



# Laboratory Furnaces for Raw Material Assessment

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Steel produced through Induction Furnace route accounts for a sizeable quantity of our country's steel production. And with the passage in time, it is bound to increase because of the various advantages it offers.

Raw material used for producing steel usually comprises of steel scrap, gas based or coal based DRI, pig iron etc. Producing steel using a combination of these raw materials requires good skill and technique and one has to be conversant with various parameters like yield, density, Fe-Metallic, Metallisation, FeO content etc. in order to extract maximum benefit from the same. Price of these raw materials is often dictated by their yield. And commercial viability is struck only when one strikes an upward balance in between yield of raw material and its landed cost.

The seller always wishes to extract the best price for his supply and the buyer in turn resorts to finding a method that would enable him pay a fair price because, unlike the seller who is a trader, his stakes as a steel producer are very high. His profitability is grossly interlinked with the yield of the raw material, whereas quality of the raw material has influence on quality of the end products.

With sponge iron / DRI becoming major raw material in lieu of steel scrap, the scene has become even more complex. Test certificate from the supplier is not always good enough or reliable enough for the melter to fix proper raw material mix and to get optimum yield. Knowing exact characteristics of sponge iron is critical for him to ensure proper quality of products and productivity as well.

In order to facilitate the buyers and melters, Electrotherm introduced first of its kind Laboratory Furnace of 5 Kg capacity around 4-5 years back. This is a versatile equipment very convenient to melt scrap and / or sponge iron, take off the slag, and determine exact yield

and composition as well. All assessments are purely "on weight" basis. Pre-weighed quantity of raw material is fed into the graphite crucible and the coil is energized. As the melting progresses, slag floats on top and this is removed/spooned away. The clean metal is poured in the container where it solidifies and it can be weighed for the exact assessment of yield. This operation can be witnessed by the buyer and seller and they can judiciously arrive upon a consensus of the "exact" yield of the raw material.

These furnaces are compact in design, floor mounted and occupy just about 600 mm x 2000 mm space excluding the DM water circulating unit. They are supplied in a single module that comprises of power supply unit and melting furnace with raise-lower arrangement.

Since they operate on nominal 25 kW power, they are plug-and-play type. 5 Kg furnaces have indeed revolutionized assessment of raw material as they provide the exact yield / recovery and composition of raw material tested.

Apart from providing right assessment of raw material yield, Laboratory Furnaces are also used for improving yield from sponge iron. This is done by varying the percentage of carbon in the charge mix so as to convert maximum FeO into liquid steel. Almost 50% of FeO available in the liquid steel can be converted back into Fe, provided it is balanced by the right amount of carbon.

With sponge iron being a major raw material and the volume in which it is added in induction melting furnaces, any minor change in percentage yield reflects in quantum savings for the entrepreneur.

Laboratory yield testing furnaces are easy to operate and user friendly in nature. They can be used both by the melters as well as plant owners, both of them having their own predefined objective. The plant owners use them to assess the exact "yield" of raw material so that they can pay the right amount to their suppliers.

And plant operators or melters witness the results so that they can judge/ascertain the conditions they wish to counter the next heat with so that they can extract maximum benefit by way of maximizing yield or reducing or eliminating "boiling", addition of various coolants etc. With the kind of assistance it provides to the buyer and the melter, the payback period for this equipment is less than 3 (three) months.

Laboratory furnaces from Electrotherm have earned a distinction of being a wonderful Productivity Improvement Equipment that has helped not just the steel makers, but also sponge iron producers and suppliers and scrap traders. Yield determined from these furnaces are considered as important as Test Certificates.



And it is a fact that this equipment is also used by Sponge Iron producers and scrap traders today. There are installations that have installed more than one such Laboratory Furnace because raw material is purchased in bulk and this raw material is unloaded into the factory only in the time in between sunrise and sunset. In such installations, Laboratory Furnaces are considered as important as melting equipment because of their versatility and “clean” results.

In some installations, in the time beyond sunset, after which raw material is not accepted in the plant, these furnaces melt cast-iron or high carbon scrap that can be poured in moulds and converted to CI plugs that are used as consumables for the continuous billet casters. In some installations, they are also employed for re-melting of aluminium wires that are received in scrap.

Aluminium wires that are received in scrap cannot be charged in to the induction melting furnaces because of their size and shape and density implications. These wires can be cut and charged in the laboratory furnace.

Once all insulation of the wires is burnt off, liquid aluminium is poured in to cubes/shapes that are dense and easy for handling and charging in the induction melting furnace for killing of steel !!



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