

## **Unit 208: Central heating systems**

### **Outcome 2**

**Materials used to install  
domestic central heating  
pipework**

# Materials

## Copper

Grade R220 and R250 are commonly used in domestic heating systems.

R220 – soft coiled microbore pipe (8mm and 10mm). Sold in coils of 10 metre and 25 metre lengths.

R250 – half hard straight lengths (15mm, 22mm and 28mm). Sold in lengths of 1, 2, 3 and 6 metres.



# Materials

## **Copper: microbore**

R220 – soft coiled microbore pipe (8mm and 10mm).

In the majority of fully pumped systems, small bore pipe is used: 22mm and 15mm. An alternative pipework system is available called microbore, which uses 12mm, 10mm, 8mm and 6mm pipe.

The 28mm or 22mm flow and return pipes are fitted with a manifold, which can accommodate several radiators. The manifolds are adaptors with a number of small outlets allowing runs to individual radiators.

One advantage is that the system contains less water, so it heats up more quickly.



# Materials

## Cooper: microbore

Manifold feeding smaller outlets



# Materials

## Cooper: microbore

Microbore systems are initially piped up in small bore on the flow and return. This leads to a manifold that can either be side entry or linear. The microbore comes in coils and can be clipped to the side of joists and routed to avoid multiple joints.

Soldered – push fit – compression



# Materials

## Low carbon steel

This is rarely used in domestic installations, although larger, older properties may have LCS installed. LCS is commonly used on commercial and industrial installations.

Grade	Colour	Use
Heavy	Red	Steam and fire systems
Medium	Blue	Heating and oil lines
Light	Brown	Gas

If LCS is installed, systems must have an inhibitor in the system to prevent corrosion.



# Materials

## **Polybutylene**

Plastic pipe is becoming a more popular material for installations, as it is easy to install and can have long lengths with no connections. The connections to a boiler need to be made in copper. Quite often, the tails to heat emitters are also made in copper and the carcass under floor is made of plastic.

Polybutylene has a high temperature and pressure resistance, a low noise transmission and a low thermal expansion.

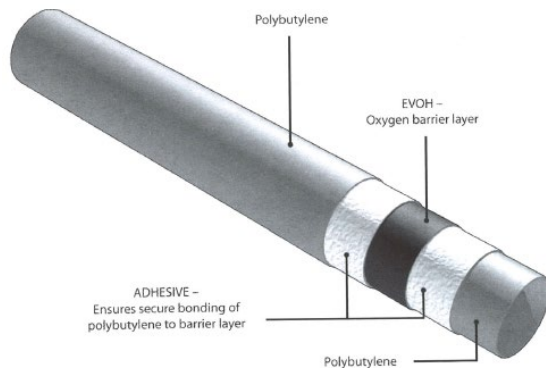
# Materials

## Polybutylene

The internal bore is very smooth allowing good flow rates, and it does not corrode like copper and LCS.

It is microporous, allowing air to penetrate the walls. An impermeable barrier has now been introduced to the pipe and it is also used in hot and cold water installations.

Sold in 10, 15, 22 and 28mm diameters, in lengths of 3 metres, and coils of 25, 50 and 100 metres.





# Materials

## Clipping distances

Size		Copper		LCS	
		Hor	Ver	Hor	Ver
15	1/2	1.2	1.8	1.8	2.4
22	3/4	1.8	2.4	2.4	3.0
28	1	1.8	2.4	2.4	3.0

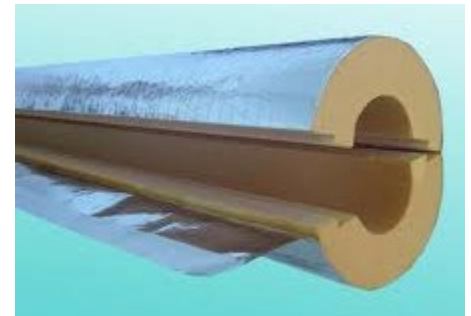
Pipe size	Run	20C	60C	80C
10-15mm	Horizontal	500mm	400mm	300mm
10-15mm	Vertical	800mm	600mm	500mm
22mm	Horizontal	800mm	600mm	500mm
22mm	Vertical	1,200mm	1,000mm	800mm
28mm	Horizontal	1,200mm	1,000mm	800mm
28mm	Vertical	1,500mm	1,400mm	1,100mm

# Materials

## Insulation

It is difficult to fully insulate against freezing temperatures; all insulation does is delay the cooling process.

- Stops cold getting to the pipe
- Stops the heat leaving the pipe
- Made up of pockets of still air
- Commercial insulation uses foil to deflect the heat or coldness



# Materials

## Insulation

Choosing the correct insulation for the application is important.

For standard domestic installations the flexible polyethylene pipe insulation is commonly used. It conserves fuel and power and protects pipes from freezing.

Complies with new part L Building Regulations and meets Water Regulations.



# Materials

## Insulation

Traditional stitched felt pipe insulation for economical and effective protection for pipework that is under floors.

It is not flammable but the original horsehair lagging is flammable and care needs to be taken in older properties when soldering.



# Materials

## Insulation

Some materials that insulation is made from:

- Stitch felt
- Polyethylene foam
- Phenolic foam
- Polyisocyanurate foam
- PVC foam
- Polystyrene
- Nitrile rubber
- Cellular glass foam

# Materials

## **Insulation**

The primary circuit for the heating and hot water should be insulated whenever they pass outside the heated living space (eg below a ventilated suspended floor or in a loft). The primary circuit for the hot water should be insulated throughout its entire length.

Pipes connected to the hot water vessel, including the vent, should be insulated for at least 1 metre from the point of connection to the vessel, or to a point where it becomes concealed.

Secondary circulation should be insulated for the entire circuit.

# Materials

## Insulation

- Saves energy
- Saves fuel bills
- Less CO<sup>2</sup> emissions
- Draw-off temperatures are better
- Water stays warmer for longer
- Keeps heat in the system
- Frost protection

# Tools

Wide jaw adjustable spanner



1/2" hexagon valve key



Adjustable pump pliers





# Tools

Radiator bleed key



Electric pipe freezing kit



Spray can freezer kit



# Tools

PTFE tape



Hemp



Jointing paste



# Tools

TRV decorators cap



Inserts for plastic pressure pipe



Bleed key

