

Instructions for Installing Plastic refractories

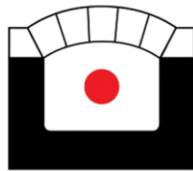
Plastic refractories are installed directly at the required location using pneumatic hammers. The following instructions shall be strictly observed during installation.

1. Ramming Procedure

- A pneumatic hammer fitted with an aluminum ramming head 60–75 mm in diameter shall be used.
- The plastic refractory layers shall be installed in position so that no gaps remain between them.
- When phosphate-bonded plastic is used, smaller layers shall be employed.
- Ramming shall always be carried out parallel to the working surface.
- Each layer shall be rammed two to three times to ensure complete bonding.
- Smaller layer shall be used around anchors when shaping burner openings.
- The installed layer shall be 3–6 mm thicker than the specified final thickness to allow for finishing.
- After ramming, the entire working surface shall be rammed once more to a depth of 75 mm.

2. Use of Formwork

- Formwork shall be used when installing plastic refractory on roofs, arches, and around openings.
- When phosphate-bonded plastic is used, the framework shall remain in place during heating, since deformation may occur under the material's own weight before the phosphate bond has fully developed. The Formworks shall be designed and installed so that it can support adequately the weight of the refractory plastic.
- The inner surfaces of the formwork shall be coated with oil before use to facilitate its removal.



3. Surface Finishing

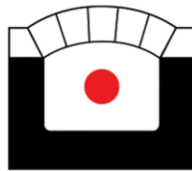
- After ramming has been completed, the working surface shall be finished using a trowel.
- Where formwork have been used, they may be removed only briefly for surface finishing, provided that no deformation occurs.
- It should be noted that to produce a polished surface during finishing, as a slightly rough surface promotes more uniform drying and minimizes excessive cracking.
- To reduce and control cracking, expansion joints approximately 50 mm deep may be required at intervals of 900 mm. These joints shall be provided both vertically and horizontally along the centerline of the anchors and then lightly covered during final troweling.

4. Roof Linings

- After the templates have been removed, the surface shall not be troweled. Instead, light ramming shall be carried out around the anchors to improve compaction.

5. Vent Holes

- Immediately after installation, vent holes 3–5 mm in diameter shall be made at intervals of 200–300 mm to a depth equal to two-thirds of the lining thickness in order to accelerate the release of water vapor.
- In linings thicker than 900 mm, vent holes shall be formed by inserting 75 mm diameter pipes at 900 mm intervals and removing them after installation. For linings with a thickness of 300–900 mm, nylon ropes spaced 300 mm apart shall be embedded in the lining. These ropes burn out during heat-up, leaving vent passages.
- Where vent holes are not permitted, such as in lead- or aluminum-melting furnaces, the working surface shall be left rough and relatively porous.



6. Heating

- Heating shall begin immediately after ramming and surface finishing. If this is not possible, the working surface shall be coated with a resin-based compound to prevent drying and shrinkage cracking.
- If shrinkage cracks develop, they shall be sealed with the same resin-based compound to prevent further propagation, although such cracks normally close during heat-up. Mortar slurry may also be used to seal the cracks.

7. Heating Schedule

- Heat from ambient temperature to 120°C at a rate of 20°C/h with the temperature measured at the working surface.
- Hold at 120°C for 1 hour for every 25 mm of lining thickness.
- Increase the temperature to 270°C at a rate of 30°C/h.
- Hold at 270°C for 1 hour for every 25 mm of lining thickness.
- Increase the temperature to 550°C at a rate of 40°C/h.
- Hold at 550°C for 1 hour for every 25 mm of lining thickness.
- Increase the temperature to the operating temperature at a rate of 50°C/h.
- Hold at the operating temperature until no further water vapor is released. If water vapor is still being released during any holding stage, the holding time shall be extended until the release has stopped.