

## Cupola Furnace

Cupola furnace is mostly and widely using type of furnace used to melt pig iron ore or scrap metal to produce iron castings. It is economical and used for melting some copper based alloy and grey cast iron and modular cast iron melting also. Cupola is available in various sizes and low sulphur coke, anthracite coal or carbon briquettes can be used to burn in it.

### **Construction**

It is made up of 6mm to 10mm thick open at top and bottom shell made of steel and inside is lined with brick and clay. Bottom is supported with cast iron leg and its bottom is closed with the cast iron door which swings when opened.

The working bottom swing door is filled up with moulding sand with slope in shape and tends toward the metal tap hole made at the bottom of the cupola furnace used to extract the burnt residue.

**Tuyeres** are the opening through which air under pressure is forced inside the cupola to aid burning. Air under pressure enters wind box through blast pipe from suitable blower. The wind box encircles cupola and see that the air circulates evenly in the cupola through tuyeres for proper firing.

The cupola of 75cm diameter may have 3 to 4 tuyeres where large cupolas are fitted with 8 to 10 or more number of tuyeres. Tuyere is provided at a height between 0.6 to 1.2 m above the working bottom and extends to combustion zone through shell and refractory wall. Tuyeres have dimension of 50 x 150mm or 100x 300mm . A cupola with 10:1 of iron to coke ratios consumes 800-950m<sup>3</sup> air to melt one tonne . Below the centre of the tuyeres a slag hole is provided at a distance of 250mm.

Slag is always lighter than the molten metal floats at the top surface and it is removed through slag hole.

The molten metal is taken out through tap hole to pour into the mould cavity or die.

To feed the charge cupola is provided with a charging platform and a charging door at the proper height.

Total height of the cupola is generally 6 meters.

### **Operation.**

Bottom door is dropped to open and the previous melting operation content is dumped at bottom and removed. Slag , Coke and iron and ash that are sticking to the side walls is chipped off and removed. Damages in the furnace like broken refractory linings , fire bricks are replaced and new one is patched with patching mixture consist of silica or ganister and fireclay. Cupola block is used to lining originally and reconditioned. Then the sand bottom is prepared. A layer of 10cm thick tempered sand slopping toward the tap hole is rammed over the bottom. A good slope is provided for proper flow of molten metal.

### **Lighting the fire**

Cupola is fired three hours before the molten metal is poured into the moulds