



APPLICATION-AREA DOSSIER, AUGUST 2026

Application area petrochemicals & reformers: refractory practice in reformers, crackers and process furnaces

Reformers, crackers and process furnaces place different demands on the refractory lining than classic industrial furnaces: high wall temperatures with comparatively little mechanical wear, but atmospheres containing hydrogen and carbon monoxide, tight tolerances around the tube coils and long run times between turnarounds. The lining is therefore almost always built up in several layers: a hot-face working layer and, behind it, graded insulating layers that keep the steel shell at a permissible temperature.

In the radiant sections of modern reformers, fibre modules have become established on the roof and walls: low heat storage mass, fast start-up and shutdown, easy partial renewal. The transitions are critical — burner blocks, sight ports, tube penetrations and expansion bellows have to be fitted and sealed cleanly, otherwise bypasses for hot gas are created. In the cyclones, risers and transfer lines of catalytic cracking units, on the other hand, erosion-resistant mixes in hexmesh or anchor anchoring dominate, applied by casting, ramming or as gunned concrete.

Service life is often decided not by the material but by how it is handled: process gases containing CO can deposit carbon in iron-bearing refractory products, and that carbon bursts the structure from the inside. After every repair the lining must be dried out under control and started up to the manufacturer's curve so that trapped water does not cause spalling. During operation, thermography on the shell gives early indications of weak points — long before a hotspot becomes a safety risk.

Ten practical points for reformers, crackers and process furnaces

- ☐ **Multi-layer wall build-up** Grade the working layer and the insulating layers according to the temperature profile and the atmosphere; the shell temperature governs the design, not just the furnace chamber temperature.
- ☐ **Fibre modules** Low heat storage mass and fast installation; butt the modules tightly, observe the fibre direction and protect the hot face against the gas flow.
- ☐ **Around the tube coils** Fit penetrations, supports and burner blocks to size; seal gaps with fibre material without restricting the movement of the tubes.

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| ☐ Erosion-resistant mixes | Use abrasion-resistant mixes in hexmesh anchoring in cyclones and transfer lines; lay the honeycomb across the direction of flow. |
| ☐ Gunned concrete | Economical for large repair areas; rebound, water addition and nozzle handling determine the quality more than the data sheet does. |
| ☐ CO attack | In atmospheres containing carbon monoxide, choose low-iron, densely fired grades; carbon deposition in the structure destroys unsuitable products from the inside. |
| ☐ Dry-out and start-up curve | After a new lining or a repair, follow the manufacturer's curve with its holding points; heating up too fast drives water vapour into the structure with explosive force. |
| ☐ Hotspot monitoring | Record and document shell temperatures regularly by thermography; trend comparisons show lining damage earlier than individual readings. |
| ☐ Turnaround inspection | Document the findings zone by zone with photographs and compare them with previous findings; use this to derive the material requirement and the repair scope for the next shutdown. |
| ☐ Occupational safety | Entry permit, gas testing and ventilation before every entry; for fibre work, apply respiratory protection and low-dust removal methods consistently. |



Burner lances after refurbishment



Maintenance gunning during the turnaround

Common mistakes

- The start-up curve after a repair is cut short under time pressure — trapped water evaporates abruptly, the new lining spalls off and the shutdown gets longer instead of shorter.
- In a CO-containing atmosphere a standard product is installed instead of a low-iron grade — the carbon deposition in the structure remains invisible for a long time and only shows itself as large-area disintegration.
- Anchoring and honeycomb alignment in erosion-loaded zones are treated as a side issue — the mix itself holds, but the lining fails at the bond and whole panels break out.

PRACTICAL NOTE

Whether it is fibre modules in the reformer, an erosion-resistant lining in the cyclone or a gunned concrete repair during the turnaround: what counts is clean workmanship, a documented dry-out and a start-up plan that suits the material. Anyone who consistently compares inspection findings and shell temperatures across the run times will plan the next shutdown with considerably fewer surprises. You will find further practice sheets at sbs-rs.de/fachwissen.