



APPLICATION-AREA DOSSIER, AUGUST 2026

Application area heat treatment & forging: refractory practice on chamber, pusher, bell and forging furnaces

Heat treatment and forging furnaces rarely run continuously: charging, heating up, holding, cooling — the lining goes through every cycle. With this operating mode, the heat stored in the wall mass determines energy consumption. Fibre linings store considerably less heat than brick or castable, follow temperature changes almost free of stress and shorten heat-up times. That is why chamber, bell and bogie hearth furnaces are predominantly fibre-lined today, provided the atmosphere and the mechanical loads allow it.

The furnace atmosphere sets limits for fibre. Under a protective atmosphere with high hydrogen or carbon monoxide contents, the silicon dioxide in standard fibres can be attacked chemically; the fibre loses substance and becomes brittle. Permanently high temperatures additionally lead to devitrification: the fibre crystallises, shrinks and turns friable. Alumina-rich fibre qualities, polycrystalline fibres or a switch to a dense lining help here — the selection belongs in experienced hands.

Mechanically loaded zones remain a matter for brick and castable. Hearths and bogie hearths carry the charge weights, and in the forging furnace scale, impact and abrasion are added — dense bricks and wear castables prove their worth here. Door arches, door lintels and burner blocks work hard thermally and are executed as shaped parts or prefabricated components. The combined build-up has proved itself: dense wear zones, lightweight insulation behind them, fibre modules on walls and roof.

What matters on heat treatment and forging furnaces

- ☐ **Heat storage** The less heat the wall stores, the less energy each heat-up cycle costs — the biggest lever with intermittent operation.
- ☐ **Fibre modules** Prefabricated, compressed modules can be installed quickly, compensate for shrinkage through pre-tensioning and replace multi-layer blanket constructions on walls and roof.
- ☐ **Classification temperature** It describes the test shrinkage value, not the operating limit — the continuous service temperature of the fibre lies well below it and governs the design.
- ☐ **Protective atmosphere** Hydrogen and carbon monoxide attack silica-containing fibres; alumina-rich or polycrystalline qualities are suitable for such atmospheres.

- ☐ **Anchor material**

Anchors age along with the lining — heat-resistant stainless steels are standard; with a carburising atmosphere or very high temperatures, nickel-base alloys or ceramic anchors are required.
- ☐ **Bogie hearth**

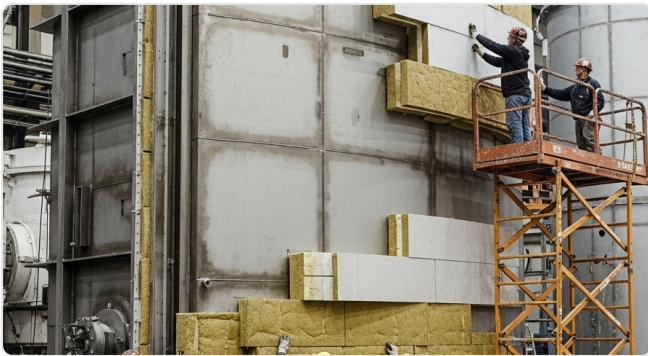
The bogie deck carries the charge and travels through the sealing plane — dense wear castable on top, insulating layers underneath, sand seals or labyrinth seals at the sides.
- ☐ **Door seal**

Leaking doors draw in false air, cool down edge zones and distort the heat treatment result — sealing cords and contact pressure need to be checked regularly.
- ☐ **Door arch**

Door lintels and arches work thermally every time the door is opened; cracks and spalling bricks are often the first visible point of damage here.
- ☐ **Hearth in the forging furnace**

Scale reacts with the hearth surface and eats into it — scale-resistant, dense qualities and planned wear layers keep the hearth serviceable.
- ☐ **Repairability**

Fibre layers can be replaced zone by zone and castables broken out and re-cast in sections — good documentation of the lining shortens every shutdown.


Insulation upgrade on a chamber furnace

Charging chamber after refurbishment

Common mistakes

- Standard fibre used under a hydrogen-rich protective atmosphere — the fibre loses substance, becomes brittle and trickles away long before temperature alone would explain it.
- Reading the classification temperature as the operating limit and designing the fibre too tightly — devitrification and shrinkage open joints through which heat reaches the anchors.
- Treating door seals, sand seals and bogie connections as a side issue — false air and escaping hot gases cost energy and destroy steelwork and anchors from the outside.

PRACTICAL NOTE

At every shutdown, check the door areas, the bogie hearth connections and the surface of the fibre lining — discolouration, hardening and open joints reveal damage early. A lining matched to the operating mode and the atmosphere pays off twice over, through energy consumption and service life. You will find further practice sheets 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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