

## **Unit 206: Domestic hot water systems**

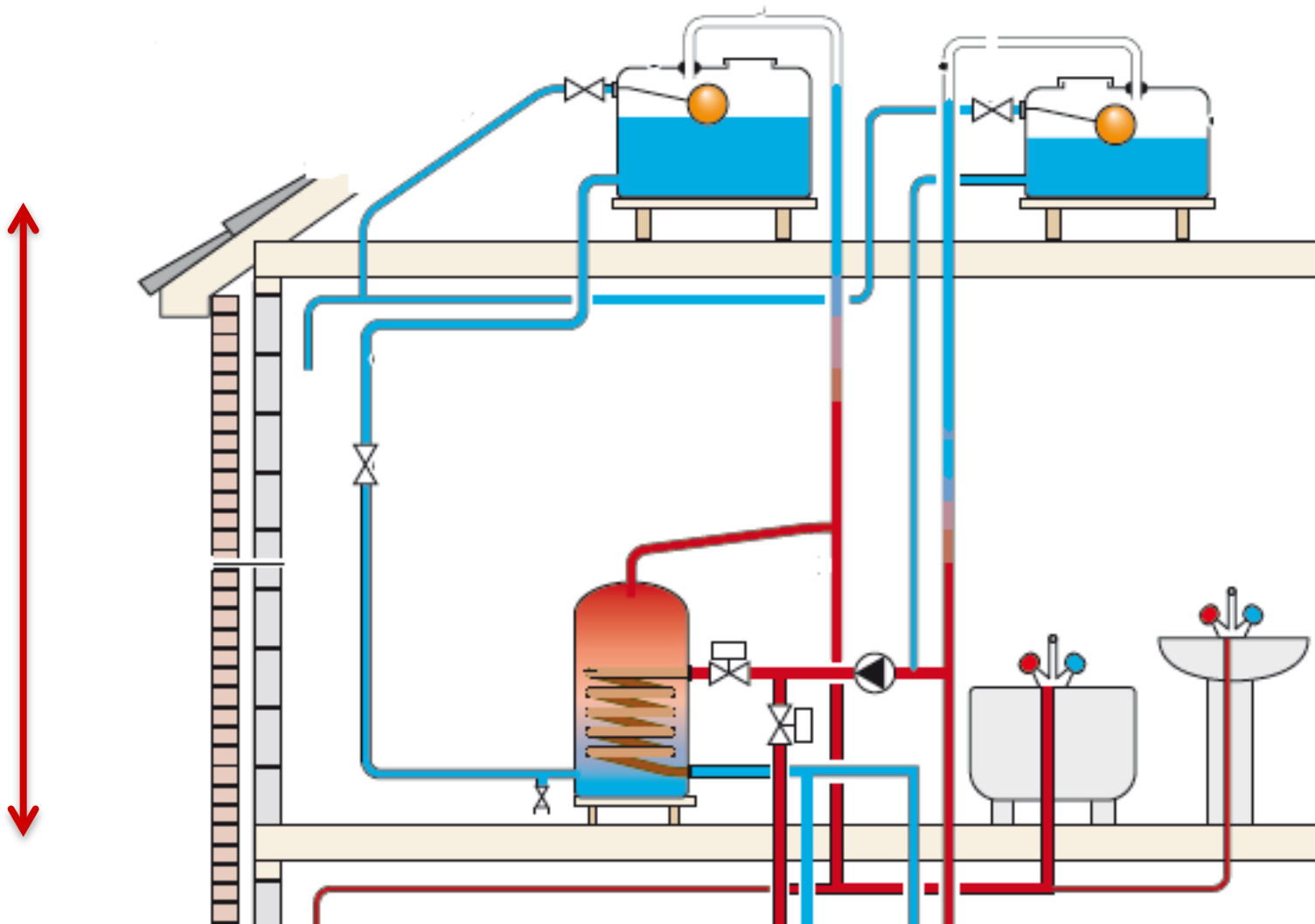
# Outcome 3 (part 1) Installation requirements of domestic hot water plumbing systems

# Installation

A standard, gravity fed, hot water system requires the head height between the cold water storage cistern and the hot water cylinder to be as high as possible.

The greater the head height, the greater the pressure.  
The larger the pipe diameter, the greater the flow rate.

# Installation

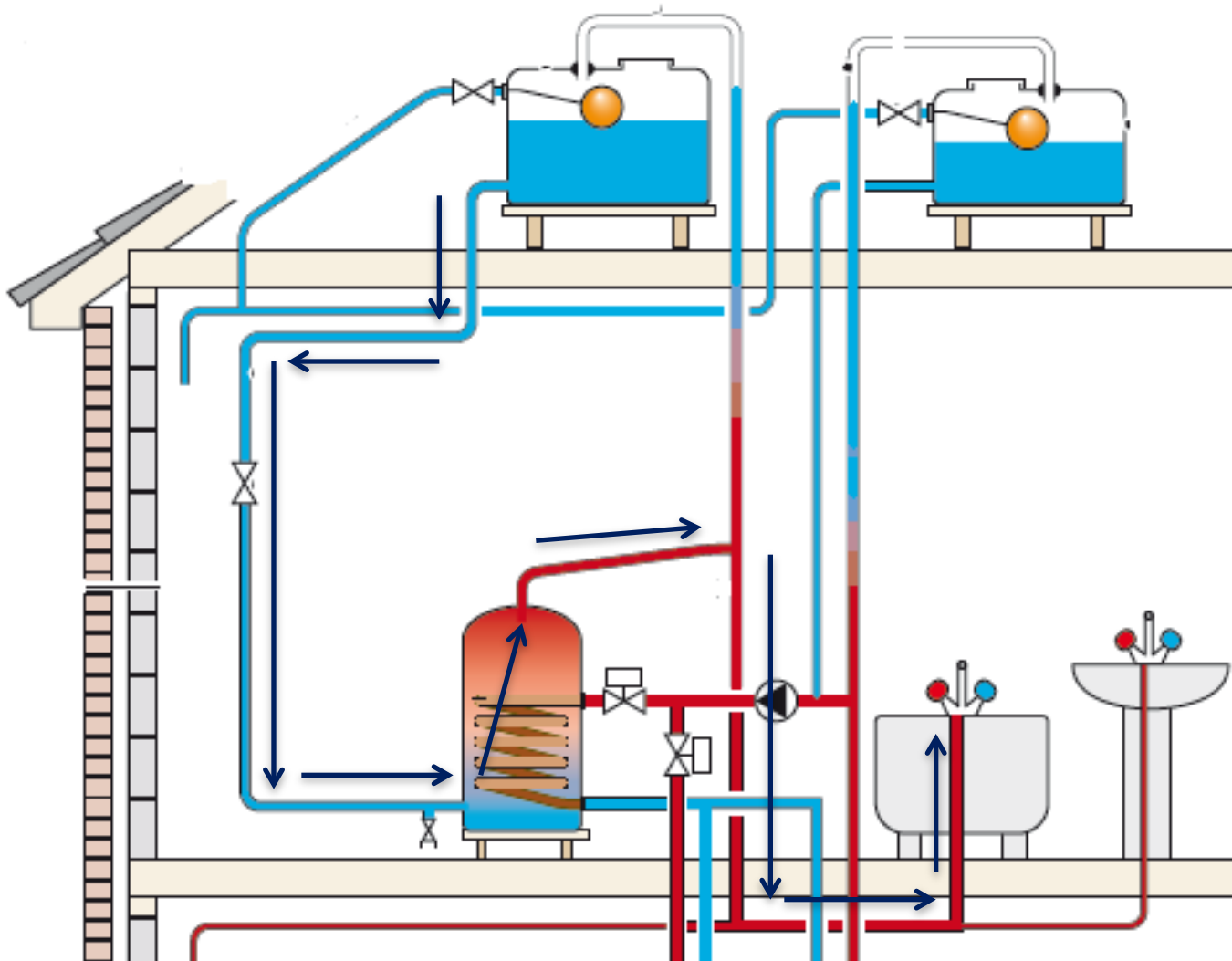


# Installation

When a hot tap is opened the weight of the water under gravity pushes the cold water from the CWSC, down the cold feed pipe into the hot water cylinder.

In turn, the hot water in the cylinder leaves the top of the cylinder via the hot distribution pipe and travels through the pipework towards the outlet.

# Installation



# Installation

The connection to the CWSC of the cold feed is made via a tank connector – these can be compression or push fit. The position of the connection is vital.

From the bottom of the CWSC, measure up 25mm, which will be the cold distribution. Measure up a further 25mm and this will be the cold feed position. The cold feed is sized according to BS6700.



# Installation

The cold feed is **always** positioned above the cold distribution. This is because if the float operated valve was to fail and the cistern did not refill with water, the CWSC would eventually empty of water.

The highest tapping is the cold feed, which would mean the hot water would stop first and therefore avoid any scalding to people, particularly in a shower.

All pipes should be laid with a slight fall (except the hot water draw off) to prevent airlocks within the system.

# Installation

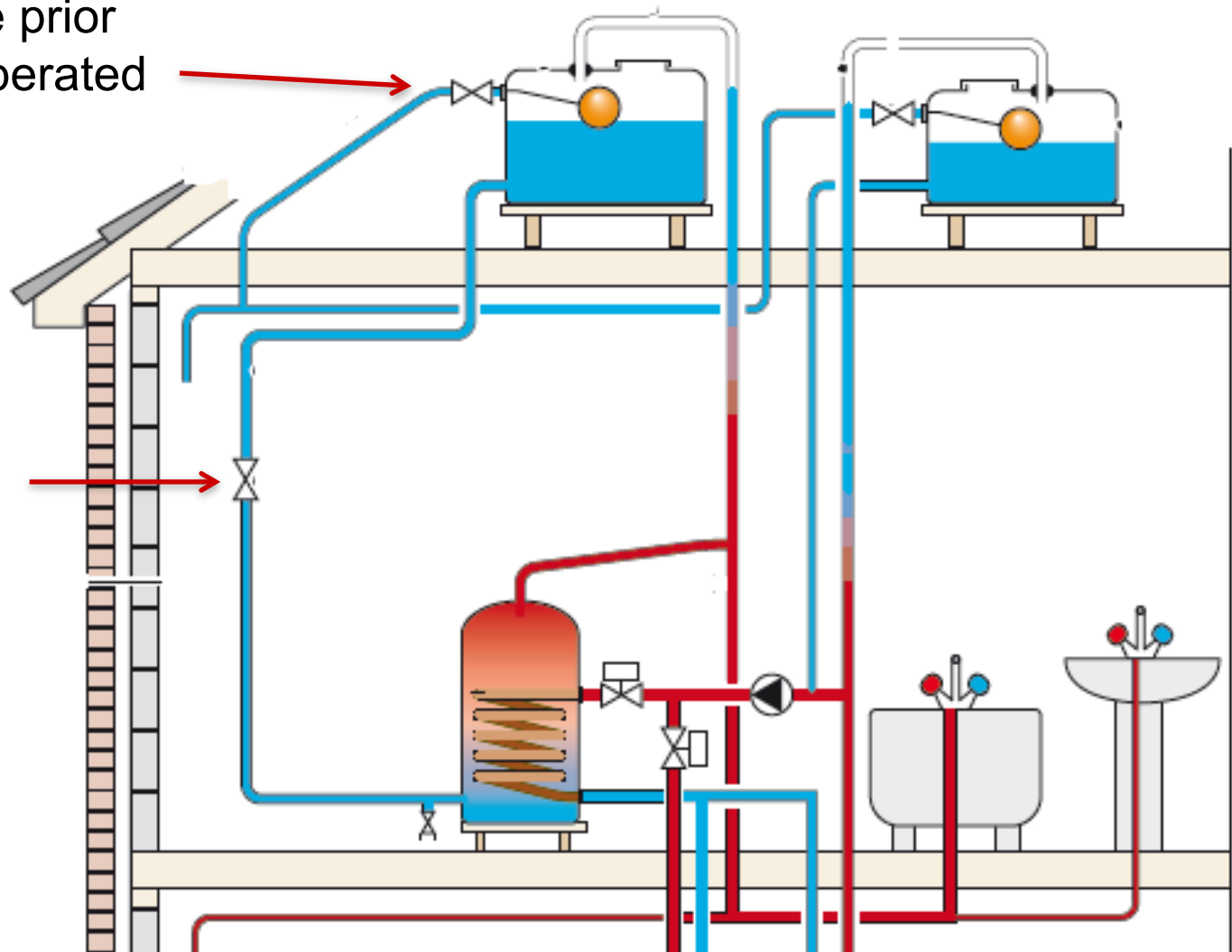
On a rising main to the CWSC, just prior to the float operated valve, a service valve must be installed to allow maintenance on the float operated valve.

On the cold feed pipe, a fullway gate valve must be installed, generally within 1 metre of the cistern. (It must be a fullway gate valve, as this is a low pressure system.) This means it will generally be found in the loft or airing cupboard. This gate valve, if closed, will stop the flow of water to the hot water system and therefore allow maintenance to be carried out.



# Installation

Service valve prior  
to the float operated  
valve



Fullway gate  
valve on the  
cold feed

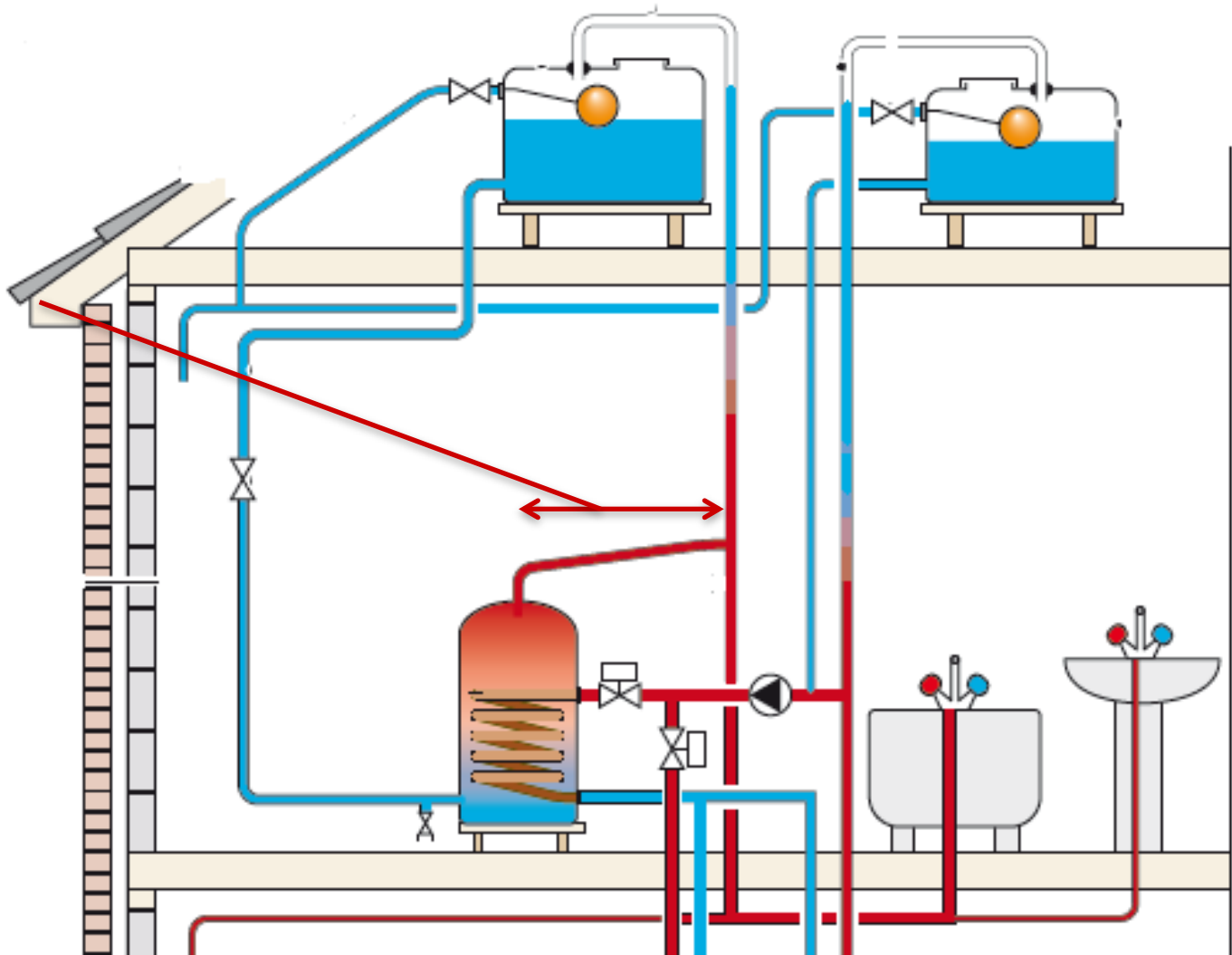
# Installation

When a hot water outlet is opened the hot water leaves the cylinder via the hot distribution pipe. The initial part of the hot distribution, which leads to the vent pipe connection, must be a minimum of 450mm in length and slightly rise towards the open vent.

The 450mm length of pipe prevents one pipe circulation which causes loss of heat. The rise in the pipe allows for any air to migrate up towards the open vent, rather than being trapped and causing an air lock.

# Installation

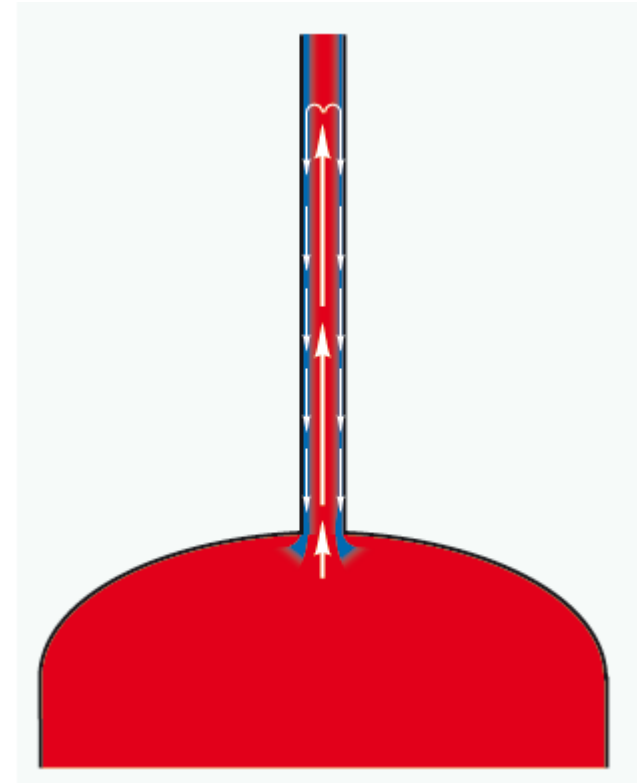
450mm long  
preventing  
one pipe  
circulation.  
Slightly rising  
allowing any  
air to escape  
up the open  
vent.



# Installation

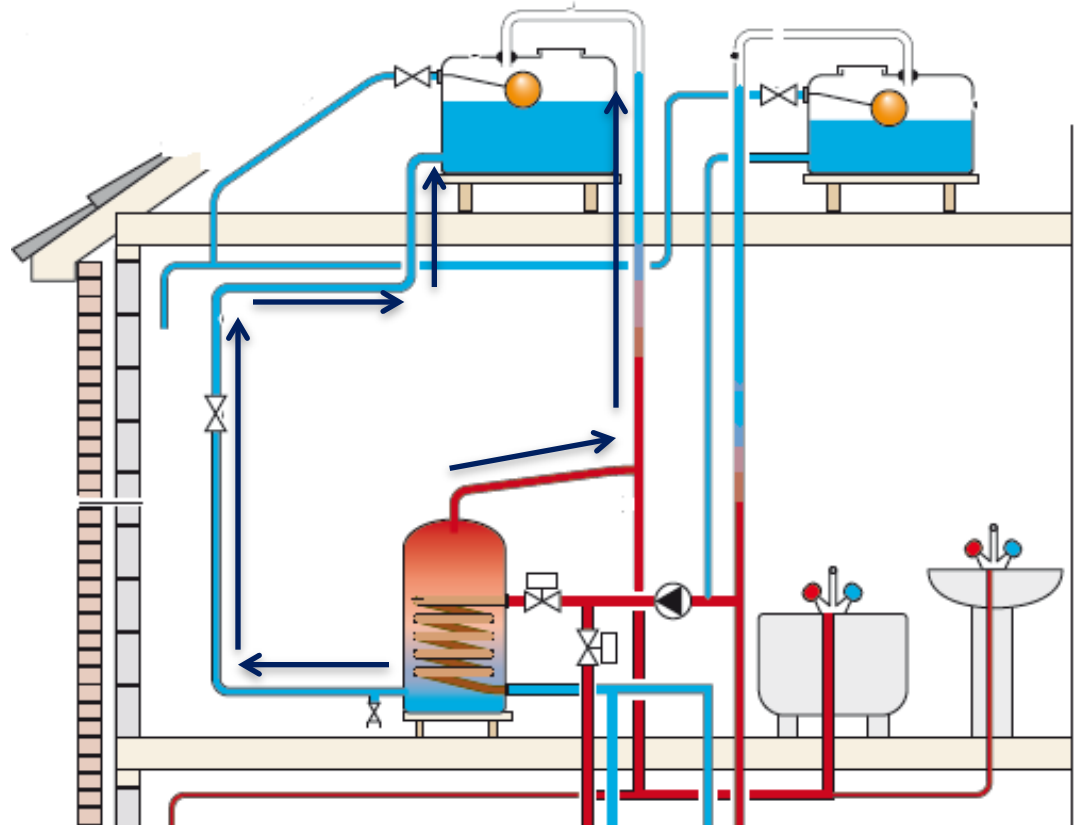
Parasitic circulation (or one pipe circulation) is circulation that occurs within the same pipe. It generally occurs in open vent pipes that rise vertically from the hot water storage cylinder.

The hotter, central water rises up the vent pipe and the cooler water, near the walls of the pipe, falls back into the cylinder. This can be a major cause of heat loss from hot water storage cylinders.



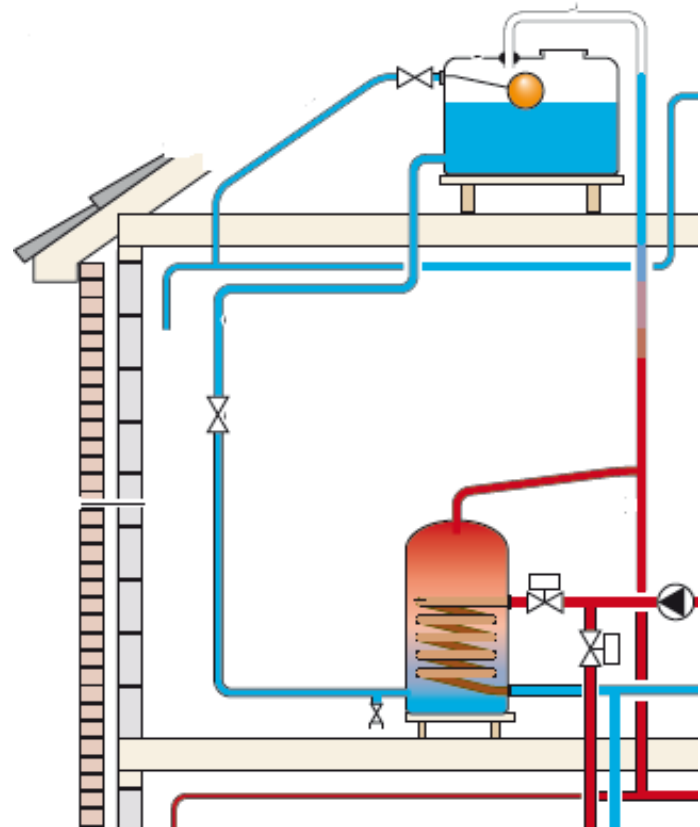
# Installation

The open vent pipe rises vertically from this connection to the CWSC cistern. Both the open vent pipe and cold feed pipe (but primarily the cold feed pipe) take up the expansion in the hot water when it is heated. The water level in the CWSC will rise slightly.



# Installation

The open vent pipe must not be smaller than 22mm and must terminate over the cold water storage cistern. It also must not have any valves connected to it, as its primary function is safety in case of the system overheating.



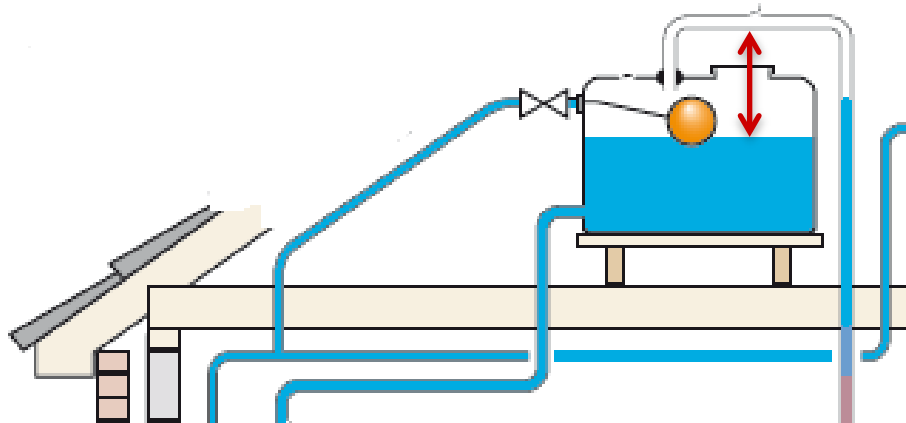
# Installation

It is important that the height of the open vent pipe over the CWSC is measured correctly.

From the water level:

The 22mm vent height from secondary hot water system is worked out by:

$150\text{mm} + 40\text{mm per metre of system height (m)}$



# Installation

All hot water cylinders **must** be part L compliant, which means they heat up efficiently and they do not lose the heat when heated, due to the insulation.

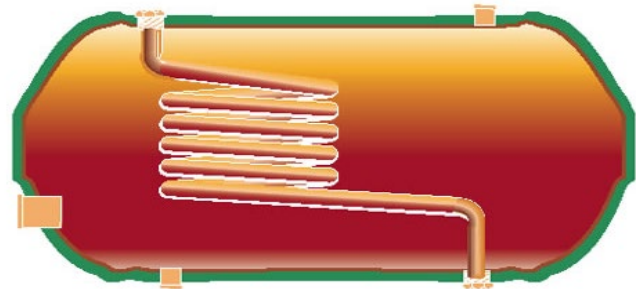
The cylinders are labelled with a Benchmark certificate, outlining the details of the cylinder.





# Installation

If a hot water cylinder is required to be installed in a loft or attic area (sealed system) where height may be restricted, a horizontal cylinder may be an option.



# Components

## Thermostat

The boiler has a thermostat that regulates the primary water temperature, which flows to the coil. When the primaries are up to temperature, the boiler will cut out until the temperature reduces.



# Components

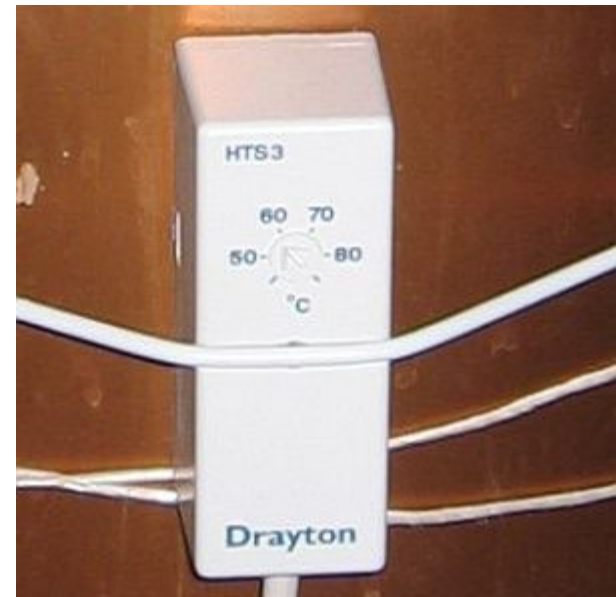
## Thermostat

There is a problem with the control of the temperature produced by solid fuel boilers. With a gas or electric boiler the heat can be switched off and controlled; with a solid fuel boiler it is uncontrolled.



# Components

The cylinder has a thermostat that regulates the domestic hot water temperature. This is placed one-third of the way up the cylinder. When the water is up to temperature, this operates the motorised valve and stops the primary water from circulating through the coil.



# Installation

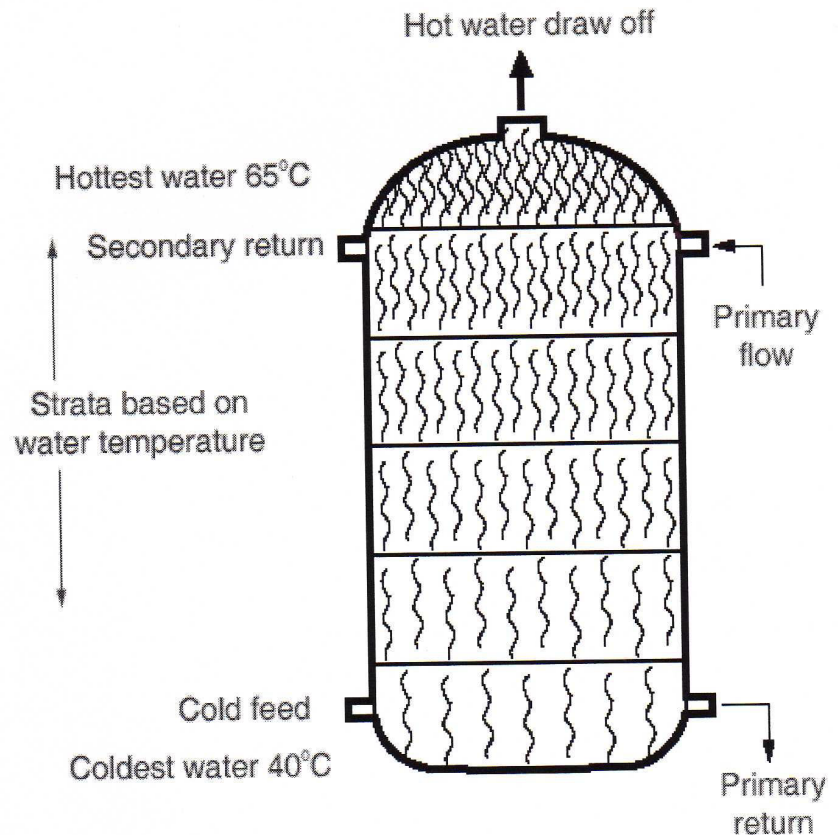
In all hot water cylinders, when they are up to temperature there is a temperature difference between the top and bottom of the cylinder. This is called **temperature stratification**.

There is a baffle installed in some cylinders, which prevents incoming cold water mixing with the hot water.

The temperature difference can be up to  $10^{\circ}\text{C}$ . The cylinder stat is placed one-third of the way up the cylinder.

Online resource:

<http://www.youtube.com/watch?v=SV2vdGPLRiY&feature=related>



# Installation

All hot water systems, whether centralised or localised need to have the advantages and disadvantages outlined to the customer.

Before suggestions are made the engineer needs to consider:

- Property size
- Storage capacity
- Usage
- Fuel type
- Installation cost
- Efficiency