# REFRACTORY LINING FOR INDUCTION FURNACE

The bottom structural part of Induction Furnace (Figure with details published in a separate article on Induction Furnace) on which main crucible lies is generally lined with bricks and do not require to be changed frequently. However, working face of the main crucible is lined with a suitable ramming mass. Selection of the ramming mass(R/M) entirely depends on the scrap melted (as given in the Table below) and operating parameters. The roof is lined with a suitable castable generally of High Alumina base and Low Cement Castable (LCC). The launder or spout of the furnace either is rammed or lined with refractory bricks. For side wall lining a suitable cylindrical former is essential. The former can be made either removable or consumable type. In case of consumable former the quality of the former should be compatible with the quality of the product (melt) to be produced. Generally bottom ramming is done first followed by the side wall ramming. Ramming is generally done layer-wise with the help of pneumatic rammers to ensure compaction and packing density. At the same time to avoid lamination between the layers each layer is to be scratched before putting fresh material for further ramming. The collar rim of the induction furnace crucible is made of the same refractory paste as used for constructing the crucible but with a greater addition of bonding materials & water. Then furnace heating schedule is to be followed carefully which will depend upon the furnace lining thickness, nature of ramming mass etc.

### Selection of Refractories for Lining

Operation and furnace area wise chart of refractories with their Standard Specifications are given below for ready reference:

(Methods of Installation, furnace Heating Schedule etc. may be provided by the refractory vendor however, in the coming posts we shall discuss on the same also).

| **Furnace Operation / Area of Application** | **Refractory Specifications (Std. Specfn)** |
|---|---|
| Melting Mild Steel, Stainless Steel, Manganese Steel & Alloy Steels. | Type= Mag-Chrome R/M, MgO%= 70-85, $Cr_2O_3$%= 8-10, Sintering Temp (ST)= 800$^{O}$C,Application Temp (AT)= 1750$^{O}$C, Grading= 0-5 mm |
| Melting Cast Iron. | Type= Silica R/M, $SiO_2$%= 97 (min), AT= 1650$^{O}$C, Grading= 0-6 mm |
| In the areas of Cover, Grout of Ind Fur melting Aluminium & its alloys. | Type= High Alumina R/M, $Al_2O_3$%= 78-80, $Fe_2O_3$%= 1.5 (max), ST= 1100$^{O}$C, AT= 1750$^{O}$C, Grading= 0-6 mm |
| In the areas of Cover, Top Cap, Spout/Receiver | Type= High Alumina R/M or LCC, $Al_2O_3$%= 90-92, $Fe_2O_3$%= 0.5 (max), ST= 1100$^{O}$C, AT= 1750$^{O}$C, Grading= 0-6 mm |
| Melting Copper, Brass & | Type= Mullite base R/M, $Al_2O_3$%= 70 |

| | |
|---|---|
| Bronze | (min), $Fe_2O_3$%= 0.5 (max), ST= 1100$^{O}$C, AT= 1750$^{O}$C, Grading= 0-6 mm |
| Melting Lead, Zinc & Tin | Type= Fire clay R/M, $Al_2O_3$%= 40-45, ST= 1100$^{O}$C, AT= 1650$^{O}$C, Grading= 0-5 mm |
| Melting Cupro-Nickel alloys | Type= Spinel bonded R/M, MgO%= 70-72, $Al_2O_3$%= 15 (min), ST= 1000$^{O}$C, AT= 1750$^{O}$C, Grading= 0-5 mm |
| Patching between the campaigns | Type= Patching Mass, MgO%= 70-75, $Cr_2O_3$%= 8-10, ST= 800$^{O}$C, Grading= 0-2 mm |
| Repairing Cover, Spout areas between the campaigns | Type= R/M or P/M, $Al_2O_3$%= 80-90, $Fe_2O_3$%= 1 (max), ST= 1100$^{O}$C, AT= 1700$^{O}$C |
| Hot & Cold repairing of Uppercase, Inductor Lining & some Structural components | Type= LCC, $Al_2O_3$%= 60-80, $Fe_2O_3$%= 1.5 (max) |

Source : http://viewforyou.blogspot.in/2008/10/refractory-lining-for-induction-furnace.html