



APPLICATION-AREA DOSSIER, AUGUST 2026

Application area aluminium & non-ferrous metals: why the bath line decides the furnace campaign

Because of its comparatively low process temperatures, aluminium melt seems harmless — in fact it is one of the most aggressive media in refractory construction. The low-viscosity melt penetrates the pores and joints of the lining through capillary forces, and alloying elements such as magnesium react with SiO₂-bearing materials. Fluxes and dross intensify the attack further.

The most critical zone of every melting and holding furnace is the bath line: this is where melt, furnace atmosphere and refractory material meet. In this three-phase zone, infiltrated aluminium oxidises to corundum, which grows into the lining as a hard build-up — the so-called corundum mushrooms. The consequences: shrinking bath volume, falling energy efficiency, oxide inclusions in the casting and local overheating of the furnace shell.

Whether a furnace lasts two years or eight is therefore decided at two points: the right choice of material for each furnace zone, and a consistent but measured cleaning practice. Both must suit the alloy, the operating regime and the furnace type — from crucible furnace and hearth melting furnace through to dosing furnace. The following overview summarises the most important levers.

Checklist: refractory practice on aluminium and non-ferrous metal furnaces

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| ☐ Monitor the bath line | The three-phase zone between melt level and atmosphere is the point of heaviest wear — corundum growth and infiltration start here first. |
| ☐ Non-wetting materials | Additives such as barium sulphate or calcium fluoride reduce the wettability of the working lining and slow the capillary ingress of the melt. |
| ☐ Dense castables | Low-cement castables with a high alumina content and non-wetting additives are the standard for metal contact zones in hearth and holding furnaces. |
| ☐ SiC-bearing qualities | Silicon carbide bricks and castables offer high abrasion and corrosion resistance for the hearth, ramp and heavily loaded charging zones. |
| ☐ Take the alloy into account | Magnesium-bearing alloys attack SiO ₂ -bearing materials considerably more strongly — the choice of material should be matched to the alloy range. |

- ☐ **Cleaning on a shift rhythm** Skim walls and bath line regularly before oxide build-up hardens — corundum that has grown on can later only be removed at the cost of substance.
- ☐ **Scrape in moderation** Overly aggressive mechanical cleaning removes the working lining; suitable tools and guided movements protect the lining.
- ☐ **Dose cleaning salts** Fluxes soften the oxide build-up and make skimming easier — but if overdosed they accelerate chemical refractory wear.
- ☐ **Crucible or hearth furnace** Crucibles of clay graphite or SiC can be exchanged quickly, whereas hearth furnace linings require controlled drying and heat-up after repairs.
- ☐ **Keep dosing furnaces tight** With continuous contact in dosing and holding operation, what counts is a dense working lining, good insulating performance and clean dosing tube and riser tube areas.


Complete overhaul of an aluminium melting furnace

The bath line: the most heavily stressed band of the lining

Common mistakes

- Cleaning postponed: corundum build-up grows firmly into the lining within a few days — when removed later it tears refractory material out with it, the bath volume shrinks and the repair becomes more expensive.
- Material does not suit the alloy: running magnesium-bearing alloys in a standard lining without non-wetting additives risks rapid infiltration, expansion phenomena and premature failure of the working lining.
- Repaired areas started up without controlled drying and heat-up: trapped moisture evaporates abruptly, causing spalling and cracks — the fresh repair is often open again after a short time.

PRACTICAL NOTE

Check the furnace shell regularly for hotspots — they are the earliest warning sign of infiltration and a thinned lining. A planned partial repair at the bath line is almost always more economical than an unplanned relining after a breakout. Further practice sheets and contacts can be found at sbs-rs.de/fachwissen.

Questions about your furnace?

We assess lining, zones and condition — with a reply within 24 hours on working days.

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