

# RESISTANCE HEATING

According to the joules law the resistance Loss ( $I^2RT$ ) is used to producing the heat from electrical energy for various industrial Purposes like Welding, Heating of buildings etc.

The Following are the 2 methods employed in resistance heating.

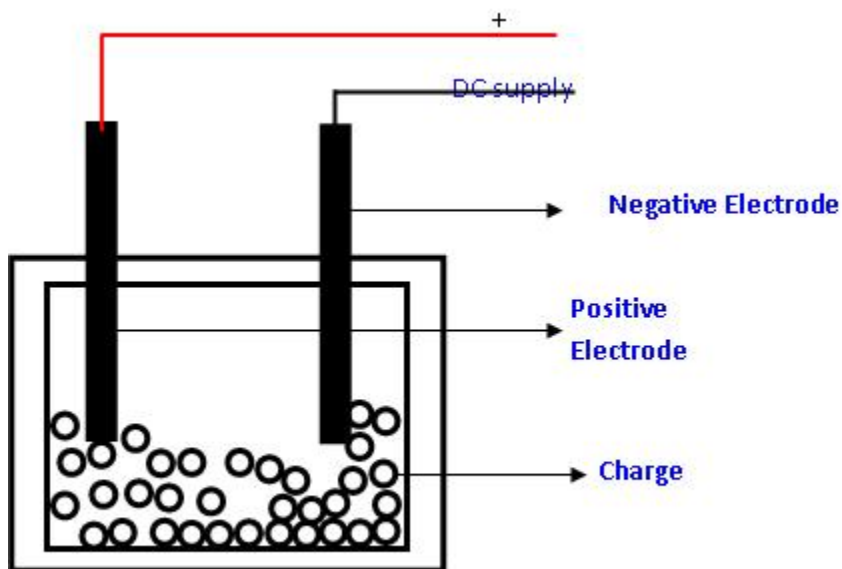
(i) Direct Resistance heating Method.

(ii) Indirect Resistance heating Method.

Direct Resistance heating Method.

In this Process the current is passed through the substances to be heated. This process is being employed in various general industrial equipment, Welding and electrodes for water heating boiler.

The arrangement is shown in the Fig1.1.



Construction:

In case of DC or single phase Ac two electrodes are required, but there will be three electrodes in case of three phase supply.

In this method in the charge (Resistive material) is put in the Tank. The electrodes are immersed in the charge at the same time the electric connected with the electrodes. The charge should be in a powder, Pieces or Liquid. If the charge is not in the Type means it requires high resistive heating element. The Heating Element to be used in furnace should possess the following Properties.

(i)High Resistivity:

This will reduce the length of the heating element,

(ii) High Melting Point:

It is necessary for obtaining high temperature,

(iii) Free from oxidation:

The element material should not be oxidised when subjected to high temperature.

(iv)Low temperature co-efficient:

For accurate temperature control the resistance should be nearly constant at all temperatures. This can be obtained only if the resistance of the material of the element does not change appreciably.

Operation:

The supply is given through the electrode. The charge should be in the form of powder or liquid. If the charge is metal pieces means the powder of lightly resistive material is sprinkled over the surface of the charge because of short circuit. The current is allowed to pass through the charge which heats up according to the Joules Law. As the current in this case is not easily variable, therefore automatic temperature control is not possible.

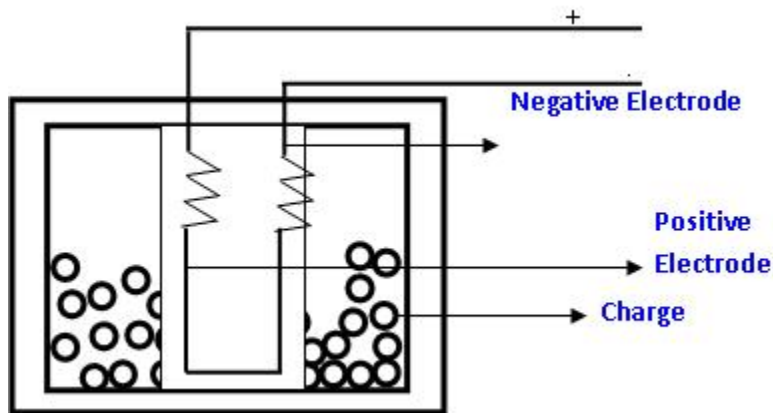
However uniform and high temperature can be obtained.

In Direct Resistance heating Method.

In this Process electric Current is passed through a resistive element and heat thus produced is conveyed to

the substances to be heated by convection or radiation Process. Resistance Oven, Immersion heaters are applications of this method.

The arrangement is shown in the Fig1.2.



Construction:

In case of DC or single phase AC two electrodes are required, but there will be three electrodes in case of three phase supply.

In this method the charge and the electrodes are separated and in between the charges the heating material is fixed and the electrodes are connected with the corresponding supply.(AC or DC).The Heating Element is selected through the important properties like high Resistivity, High Melting point, Low Temperature Co-efficient and Free From Oxidation.

Operation:

The supply is given through the electrodes. The charge should be in the form of powder or liquid. If the charge is metal pieces means the powder of lightly resistive material is sprinkled over the surface of the charge because of short circuit. The current is allowed to pass through the charge which heats up according to the Joules Law. Then the heat transferred through the heat waves (Radiation).So it requires high power to heat the material compare with the direct resistance heating Method. As the current in this case is not easily variable, therefore automatic temperature control is not possible.

However uniform and high temperature can be obtained.

Source : <http://mediatoget.blogspot.in/2011/12/resistance-heating.html>