Crucible Installation for Induction Melting

SELEE® Advanced Ceramics™ Technical Service

"Proper installation of a crucible is the most important factor affecting crucible performance."

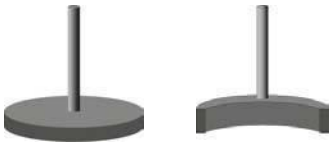
Steps for Proper Crucible Installation:

1. Inspection and Grouting

- Inspect crucible for damage sustained in shipping or storage.
  - Tap crucible to make sure it has a bell-like ring.
  - Do not install a crucible with cracks or structural flaws.
  - Make sure crucible is dry, heat crucible slowly if necessary to dry it.
- Check the bottom brick in the coil chamber.
  - If replacement is necessary use a high strength brick and seal with refractory mortar.
- Examine furnace coil for voids.
  - Repair voids with a high temperature refractory grout.
  - For repairs or bare coils apply grout around coil with at least a ¼" thickness to the coil surface to form a nearly symmetrical cylinder.
- Check all leak detectors to make sure they are intact, with the correct spacing and length.

2. Crucible and Refractory Installation

- Ramming Tools
  - Use a rod connected to a flat piece of steel for the base ramming tool.
  - Use a rod connected to a curved flat piece of steel so that it conforms to the outside curve of the crucible for the side wall ramming tool.
  - These are the best design for optimal packing because their large surface areas will compact the ram.



- Base Ram
  - Add ~3" of dry ram material to the bottom of the cylinder chamber.
  - Ram tight and even with a ramming foot.
  - Scratch all packed ram surfaces with a fork to promote knitting of layers to avoid laminations.
  - Add successive ram layers using 1-2" of loose material.
  - Ram to a firm pack.
  - Continue these steps until the base is slightly higher than required for seating (height of crucible relative to furnace should be just above the lower furnace coil).
  - Level the base ram with a straight edge and remove any excess material.

- Crucible
  - Center the crucible in the chamber and level it.
  - Firmly seat the crucible using a twisting motion and check for level again.
  - Place a heavy weight inside and spacers around the crucible to prevent shifting during ramming.

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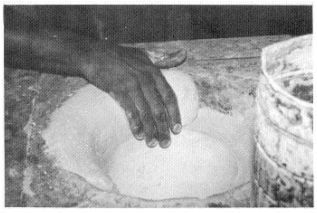
- Ram Sides
  - Add 1-2” of dry ram.
  - Pack the ram with a footed tool to consistent densities.
  - As before, scratch the rammed surfaces.
  - Continue these steps until the height of the ram is ~1/2” to 1” from the top of the crucible.
  - Scrape back the top layer of ram expose a dense top surface prior to top-cap forming.

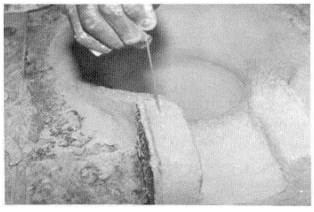
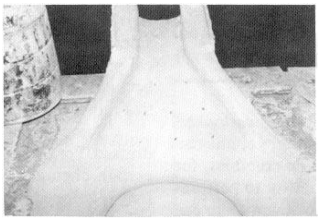


3. Installation of Top Cap and Spout

- Top cap should begin about 2 to 4” down from the top rim of the furnace.
- Wet cap material
  - Too much moisture in the wet cap material can cause excessive shrinkage and cracking during curing.
  - Test the cap material by taking a sample and balling it up, if the ball leaves an excess of fine powder on your hands the material is too wet.
- Install Wet Cap
  - Work the initial layer of cap material into the dry backup to avoid laminations.
  - Smooth cap using very little water, since it can cause cracking, spalling, and blistering during cure out.


- Poke several holes in the top cap and spout for moisture escape during curing.
- Apply a heat source to speed moisture removal.

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