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Vertical core type induction furnace diagram

Induction heating: Induction heating processes use currents induced by electromagnetic action in heating materials. Induction is based on the principle of heating transformers. There is a primary winding through which an ACS current is passed. The coil is magnetically heated with metal which acts as a accessory. An electric current is induced in this metal when the ACA is passed through the current primary coil. The following are different types of induction furnace 1. Core type furnace. Direct Core Type Induction Furnace. Vertical core type induction furnace. Indirect core type induction furnace2. Core Low Type FurnaceDirect Core Type: Direct Core Type Induction Furnace Ion Fig is shown. It consist of an iron core, crucible and primary curved attached to an ACS supply. The charge is placed in the crucible, which makes the same bend short circuit secondary circuit. The present in charge is very high in the order of several thousand ampere. The charge is magnetically coupled with the primary curved. The change melts due to the high current induced in it. When there is no molten metal, no current will flow into the secondary. The furnace is poured into the oven from the previous charge to start the molten metal. This type of furnace has the following drawbacks: the magnetic coupling between primary and secondary is very weak, so the leakage reaction is very high. This causes less power factor. Low frequency supply is necessary because normal frequency causes turbulence of charge. If the current density is approximately greater than 5 amps/mm2 then the electromagnetic force produced by this current density causes blockage in the secondary current. Therefore, metal heating is disrupted. This is called pinch effect. Inconvenient from the point of view of crucible and metallurgy for odd-shaped charge IDs. If the secondary circuit is open, the furnace cannot work. It must be closed. To start the furnace either molten metal is poured into the crucible or enough molten metal is allowed to remain in the crucible from the previous operation. Such furnace is not suitable for intermittent services. Indirect Core Type Induction Furnace :I n This type of furnace induction principle has been used to heat the metals. An inductive hot element in such a furnace is made to transfer its heat to change when connected to the primary curved supply, induced into the secondary of the current metal container. Therefore heat arises due to induced current. This heat spreads from radiation to charge. Part of the magnetic circuit ab is made of a special alloy and placed inside the furnace chamber. Special alloys will loosen their magnetic properties at a particular temperature and have magnetic properties When the alloy will cool down. As soon as the furnace receives significant temperatures the reluctance of the magnetic circuit increases several times and the causative effect is reduced accordingly thereby cutting the heat supply. Bar AB is a removable type and can be replaced by others, with different significant temperatures. Thus the temperature of the furnace can be controlled very effectively. Coreless Induction Furnace: Coreless Induction Furnace also operates on the principle of transformer. There is no core in this furnace and thus flux density will be low. Therefore to compensate for the low flow density, the primary must have a sufficiently high frequency at present supplied. The flow established by the primary winding produces vortex currents in charge. The heating effect of vortex currents melts the charge. The activity of metals is caused by the action of electromagnetic forces. Corless furnaces can be operated or non-operational containers. Fig shows a corless induction furnace in which the container is made up of material operations. The container acts as secondary winding and can have either operational or non-operational properties in charge. Thus the container makes a short circuit single turn secondary. Hence the heavy currently induced and produced heat. The flow produced by the primary winding produces vortex currents in charge. The heating effect of vortex currents melted charging. Stirring action in metals is caused by the action of electromagnetic forces. Benefits: ü The time taken to reach melting temperatures is short. ü Precise power control is possible. Any size of the sch crucible can be used. Ü Vortex currents in charge result in automatic activity. ü Absence of dirt, smoke, noise, etc. the construction cost is low. Applications of induction heating reduction furnace induction adapted consistency for induction heating from induction brejingu induction ceiling to fitu heatingadants improved product quality ü extended stability life environment sound low energy consumption page 2 dielectric heating: Dielectric heating is also sometimes referred to as high frequency capacity. If insulators such as non-metal materials i.e., wood, plastic, China clay, glass, ceramic etc. are subject to high voltage AC current, then the temperature will increase due to the conversion of dielectric loss in heat. Dielectric loss depends on frequency and high voltage. High voltage is usually employed at high frequency to achieve a high heating effect. Heating metal is placed between two sheets Electrode which makes capacitors shown in figs. The fig also shows equivalent circuits and vector diagrams. When the supply of ACS is attached to two electrodes, the current voltage drawn by it is taking exactly 90 degrees. The angle between voltage and current is slightly lower than 90 degrees, but at high frequencies, the damage becomes larger, which is enough to heat the dielectric. Benefits: ü Uniform heating is achieved. ü Running cost is low. Ü Non-conditioning material is heated within a short period of time. Ü Easy heat control. Application: For Food Processing. ü For wood processing. ü For the purpose of drying in the textile industry. ü For electronic sewing. Page 3 Electric Arc Furnaces: Ajax WYATT Vertical Core Type Furnace: The principle of operation is that of a transformer in which secondary turns are replaced by a closed loop of molten metal. Placed on the central part of the primary curved core. Therefore the leakage response is relatively low and the power factor is high. Is lined up with the refractory based on the charge inside the furnace. The top of the furnace is covered with an insulated cover that can be removed to charge. Necessary arrangements are usually made to titling the furnace to flush out the molten metal. The molten metal in the "V" part acts as a short circuit secondary. When the primary ACS is linked to the supply, the higher current will be deposited below and even a small amount of fee will keep the secondary complete. Therefore the chance of disintersection of the circuit is low. Advantages: ü High efficiency and low operating costs. ü Since both primary and secondary are at the same central core, its power factor is better. Ü Furnace is powered by normal supply frequency. Ü The probability of dissection of the secondary circuit is low, so it is useful for intermittent operation. Application: Ü This furnace is used to melt non-ferrous metals such as brass, zinc, tin, bronze, copper, etc. Page 4 Access to Electric Welding: Welding is the process of joining two similar metals by heating. Metal parts are heated to the point of melting. In some cases the metal pieces are heated in the plastic phase to get involved and are attached together. Electric welding sets can be either DC or AC types. DC welding sets are of two types namely generator type welding set which consists of a differential compound wound DC generator, consisting of any type of prime-mover (the induction motor of the squirrel cage or petrol or diesel engine) and a differential compound wound DC generator powered by a dry type correctional (selenium correctionor). Generator type can be achieved by tapping the control chain area in the welding set or by providing a suitable shunt throughout Curved chain area. The DC voltage in the correctional type set is controlled by regulating transformer production. If supplies from the existing DC distribution system are to be used for welding then ballast (resistance) is put in series with equipment and the control is affected by this external chain resistance varying. In the electric welding process, electric current is used to produce large heat, which is necessary to join two metal pieces. There are two ways by which electric welding can be done. These are a) Resistance welding and b) arc welding. Vertical core-type induction furnace vertical core-type induction furnace Also known as Ajax-Wyatt furnace and represents improvement on the core-type furnace discussed above. As shown in Fig 1, it has a vertical channel (instead of the horizontal one) for charge, so that the crucible use is also vertical which is convenient from the point of view of metallurgy. The magnetic coupling in this furnace is comparatively better and the power factor is high. Therefore, it can be operated from normal frequency supply. Circulation of molten metal is placed around the V part by convection currents shown in Fig-1. Since the V channel is narrow, even a small amount of charge is enough to keep the secondary circuit closed. However, the V channel should be kept full of charge to maintain the continuity of the secondary circuit. Figs: 1 This fact makes this furnace suitable for continuous operation. The tendency to break the secondary circuit due to pinch effect is a reaction from the weight of the charge in the crucible. The choice of material for the internal lining of the furnace depends on the type of fee used. The clay layer is used for yellow brass. For red brass and bronze, an alloy of magnetia and alumina or cordum is used. The top of the furnace is covered with an insulated cover that can be removed to charge. The furnace can be tilted by the hydraulic arrangement suitable for carrying out molten metal. This furnace is widely used to melt and refine brass and other non-ferrous metals. As stated earlier, it is suitable for continuous operation. It has a PF of 0.8-0.85. With a normal supply frequency, its efficiency is about 75% and its standard size is 60-300 kW, all different from the single phase. Single phase.