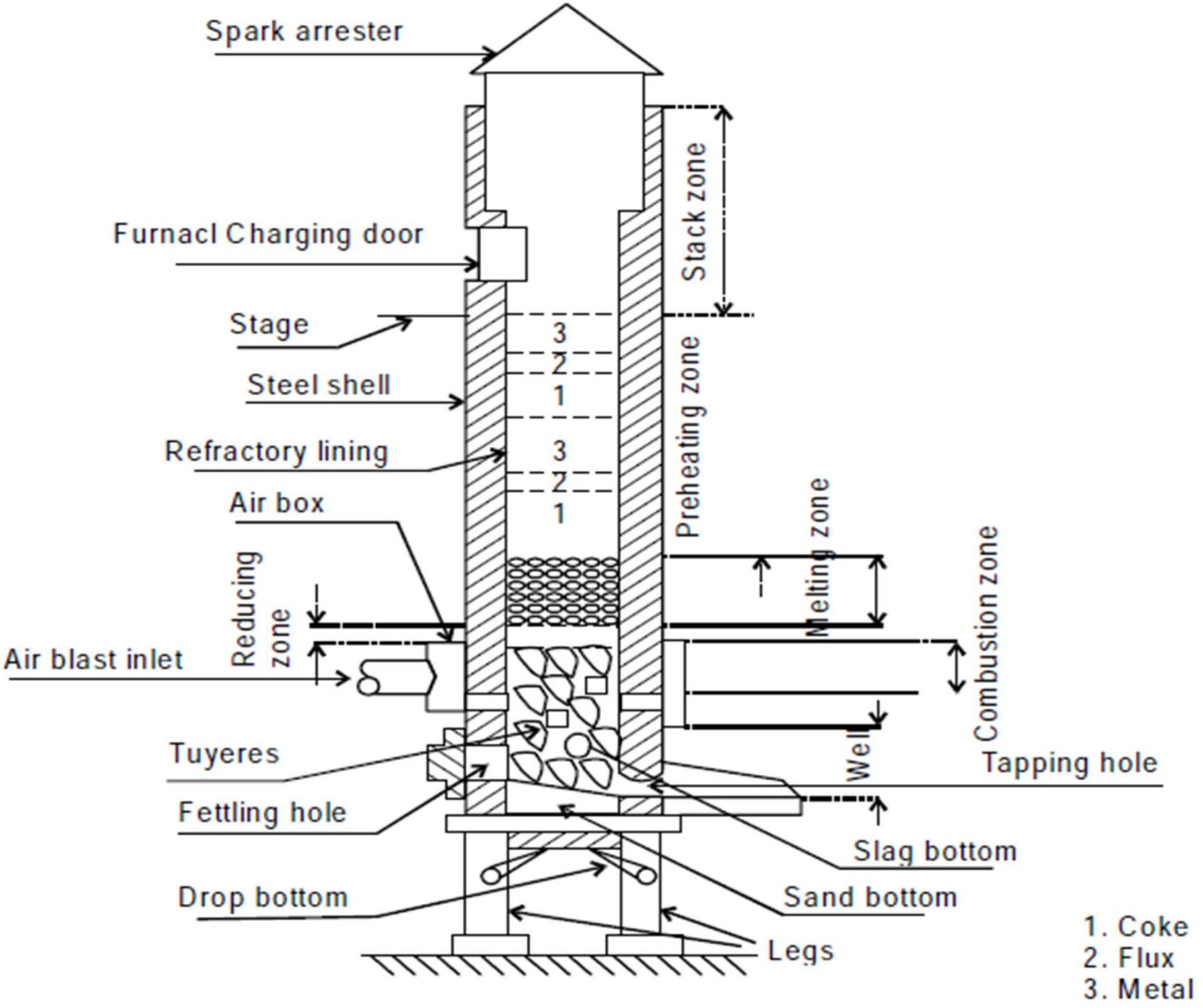
CUPOLA FURNACE

Cupola furnace is employed for melting scrap metal or pig iron for production of various cast irons. It is also used for production of nodular and malleable cast iron. It is available in good varying sizes. The main considerations in selection of cupolas are melting capacity, diameter of shell without lining or with lining, spark arrester.


Spark arrester
Furnacl Charging door
Stage
Steel shell
Refractory lining
Air box
Air blast inlet
Reducing zone
Tuyeres
Fettling hole
Drop bottom
Legs
Sand bottom
Slag bottom
Tapping hole
Well
Stack zone
Preheating zone
Melting zone
Combustion zone
3
2
1
3
2
1
1. Coke
2. Flux
3. Metal

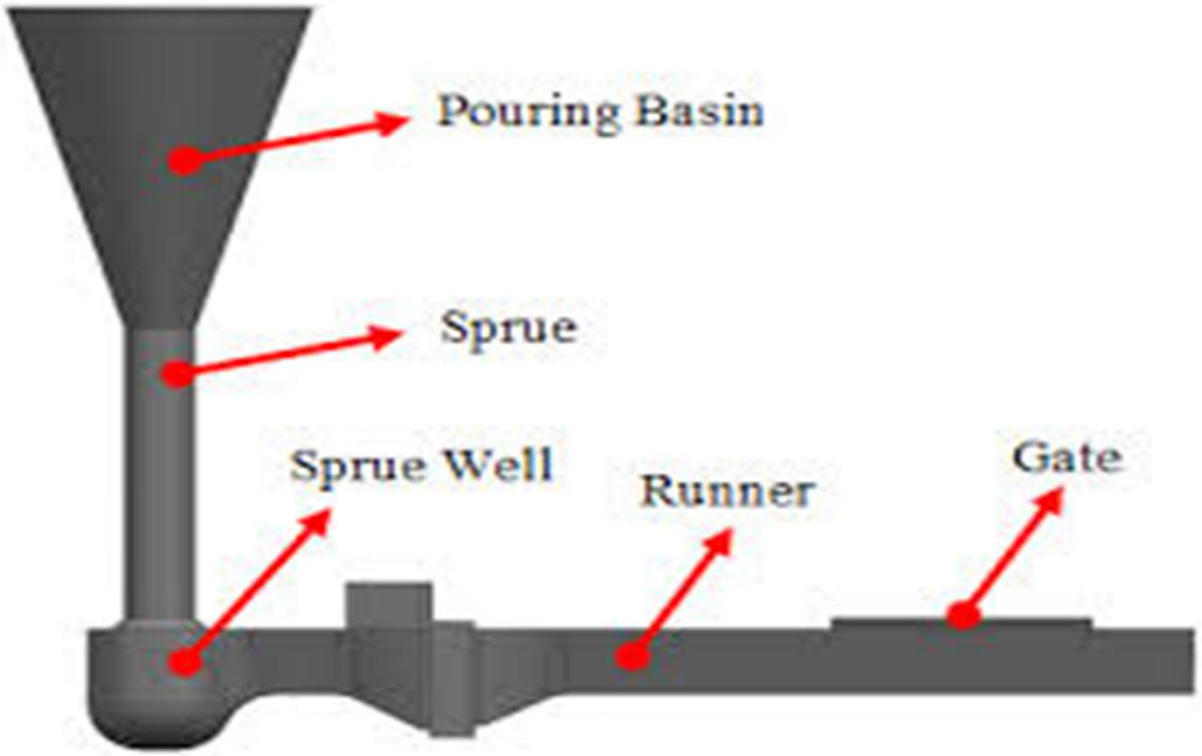
working

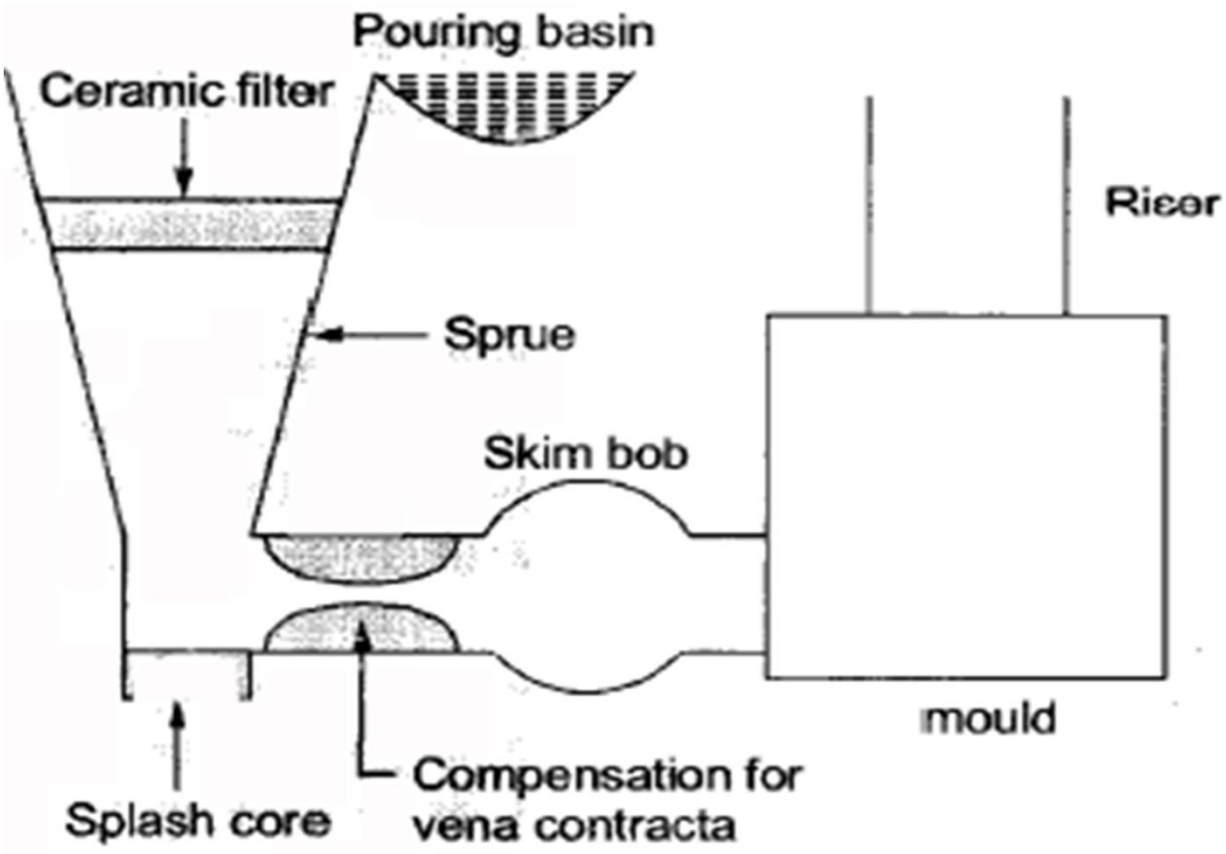
- Initially the furnace prop is opened to drop the existing earlier charge residue. The furnace is then repaired using rich refractory lining. After setting the prop in position, the fire is ignited using firewood and then small amount of coke is used to pick fire. The little oxygen is then supplied for combustion**.** Lime, coke, and metal in balanced proportions are charged through the charging door upon the coke bed and at proper time on starting the blower. Air is forced from wind box through tuyers into furnace. The forced air rise upward rough the stack furnaces for combustion of coke. Besides being fuel, the coke supports the charge until melting occurs. On increase of temperature, the lime stone melts and forms a flux which protects the metal against from excessive oxidation.

Lime also fuses and agglomerates the coke ash. The melting occurs and proceeds and molten metal is collected at the bottom.

Molten metal may be tapped at intervals before each skimming, or the tap-hole may be left open with metal flowing constantly. In most cupolas slag is drained from the slag hole at the back of furnace. When metal is melted completely the bottom bar is pulled sharply under the plates and bottom is dropped. All remaining slag, un-burned coke or molten metal drops from the furnace. When the melt charge has cooled on closing furnace, it is patched and made ready for the next heat.

GATING SYSTEM




Pouring basin
Ceramic filter
Riser
Sprue
Skim bob
mould
Splash core
Compensation for
vena contracta

Pouring basin

- It is the conical hollow element or tapered hollow vertical portion of the gating system which helps to feed the molten metal initially through the path of gating system to mold cavity. It may be made out of core sand or it may be cut in cope portion of the sand mold. It makes easier for the ladle operator to direct the flow of molten metal from crucible to pouring basin and sprue. It helps in maintaining the required rate of liquid metal flow.

Sprue

- It is a vertical passage made generally in the cope using tapered sprue pin. It is connected at bottom of pouring basin. It is tapered with its bigger end at to receive the molten metal the smaller end is connected to the runner.

Runner

It helps to feed molten metal without turbulence to the runner which in turn reaches the mold cavity through gate. It some times possesses skim bob at its lower end. The main purpose of skim bob is to collect impurities from molten metal and it does not allow them to reach the mold cavity through runner and gate.

Gate

- It is a small passage or channel being cut by gate cutter which connect runner with the mould cavity and through which molten metal flows to fill the mould cavity. It feeds the liquid metal to the casting at the rate consistent with the rate of solidification.

RISER

Metals and their alloys shrink as they cool or solidify and hence may create a partial vacuum within the casting which leads to casting defect known as shrinkage or void. The primary function of riser as attached with the mould is to feed molten metal to accommodate shrinkage occurring during solidification of the casting. As shrinkage is very common casting defect in casting and hence it should be avoided by allowing molten metal to rise in riser after filling the mould cavity completely and supplying the molten metal to further feed the void occurred during solidification of the casting because of shrinkage. Riser also permits the escape of evolved air and mold gases as the mold cavity is being filled with the molten metal. It also indicates to the foundry man whether mold cavity has been filled completely or not. The suitable design of riser also helps to promote the directional solidification