the unvented cylinder the pressure relief valve will discharge when the water is heated.

- In both cases the secondary system will need draining to the base of the hot water cylinder
- Then the system can be refilled, which will reinstate the air bubble

Maintenance

Faults

Water boiling: This should be evident to a customer, with steam in loft area, the open vent discharging and water dangerously hot when drawn off.

This occurred when old immersion heater thermostats failed with the element still powered. If older immersions are found they need to be replaced with new immersions that contain a non self-resetting thermal cut out.

If a cylinder stat fails, the water will continue to heat but will then be controlled by the boiler stat, which should cut out at approximately 80-85°C.

Maintenance

Faults

Cold water warming up: This can happen due to the hot and cold water pipes being too close together and so the heat from the hot water pipe transfers over to the cold water pipe. Hot water pipes should be installed above cold water pipes to avoid this transfer of heat, and insulated to avoid heat loss.

As already mentioned, if the hot water cylinder overheats, the vent pipe discharges into the CWSC and this can also warm the cold water up.

BS8000 pt15 states that the hot pipe should be above the cold pipework, and that if there is any possibility of heat transfer the pipe should be insulated.

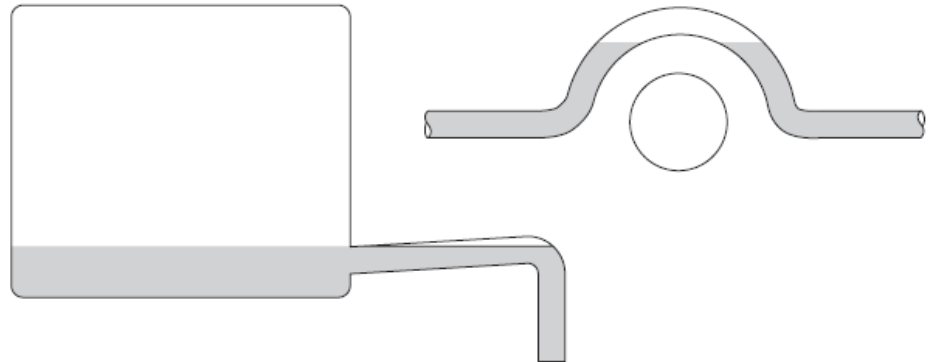
Maintenance

Faults

Air locks: This generally occurs in low pressure systems, when pipework is not installed correctly, and it can be a constant nuisance especially when commissioning. A common situation is when horizontal pipework slightly rises, allowing air to be trapped and water pressure is too low to push the air out of place.

Indicator: No flow of water or intermittent water flow.

- Install pipework correctly



Maintenance

Faults

Blockages: These generally occur due to debris in the system and will affect the flow rate at draw off points. At the commissioning stage, the system will need to be flushed out to remove any debris – BS6700. If a valve does not fully open or breaks, or if pipework gets squashed, this can also cause blockages.

Indicator: Restricted water flow.

- Remove and clean filters
- Trace draw off points and pipework to locate blockage
- Remove and replace

Maintenance

Faults

Limescale: This is very apparent in hard water areas and can cause blockages, jam components, reduce efficiency and cause unsightly build ups. Sometimes most noticeable on shower heads where the flow rate from the rose reduces over time.

Indicators: Reduced water flow; build ups on draw off points; stiff valves.

- Install a water softener or install a scale inhibitor

Maintenance

Faults

With any situation, always look at the basics first:

- Temperature settings
- Timer settings
- Fuse
- Water treatment
- Installation and connections
- Insulation

Maintenance

Faults

Temporary hard water can cause maintenance problems in plumbing systems. If hard water is heated above 65°C, it loses its calcium and limescale is formed. Look at the inside of the kettle.

- The limescale insulates the water from the heat source
- The limescale can cause blockages

Ideally, hard water needs to be treated before it enters a domestic water system.

Maintenance

Faults

There are instances when warm water comes out of cold taps.

This is generally caused by:

- A hot pipe touching a cold pipe
- The hot pipe has been installed below a cold pipe

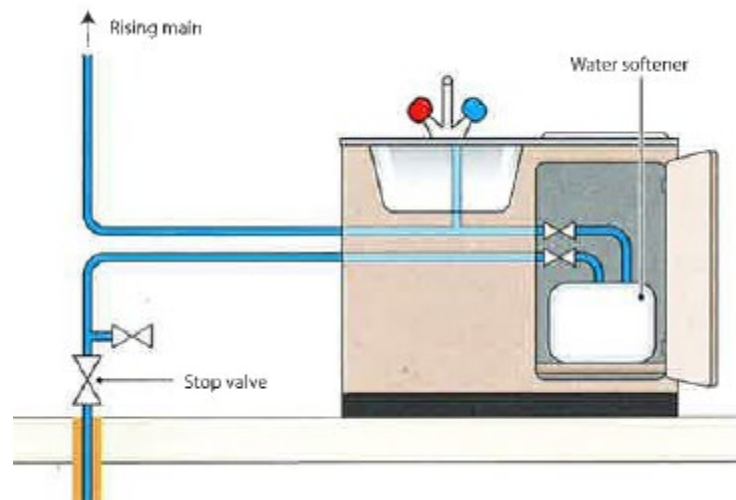
Both these situations relate to heat gain: a cold pipe should always be installed below a hot pipe to prevent heat gain.

Maintenance

Water softener (or base exchange unit)

The only true way to totally prevent scale, scum and tide marks is to fit a water softener.

This is a process where water is taken through a **zeolite** or resin bed before flowing out of the top of the vessel to the tap. The resin holds the calcium within the filter. The unit is then back-washed by a brine solution to allow the process to resume.

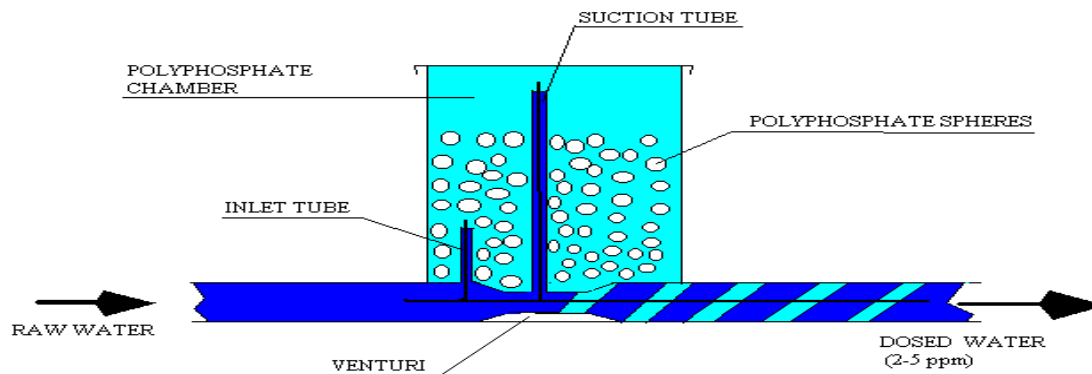


Maintenance

Chemicals

These can be used but they do not soften the water; they stabilise the salts to prevent scale. Calcium crystals tend to bind together to form hard scale.

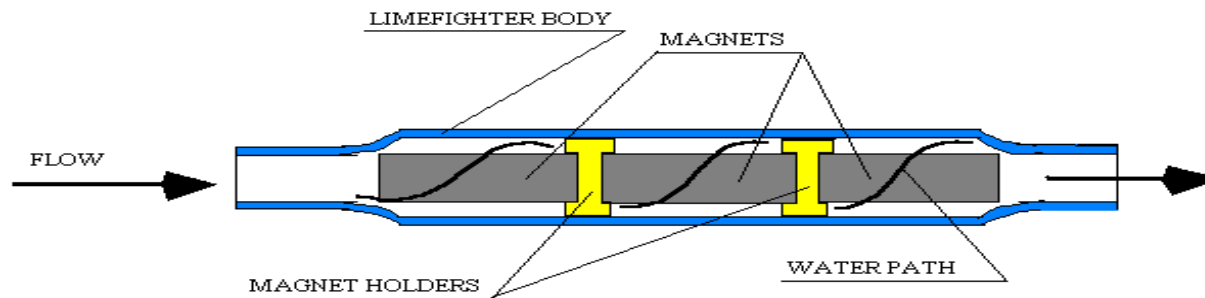
Polyphosphate chemicals form on the calcium crystals, preventing them sticking together and getting caught up in the cartridge filter. These are found on the cold water inlet to combination boilers prior to the boiler heating the water.



Maintenance

Magnetic scale inhibitors

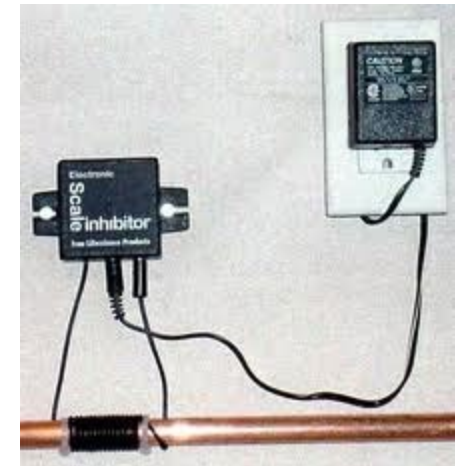
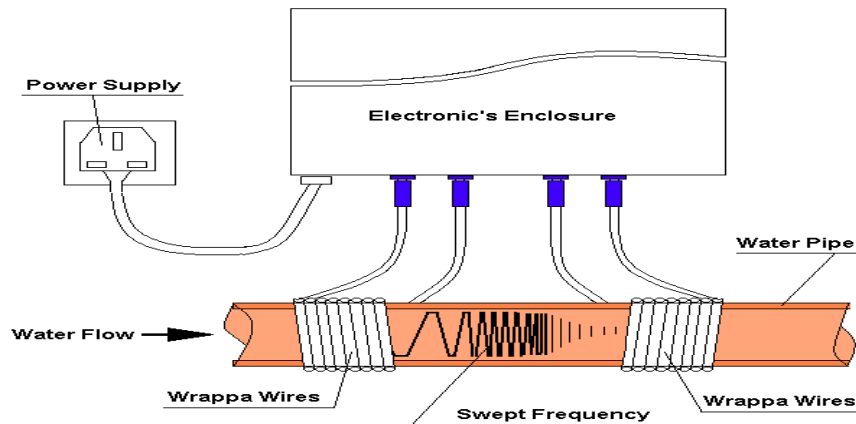
The water is passed through a strong magnetic field running across the water flow. This alters the physical nature of the water and breaks the salt crystals down into small pieces so they cannot stick together.



Maintenance

Electrical scale inhibitors

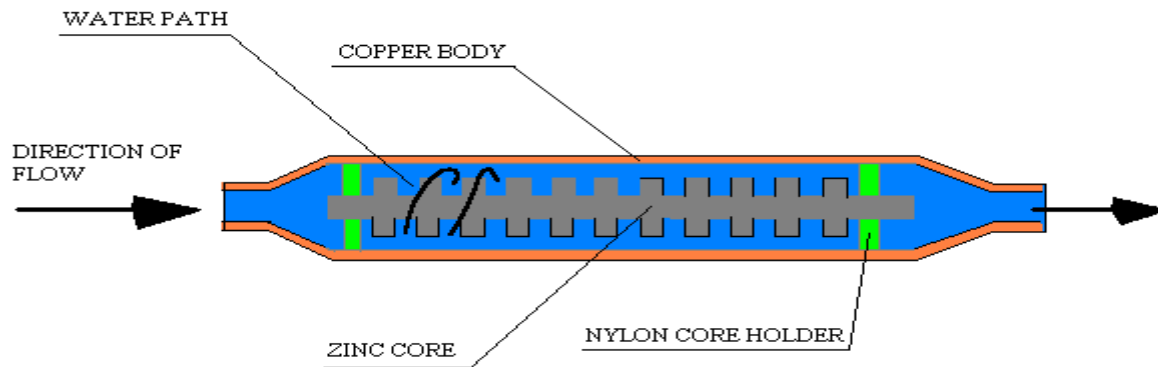
Work in a similar way to the magnetic inhibitors except they use a magnetic field to produce low level radio waves that pass through the water.



Maintenance

Galvanic cell scale inhibitor

Uses a combination of zinc and copper to form an electron flow (zinc being the anode that will break down).



Maintenance

Drinking water filters

These alter the water composition of the water to improve the taste.

Both jug filters and plumbed-in filters will need replacement on a regular basis. The plumbed-in filters are used prior to worktop boilers in kitchen areas.

