

# The Radical Radiator of The Future

Bisque Radiators is asking you to look at radiator design with the intention of creating some inspired new designs. These designs would have to be original, innovative in their construction and arresting in the impact they make on the prospective purchaser.

The designs must satisfy the following four criteria:

## 1. Original / Innovative design

They should not look like any existing designs

## 2. Attractive design

They should have popular, aesthetic appeal

## 3. Heat output

A good heat output can be achieved when the total surface area of all the radiator components is at least 1m<sup>2</sup>

## 4. Reasonable manufacturing cost

Uncomplicated designs are cheaper to manufacture and are therefore more likely to sell in quantity

The following information will help you to design radiators that work.

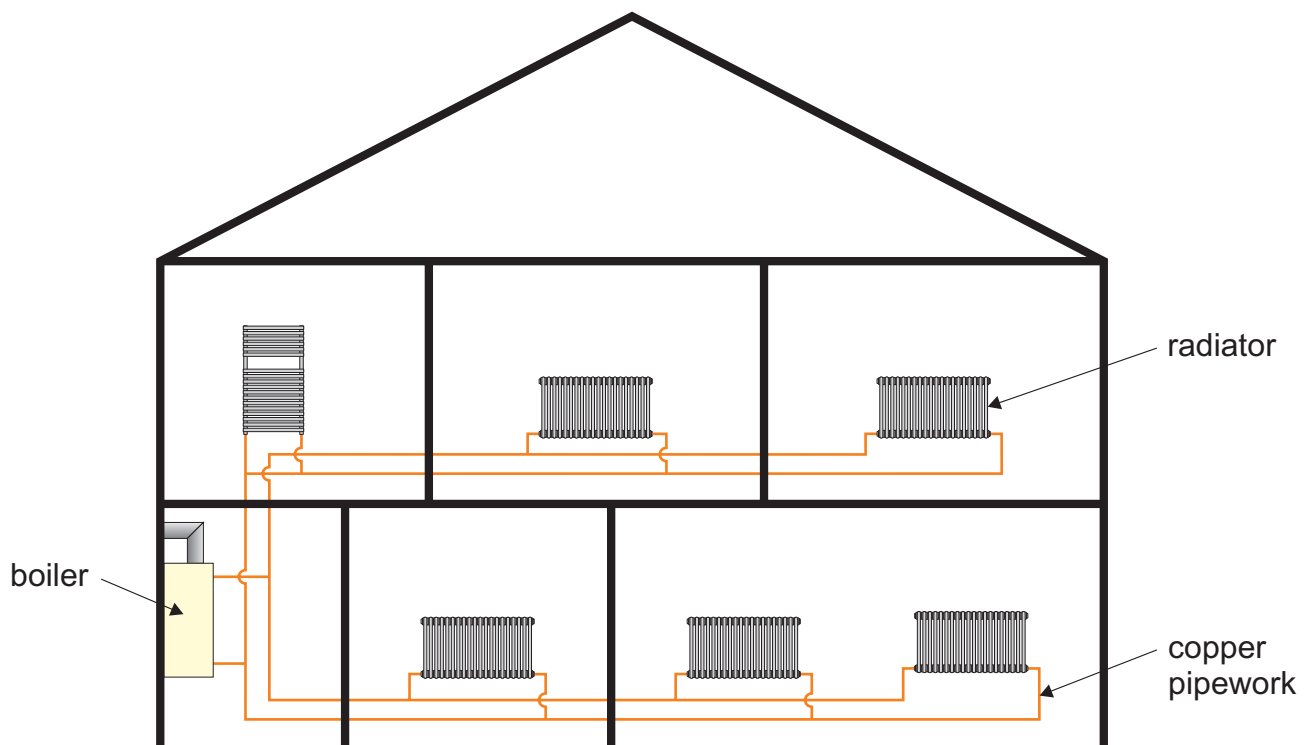
## Central Heating Systems

One of the first central heating systems was the hypocaust used in Roman times, where hot air from a furnace was circulated around spaces created under the floor and within the walls.

In the nineteenth century, a new system was devised with a solid fuel (coal fired) boiler to heat water, which then circulated through pipework to cast iron radiators.

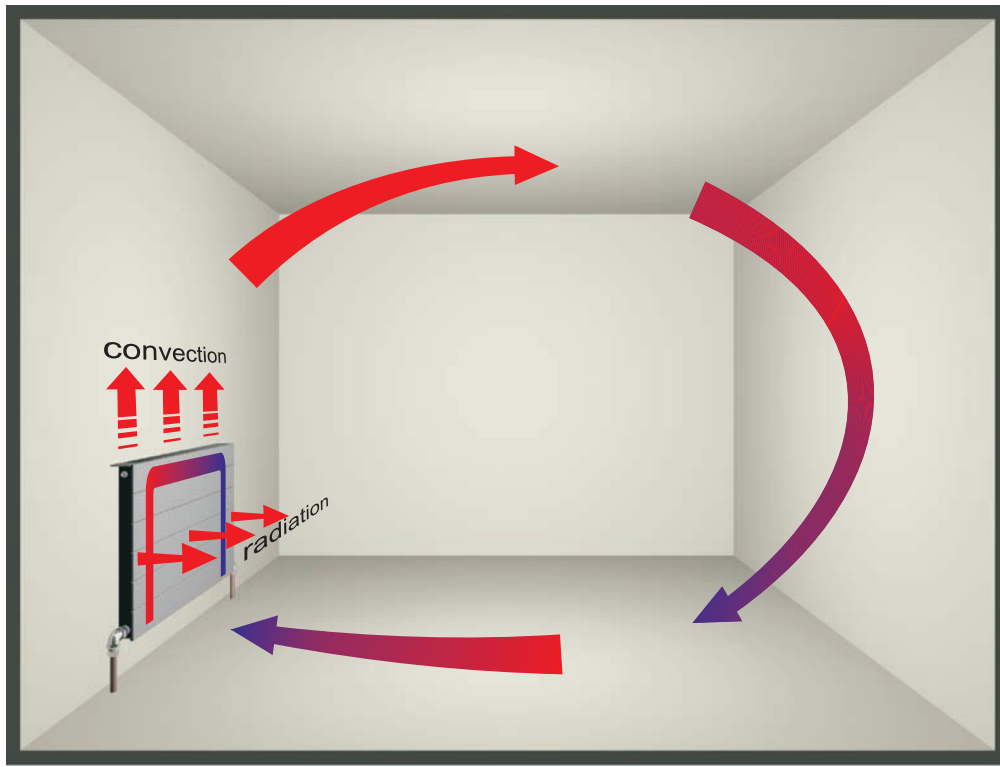
In countries with very hot summers and very cold winters, forced air systems (air-conditioning) are employed to cool the air in summer and heat the air in winter. Countries with moderate climates, where the summer is not too hot, only require central heating in winter.

Modern central heating systems have boilers fuelled by gas or oil, with copper pipework distributing pumped hot water to radiators in each room.



## Radiator Design

Radiators are not very complicated objects. Water goes in one end and comes out the other, losing some of its heat in the process. Baffles are sometimes inserted to make sure the water circulates evenly throughout the whole radiator and doesn't take the line of least resistance leaving part of the radiator cold.



Radiators which put out heat by both radiation and convection are often the most effective. A standard panel radiator often has a corrugated sheet of steel attached to the rear, to produce a series of miniature airways in a chimney effect, where the heated air rises pulling cool air after it, to be warmed in its turn. The corrugated sheet also increases the surface area of the radiator, which results in increased output.

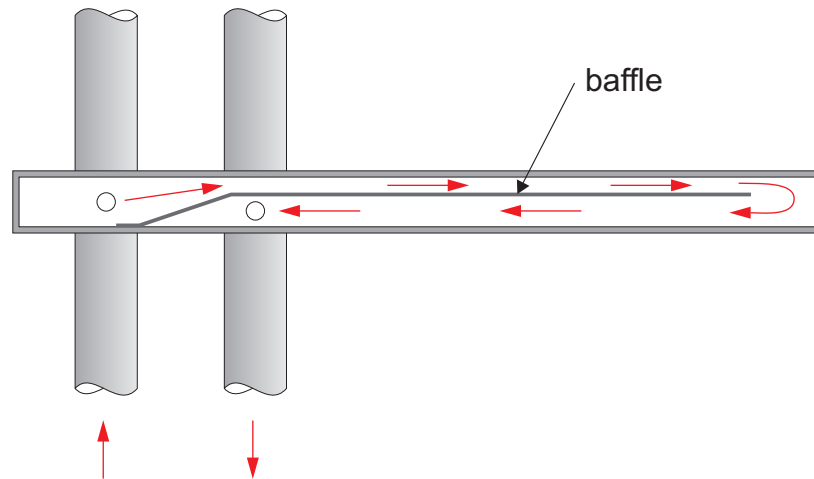


*horizontal tube with vertical fins*

*vertical tube with horizontal fins*

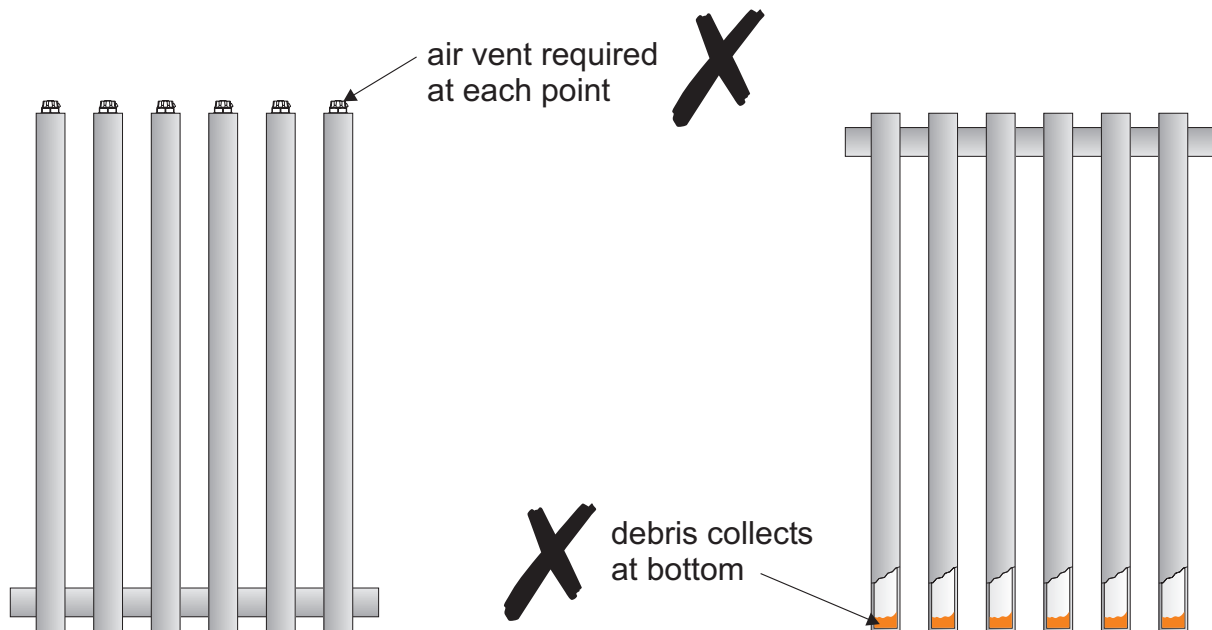
Horizontal tubes with fins at right angles will allow the heated air to rise vertically between the fins. A vertical tube with horizontal fins will not work effectively because the heated air cannot rise and gets 'clogged'.

Horizontal tubes with dead ends should be avoided although baffles can be inserted to make the water flow through the whole pipe.



In radiators, air will often get trapped at the highest point and a means of venting the air out is required (air vent).

Vertical tubes with dead ends at the top should be avoided, as a row of these would require an air vent at the top of each tube. Vertical tubes with dead ends at the bottom should be avoided, as any debris in the system will collect there and result in corrosion.



## Other Considerations

For maximum efficiency of heat transfer to the air, radiators are traditionally made from metal, generally steel. Radiators made from aluminum require special inhibitors to be added to the water to prevent corrosion.

How the radiator connects to the pipework is an important consideration. Ugly pipework should be kept to a minimum. Most pipework comes up from the floor or through the wall at low level.

Safety is also important. There should not be any sharp edges or protrusions, nothing that will catch on items of clothing and nothing that will trip people up.

Brackets must allow for thermal expansion of the radiator, they should not detract from its good looks, they should keep the radiator securely against the wall and are ideally easy to fit.

There are several situations which can influence the design of a radiator:

### **1. End Use**

Consider the use to which the radiator is put.

For example, towel radiators provide the luxury of warm towels in a bathroom. They also provide somewhere to place the towels near to a bath or washbasin. Ideally, towel radiators would have long horizontal bars along which the towel can be spread without bunching. There is not always room in a bathroom for such a shape and narrow versions are often employed. Sufficient space behind the radiator to enable the towel to be inserted easily is always a good idea but often is sacrificed in favour of minimising the projection from the wall.

### **2. Corner radiators**

These make use of wall space, in the corner of a room, unoccupied by paintings, mirrors, windows, doors and uncluttered by furniture.

### **3. Tall thin radiators**

These can fit into spaces which are otherwise unused, typically beside a window or next to an arch, or in the small space left unoccupied in a kitchen for instance.

### **4. Free-standing radiators**

Most radiators are attached to walls. The most common free-standing radiator is the long low convector type, normally employed in front of floor to ceiling windows.

### **5. Traditional radiators**

A significant proportion of homes have antique or reproduction furniture in wood with fabrics of traditional design. To find radiators that complement these can be difficult.

Finally, radiator designs have been inspired by many forms in nature, by book binders, by bicycle racks. Maybe somewhere out there is the form waiting to be adapted into the perfect radiator by you, and which will take the world by storm.