

Processing instructions V 8.0

REFRAPATCH®

Note: Please read the product information sheet first, to ensure that these are the right processing instructions for your product. This document describes the application procedure for dense **REFRAPATCH®** refractory concretes.

The instructions contained in this document must be complied with during processing and installation of the respective refractory concrete. Modification of or deviations from the processing instructions can lead to major problems during installation, and possibly to total failure of the installed refractory material. These instructions provide general guidelines for storage, processing, and installation of the specific refractory material. If, due to specific site conditions, it appears necessary to deviate from the procedures described here, please consult Refratechnik Steel GmbH before starting work.

Storage

- In general: Store under cool, dry, and frost-free conditions.
- The liquid binding agent must always be stored at a temperature of > -20 °C.
- The shelf life stated in the product information sheet is valid from the production date, and only if storage is in accordance with our recommendations. The production date is stated on the packaging label.
- Under certain circumstances, material that has been properly stored may still be usable even after expiry of the stated shelf life. In such a case, conduct a setting test with a sample before using the material. In case of doubt, the expired material can be checked by Refratechnik Steel GmbH.
- Incorrect storage can greatly reduce shelf life, and can impair product quality.
- The original pallet wrapping foil should be left intact for as long as possible to protect the product. However, the foil is not a substitute for storage under cover.

- Also standing water, e.g. due to inadequate drainage of the storage area, can damage the material.
- Stacking of the goods supplied by us (in sacks, Big Bags, etc.) is done under the sole responsibility of the shipping company or customer. Refratechnik Steel GmbH accepts no liability for possible consequential damage (damaged packaging, personal injury, etc.).

Health and safety

- Always wear suitable safety goggles, dust mask, protective clothing, and working gloves.
- Avoid eye and skin contact. (amongst other substances, liquid binding agent contains aluminium phosphate). Prolonged skin contact can lead to skin irritation.
- Keep eye washing equipment ready.
- In case of eye or skin contact, wash the affected area thoroughly with water.
- Always wash thoroughly after working with the material.

- National and industrial safety regulations must be observed.
- Observe the safety data sheets of the dry mixture and the liquid binding agent.

General information

- **REFRAPATCH®** products are chemically bonding two-component materials. Delivered dry in 25 kg sacks or in Big Bags, it is mixed on site with the liquid binder supplied, and then applied. Curing occurs at temperatures above 200 °C.
- All **REFRAPATCH®** products are two-component materials (dry mix + liquid binding agent), which must be mixed before processing.
- Always mix complete packaging units (1 sack). The use of partial quantities can lead to demixing and changed material properties.
- **REFRAPATCH®** products may only be installed at temperatures above +10 °C, and must be protected from frost before, during, and after application.

- Please take the expansion of the refractory material for your specific furnace application into account. The reversible and irreversible expansion values and the respective material properties are given in the product information sheet. Depending on the furnace operating conditions and the specific characteristics of the refractory material, any arising stresses and pressures must be compensated by suitably designed expansion joints.
- During installation of the monolithic refractory material, please ensure correct anchoring to the existing furnace structure and/or to the existing or adjacent refractory material (e.g. with steel anchors, ceramic anchoring systems, etc.).
- Suitable measures must be taken to ensure that the water or water vapour generated during the drying & heat-up process is removed from the refractory lining without pressure build-up.
- With certain kiln structures and refractory linings, the drying process can cause the generated water or water vapour to diffuse outwards in the direction of the furnace shell instead of inwards to the hot side (kiln chamber). Therefore, suitable measures must be taken to ensure that the water or water vapour can escape to atmosphere. For this purpose, 10-mm holes drilled into the kiln's outer steel shell (at least 5 per m²) have proved to be successful.
- Regarding the build-up of water vapour pressure, attention must be given to the entire wall structure of the lining (wear lining/permanent lining/insulation). In the area behind the wear lining, it must also be ensured that only such materials are used, which provide an adequate (highest possible) permeability to the steel shell.
- If the permanent lining/insulating layers are used several times and only the wear lining is replaced, they can become clogged in the course of time due to moisture transport with dust contamina-

tions, salts, etc., thereby also impeding moisture transport. Consequently, multiple use of such layers must be seen as counterproductive in terms of dewatering performance. It might even be safer also to replace the permanent lining, in order to ensure perfect flowthrough to the cold side.

- To ensure a continuous drying process, the complete kiln chamber must always be flushed with an adequate amount of fresh air during the entire drying and heat-up procedure. The air circulating in the kiln chamber may never be saturated with moisture.
- During heat-up, it is essential that flames do not impinge on the refractory lining only in small areas. Local overheating can result in severe damage of the refractory material. Therefore, it must be ensured that the entire lining surface is heated uniformly and without significant temperature differences.

Equipment required on site

- Positive mixer with spare parts
- If only small quantities are to be processed, a bowl mixer with a capacity of 15...25 l (e.g. a HOBART mixer) should be used.
- Material scales and measuring beakers
- Adequate quantities of personal protective equipment (safety glasses and rubber gloves)

Mixing

- All equipment used for mixing (scales, measuring beakers, mixing bowls, agitators, etc.) must be carefully cleaned, and no foreign matter may adhere to them, as any contamination might affect the setting behaviour and strength of the **REFRAPATCH®** material.
- A positive mixer is essential for preparing **REFRAPATCH®** materials. If only small quantities are to be processed, a

bowl mixer with a capacity of 15...25 l (e.g. a HOBART mixer) should be used.

- Processing time is about 60 minutes. Therefore, do not mix more material than can be processed within this time.
- Data on the maximum and minimum amounts of liquid binding agent to be added is given in the product information sheet or on the packaging label. Please note that the quantities to be added are stated in l/100 kg or kg/100 kg.
- If different amounts of dry component are to be mixed, correspondingly different amounts of liquid binding agent must be used.
- The liquid binding agent is added at slow mixing speeds. Then continue mixing for a further 3 to 5 minutes at a higher speed, until 2 or 3 large balls of homogeneous, putty-like material have formed.
- If the consistency requires adjustment, only use the liquid binding agent supplied for the respective **REFRAPATCH®** material.
- On no account may water be used instead of liquid binding agent.
- If the mixing process is interrupted, the mixing bowl and agitator must be carefully cleaned.

Precautions with high outdoor temperatures

- Store the material in a cool place.

Precautions in cold weather

- Low temperatures will prolong the setting time.
- Therefore, store the material at room temperatures of at least 15°C.

- **REFRAPATCH®** materials may only be processed at temperatures above +10 °C.
- Protect the material from frost before and after installation.

Processing

Refractory lining on studded walls

- Before starting work, all surfaces that are to be lined with **REFRAPATCH®** must be carefully cleaned of rust flakes, scale, oil, grease, and other substances (e.g. paint, rust inhibitor, etc.) by suitable means, e.g. sand blasting.
- Observe the following instructions to obtain a dense, well-filled lining with a smooth surface:
 - Wear thick rubber gloves wetted with a thin film of water (dip the gloves in water and shake off the excess water).
 - Only freshly mixed material should be processed.
 - Take handfuls of the mixed material, and press it well in by hand so that no voids are created.
 - Occasionally, remove residual material from the tools by cleaning them thoroughly with water, and then dry them well.
 - Smooth the material surface with slightly wetted rubber gloves (see above).
- **REFRAPATCH®** can be processed as long as it can be kneaded easily by hand.
- Do not use material that has a crusty surface, and never attempt to make it reusable by adding water or liquid binding agent.

Setting and curing

- On no account may **REFRAPATCH®** materials be mixed with water. After a setting time of 48 hours at an ambient temperature of 10...25 °C, the lining can be dried with the lowest possible heating rate (please observe the corresponding heat-up instructions).
- In case of extremely high air humidity, the lining should be covered with plastic film after the 48-hour setting time to prevent the ingress of moisture.
- After application, the **REFRAPATCH®** material must be kept as dry as possible.

Drying and heating up

- Drying and heating up can be started when the 48-hour setting time has passed.
- Refractory linings should be dried or heated up immediately after installation in order to expel the contained water. Freshly installed refractory linings should not be left undried for longer periods. In exceptional cases, please contact Refratechnik Steel GmbH beforehand.
- Suitable drying/heating means should be made available – do not use steam (boiler steam) for this purpose.
- Direct contact of newly lined surfaces with open flames should be avoided.
- To ensure homogeneous solidification of the material, a temperature of at least 400 °C should be reached during the first heat-up, and must be maintained for at least 8 hours.
- Please check the product information sheet to ensure that you have the right heat-up instructions for your product.

- The heat-up instructions must always be followed precisely. Hereby, it must be ensured that the respective heating curve is followed, monitored, and recorded by means of several correctly-positioned thermocouples. Moreover, a homogeneous temperature distribution must be ensured.