



POST OF 03/07/2026

Running heat-up curves correctly

After relining there is still water in the material — as mixing water in the pores and as water of crystallisation in the bond. When it evaporates it increases its volume 1,700-fold. If it escapes faster than the structure can carry it away, steam pressure bursts the fresh lining from the inside.

That is why every plant is started up to a material-specific curve: limited heating rates and holding stages in the temperature windows in which moisture is released. Depending on the material and the wall thickness this takes two to five days. The data sheet of the material always takes precedence.

The curve in stages

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| ☐ Before the start | thermocouples fitted and checked, curve in writing, responsibility for nights and weekends settled |
| ☐ Up to 110 °C | slowest stage, 25–50 °C/h — free water evaporates; the upper end only for thin brick linings |
| ☐ Hold at 110 °C | until no more steam escapes. Rule of thumb: in hours, at least twice the wall thickness in centimetres |
| ☐ 110 to 350 °C | continue at a limited rate, castables and ramming mixes at the lower end of the range |
| ☐ Hold at 350 °C | residual moisture out of the pores before the bond starts to work |
| ☐ 350 to 600 °C | critical window with cement bonding: water of crystallisation is released here, and this is where you go slowest |
| ☐ Hold at 600 °C | bonding phase fully developed — only after that may heating speed up |
| ☐ Above 600 °C | up to operating temperature as per data sheet; here brick linings need the time for the joints, not for moisture |
| ☐ Cooling down | with the same care as heating up — uncontrolled cooling tears the lining open just as badly |
| ☐ Documentation | the curve run, the measuring points and any deviations belong in the sign-off documents |



Freshly lined furnace section before the controlled heat-up

Common mistakes

- Going by feel instead of by the curve: without thermocouples at several points it goes unnoticed that one zone is running far ahead.
- Cutting the holding stages short because the plant is needed: the two days saved cost campaigns later on.
- Starting up after a partial repair without a curve — the new castable does not dry any faster just because there is less of it.

PRACTICAL NOTE

Set the curve before the first castable is installed, and hang it on the furnace. Anyone who only goes looking for it on the day of start-up is working by feel — and you will see that in the lining two campaigns later.

Questions about your furnace?

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

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