Unit 208: Central heating systems

Outcome 3 (part 1)

Heat emitters and their components

Heat emitters

Heat emitters come in various styles and sizes and are responsible for getting the heat into the actual room or dwelling.

The sizes, outputs and styles of emitters can be found in the manufacturers' brochures.

Online resource:

http://www.myson.co.uk/products/radiators.asp

Heat emitters

Panel radiators

These are modern radiators found in new-build properties. Approximately 85% of the heat is convected via the fins welded to the back of the radiator. They warm the cold air that passes through them, creating convection currents.

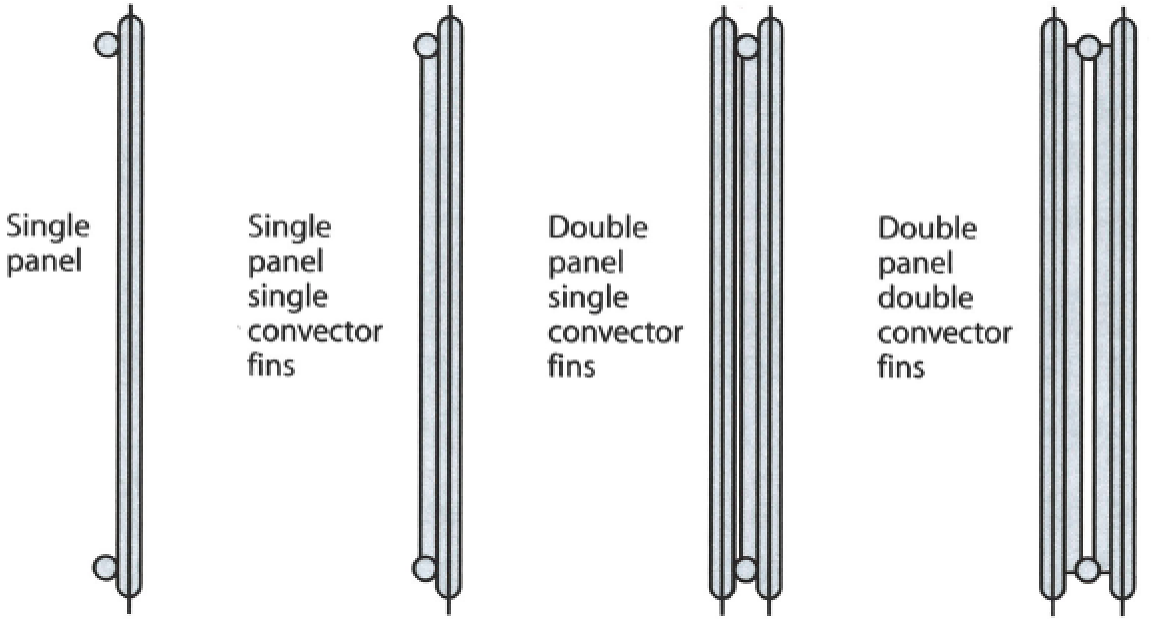
Radiators that do not have fins rely heavily of radiated heat, which can result in cold areas in the room.

Heat emitters

Panel radiators

These should be installed where obstructions will not interfere with the convection flow.

Manufacturers recommend they should be fitted at least 150mm from floor height (depending on skirting height).



Heat emitters

Panel radiators
The radiators are connected to the pipework in various ways:

TBOE: Top – Bottom –Opposite ends
The most efficient way to pipe radiators; can look unsightly.

BBOE: Bottom – Bottom – Opposite ends
This is the usual and most common method to pipe radiators, showing little pipework.

TBSE: Top – Bottom – Same end
Rarely found except on some one-pipe systems.

Heat emitters

Panel radiators

Manufactures supply many differing heights of radiators:

- 300-900mm
- They also supply varying lengths, from 400mm (increasing by 100mm)

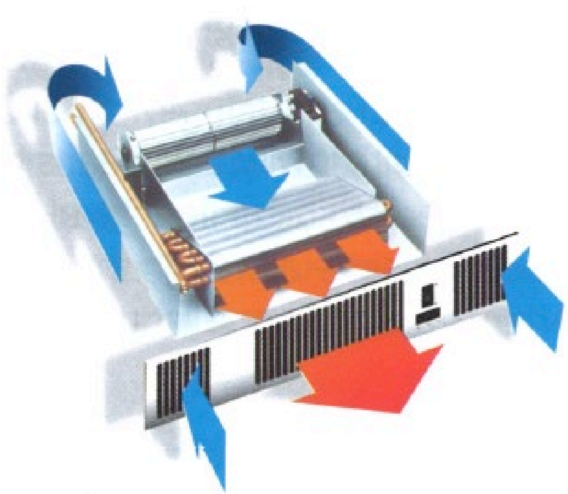
Seam top: Commonly found; top and side grills available
Compact: Most common; grills are factory fitted
Rolled top: Least popular; older type

SmartScreen.co.uk
Dedicated online support

Heat emitters

Kickspace heater
These are designed for rooms with limited wall space to mount a radiator: kitchen, bathroom or stairwell.

They are installed under the kitchen unit or vanity unit and blow warm air into the room via a grill mounted on the kick plinth.

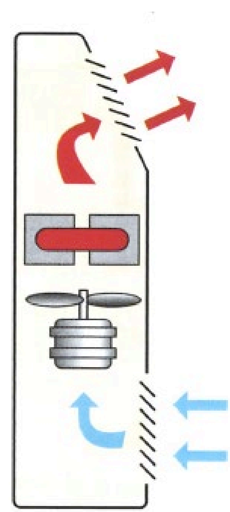


Heat emitters

Fan convector

These work on a similar basis to the finned radiator. A copper heat exchanger mounted in the casing has lots of fins attached. This allows for additional surface area.

Below this heat exchanger a low-volume electric fan is installed, which is operated by the heat exchanger warming up. These emitters can heat up large areas quickly.



Heat emitters

Skirting convector

This type of heater also has a finned copper heat exchanger but relies on natural convection only. It is installed around a room, instead of skirting boards, and tends to offer background heating.

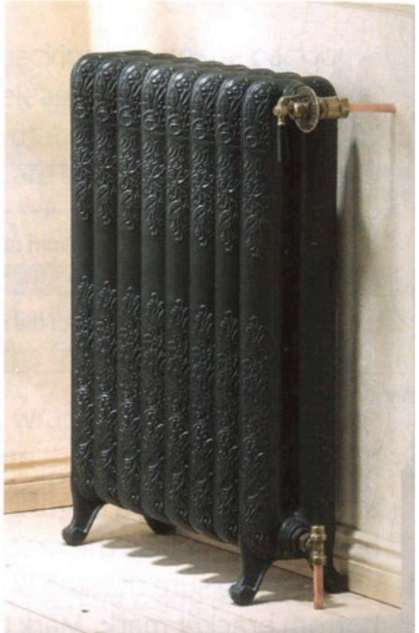
The main disadvantage with this type of emitter is that dust can block the fins, and stall the convection current.

Heat emitters

Column radiators

These cast iron emitters have been used for many years – the more columns the greater the heat output. Nowadays these are also made from steel and aluminium.

Public buildings still use these and they can also be found in retro-fit properties.



Heat emitters

Low surface temperature radiators

LSTs were originally designed for the NHS, where radiators couldn’t have a surface temperature above 43^{0}C. This was then accepted by nurseries, primary schools, and homes for the elderly, disabled or infirm.

SmartScreen.co.uk
Dedicated online support

Heat emitters

Towel rails

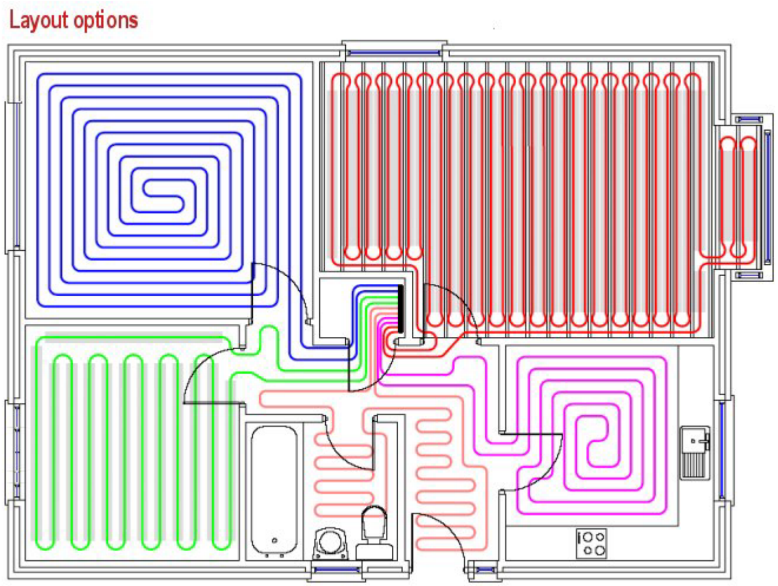
These come in a wide range of designs and colours and can be used in a wet central heating system, or independently with an electrical element.

Towel rails can come with an inverted radiator, conventional tubular style or designer styles.

Heat emitters

Underfloor heating

This type of heating works differently to conventional heat emitters. The floor becomes the heat emitter when it is heated up by pipework that has been laid under the screed-in boards.



Heat emitters

Underfloor heating

It is now one of the most widely used systems for heating domestic and commercial properties. This growing popularity is due to numerous benefits such as comfort, economy, flexibility and virtually no maintenance.

Min 65^0C is required at the manifold, which is then blended from the return to give approximately 55^0C (40^0C can be used via a ground source).

Heat emitters

Underfloor heating

The boiler heats the system water, which is pumped to the manifold. The manifold blends this water and distributes it through circuits. The pipe warms up, the screed warms up, the floor warms up, the room warms up.

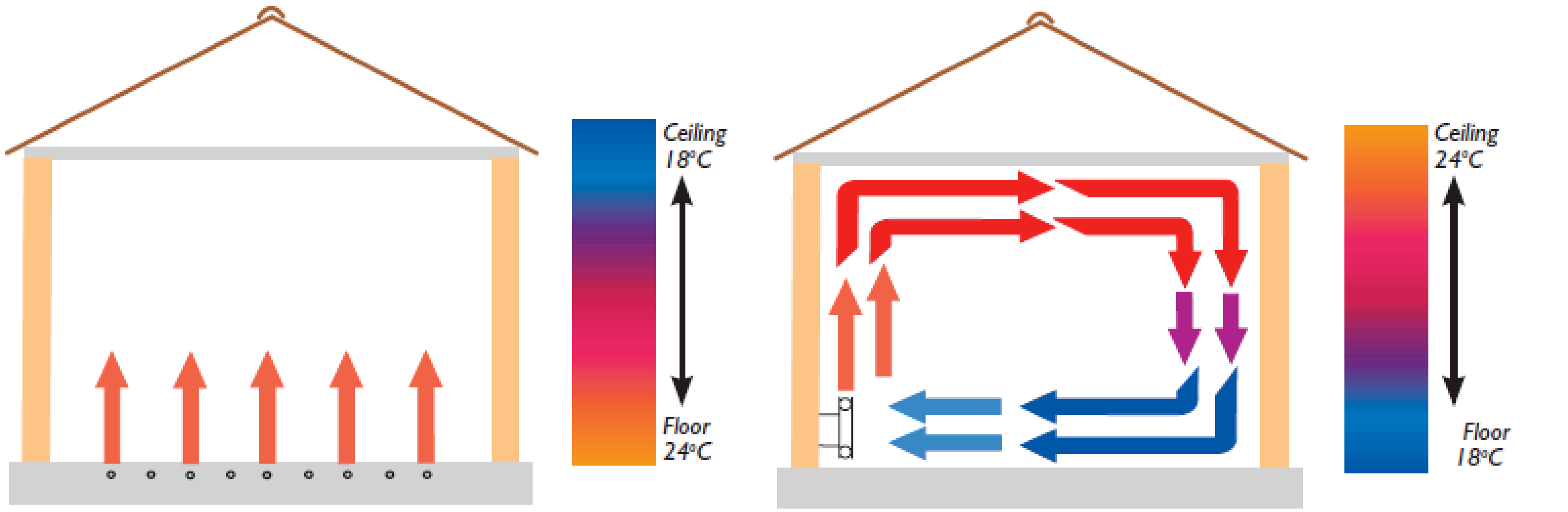
With this type of heating, there is a lower and more even temperature.

The crucial factor is flow rate, which is set by the manufacturer – for correct heat transfer, flow rate is slow.

Second factor is temperature difference – approx 6^0C.

Heat emitters

Underfloor heating



With underfloor heating the heat is concentrated at floor level.

Heat emitters

Underfloor heating

Advantages:

- Lower temperature for operation
- Lower potential fuel costs for the customer
- Suited to groundsource heat pump
- Suited to solar systems
- Even heat over the floor area
- No heat emitters on the wall

Heat emitters

Underfloor heating

Disadvantages:

- High installation costs
- High component costs
- Takes longer to heat up a room
- Tends to be little or no condensation
- Not always suitable to every situation

Heat emitters

The heat emitters all use convection and radiation to varying degrees.

This can be natural convection or forced convection, with low surface temperatures or higher surface temperatures.

BS EN 4422 is the specification for radiators and convectors.

An important factor in sizing radiators is knowing **Delta T,** the difference in temperature between the mean radiator temperature and the ambient temperature of the room.

Heat emitters

Whatever type of system and heat emitters are installed, the plumber must take the following into consideration:

- Cost effectiveness
- Comfort for the customer
- Control of the system
- Environmental issues
- Best practice (DHCG and CHESS)

Heat emitters

Radiator valves

These are valves fitted to each end of the heat emitter. Normally in the UK, these valves are installed in the bottom female tapings of the radiator (BBOE). Occasionally they are still found fitted to the top bottom ends (TBOE).

Online resource:

http://www.screwfix.com/c/heating-plumbing/manual-valves/cat831018;jsessionid=jV9JQP7ZCQMtQJskzWyvfKlJMfGCM2Y2HhTBsfQNhhgDnpy9YkYx!1676769000

Heat emitters

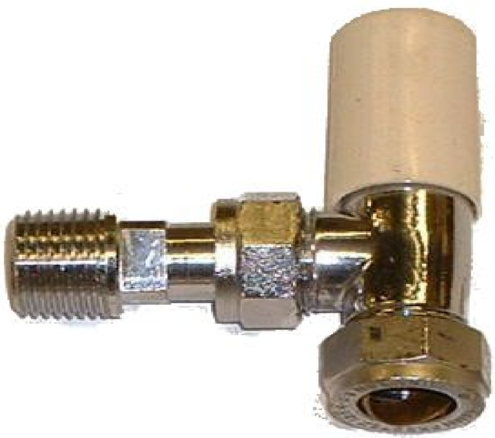
Wheelhead valves

These are fitted to the radiator to allow the **customer** to turn the radiator on and off, if desired. They will also be closed in conjunction with the lock shield valve to enable a radiator to be drained and removed.

Heat emitters

Lock shield valves

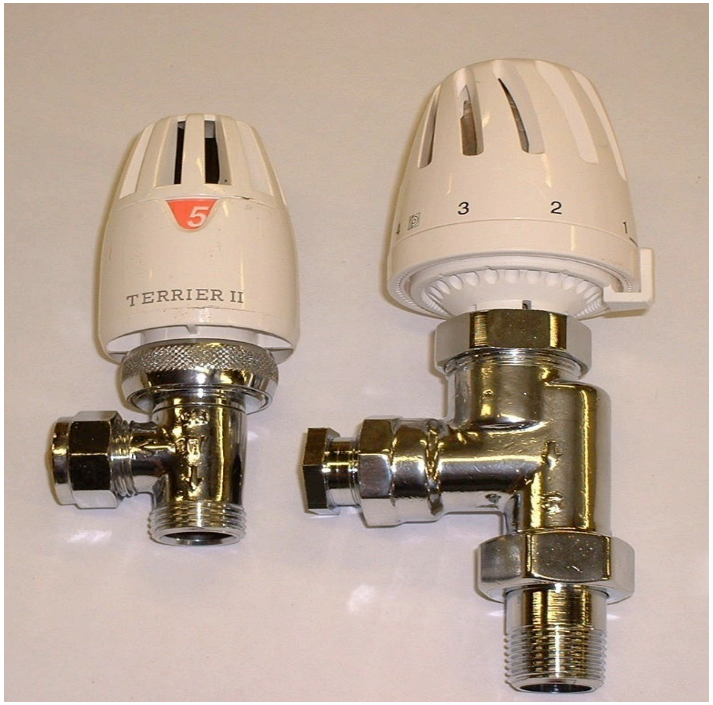
These valves are fitted to the radiator to allow the plumber/engineer to balance the system. If the radiator is removed for decorating, note the number of turns made to close the valve. This is exactly the same valve as the wheelhead, except the wheelhead has been removed and the lock shield installed, so the customer cannot interfere with it.



Heat emitters

Thermostatic radiator valves (TRVs)

These valves are fitted instead of the wheelhead valve, and allow temperature control of a single radiator. These are required under Building Regulations part L best practice.



Heat emitters

TRVs

These have a special head fitted to the valve, which reacts to **ambient air** temperature. Within the head there is a sensor containing a volatile liquid, which expands when heated. The warmer the room the greater the expansion, which closes off the valve by pushing a pin down in the valve. As the room cools so the liquid contracts, opening the valve and allowing the radiator to heat up.

One radiator in the circuit **must** be left without a TRV fitted. Building Regulations state it should be the hallway radiator.

Online resource:

http://www.draytoncontrols.co.uk/RadiatorValves.aspx

Heat emitters

TRVs

If a radiator fitted with a TRV is removed for decorating, it is important to remember to fit a decorators cap over the head to the valve – it saves you mopping the floor.

If the customer has long curtains and requires a TRV to be fitted, a remote head could be installed.

Heat emitters

Radiator valves

No matter which type of valve is installed the plumber will require the use of a radiator valve key to secure the valve stems.

The four ½” BSP radiator inlets will have two valves and one blanking plate located in three of the inlets, and a bleed valve in one of the top inlets.