# Trailblazing crown engineering enhanced by SEFPRO mullite innovations

Explaining how SEFPRO BP Mullite REC overcomes silica crown limitations, the following article by B. Hérout, SEFPRO Insulation & Reinforcement Market Manager, C. Mesnager, R&D Project Leader at Saint-Gobain Research Provence and K. Muvvala, R&D Manager at Saint-Gobain Research India, further demonstrates how it enables higher temperatures, reduced heat losses and safer, more efficient glass furnace operation.

## ALTERNATIVE CROWN DESIGN WITH SEFPRO BP MULLITE REC

Among the various ways to design a crown, material selection is done between fused cast or sintered, with a natural dominance of sintered material. In the context of industrial footprint contraction, we observe a tendency to get larger pull rate per furnace, and this leads to larger designs of spans for the crown, up to 7-9 m. Combining this trend with the rise of electrical boosting and transition to news fuels as energy source, the function of the crown is also to limit the heat losses from the melter, resist to oxy/gas combustion, water vapor and heavy metals generation, alkali vapors in case of soda-lime glass, and carry-overs. The most encountered crown solution is the use of silica bricks, usually with a cementitious binder. Recent market trends show more silica products with low or no lime content. In various working conditions this material can face spalling or rat-hole degradation, leading to complex repair in hot conditions, such as ceramic welding. This visible degradation appears with silica-based products when the crown temperature is above 1,620°C. Below 1,400°C, sodium silicate starts to form if the glass chemistry or atmosphere contains alkalis. In case of cold crowns for high-boosted furnaces, the silica material could be at risk. Standard silica is generally bonded with lime or phosphates. Combined with raw material pollution (CaO, MgO, Al2O3, K2O), it will locally decrease the refractory melting point in presence of corrosive agents. The low-lime silica will thus help with corrosion resistance between 1,400°C and 1,620°C. However, as the low-lime silica refractory is poorly bonded, the material is not well sintered and usually heavily microcracked. This leads to a more brittle material. Even though corrosion resistance is better, the potential propagation of cracks during the glass furnace operation and local spalling must be taken into consideration. A bonded alternative to silica is mullite, which has an enhanced corrosion resistance to carry overs and atmosphere vapors. This material is already a worldwide solution for low-alkali glass chemistries, providing limited spalling risk and enhanced creep resistance in various applications.

In the next section, we present the SEFPRO BP Mullite REC, developed to offer alternative crown design when operating in severe conditions. This is achievable thanks to a material microstructure non-sensitive to water vapor or to temperature, a controlled behaviour in high alkali concentration and very good creep and thermal shock resistance.

Standard degradation with silica crown © SEFPRO, 

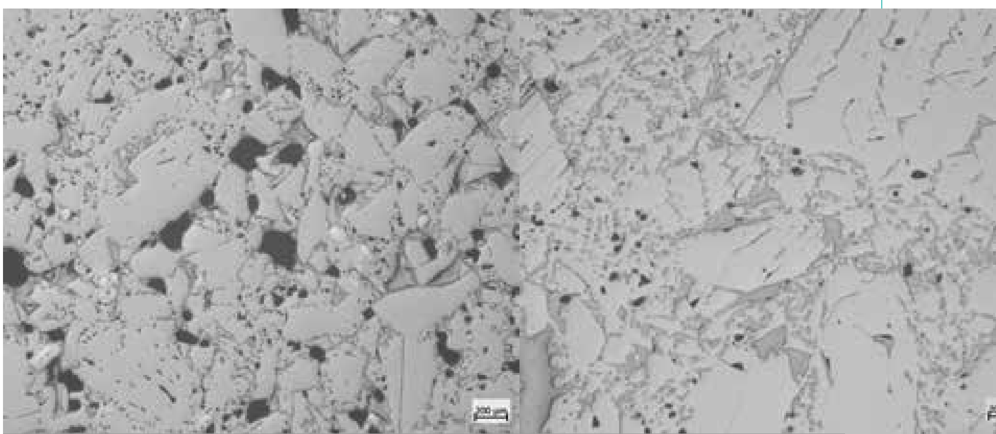
## DEVELOPMENT OF BP MULLITE REC FOR SEVERE CONDITIONS

High-creep and chemical resistance with BP Mullite REC solution SEFPRO has developed the BP Mullite solution regarding severe conditions encountered in crown. Objective is to offer to furnace designer and glass maker a material that will have excellent refractoriness under load and high cold crushing strength.

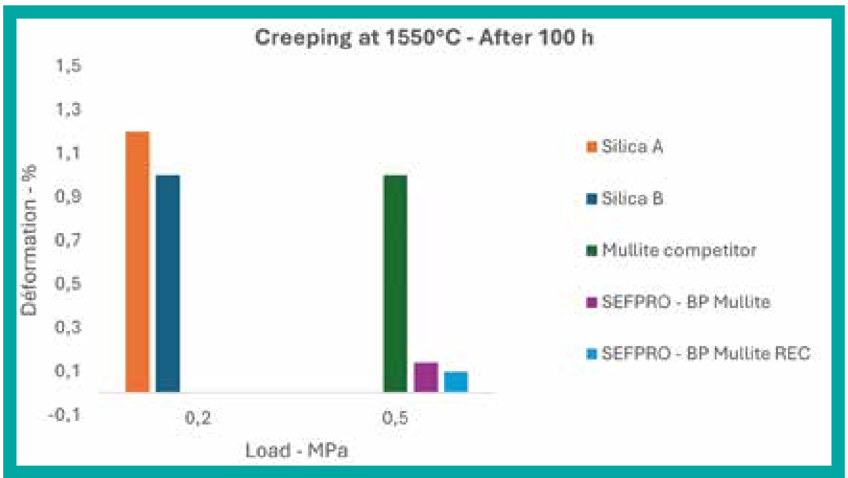
The differences between SEFPRO BP Mullite and BP Mullite REC -for recrystallised- are controlled by a specific manufacturing process, bringing low level of closed porosity and significantly better behaviour for creeping at high temperatures.

## UNLOCKING HIGHER PERFORMANCE THROUGH ADVANCED MULLITE TECHNOLOGY

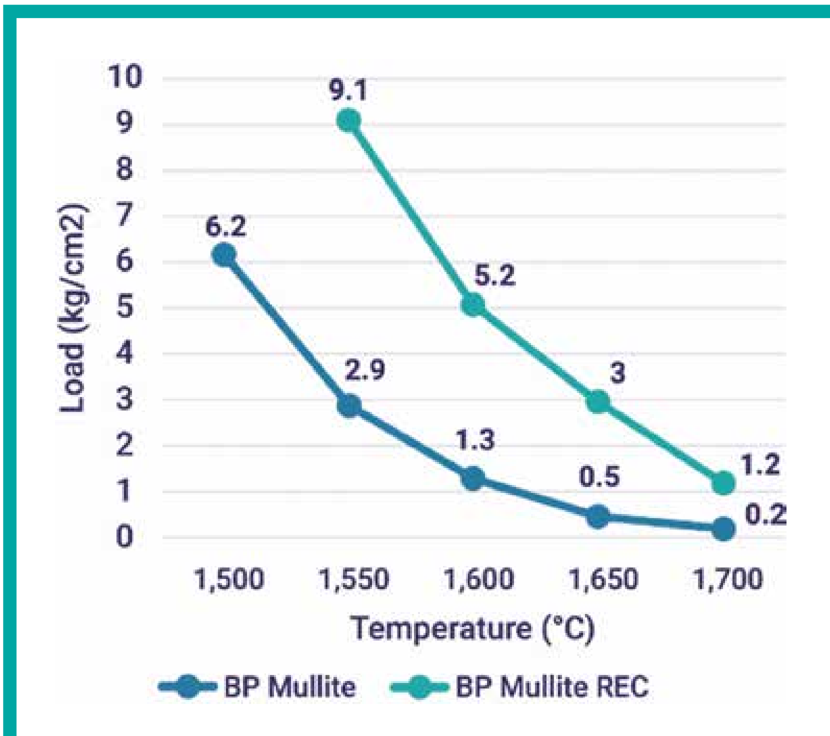
BP Mullite REC superstructure opens the way to new operating conditions Based on enhanced creep and chemical resistance, BP Mullite REC allows to increase the crown temperature by more than 100°C



Material properties © SEFPRO, 



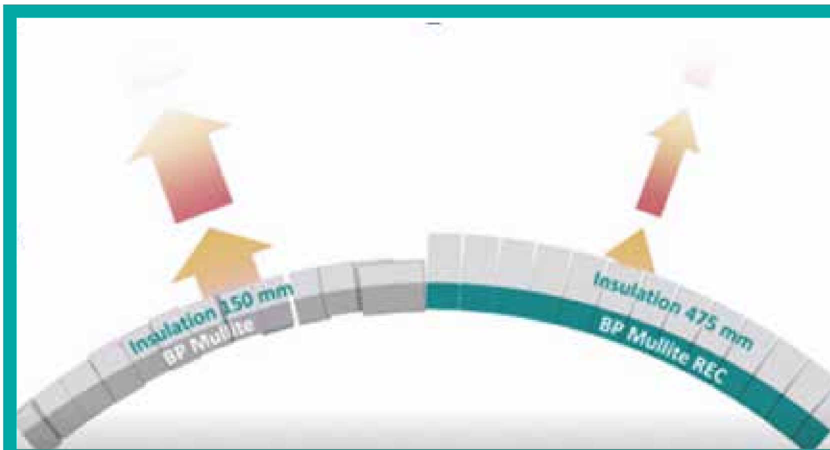

Closed porosity (BP Mullite - left / BP Mullite REC - right) © SEFPRO, 




Refractoriness under load. © SEFPRO, All rights reserved 2026

while allowing a safer operation thanks to a much higher creep resistance, up to 6 times at 1,700°C, that were not previously achievable to reinforcement fiber glass, textile fiber glass, ceramic and borosilicate glass furnaces.

A crown material being able to withstand a higher load at higher temperature helps reduce superstructure energy losses by allowing a much heavier insulating package. Higher refractoriness under load also enables an increase in the glass melting temperature to reach a higher pull (above 1,550°C and higher) and improve the manufacturing performance. Refractories integrity and stability during the whole campaign life are the key to high performance melting process, particularly critical for the crown application. BP Mullite REC crown for reinforcement and textile fiber glass melting furnace is especially adapted to oxy-firing combustion and its high flame temperatures.




Higher insulation package thanks to BP Mullite REC © SEFPRO, All rights reserved 2026

## REDUCING THERMAL LOSSES WHILE ENSURING STRUCTURAL STABILITY

Thermal losses reduction in reinforcement glass furnaces A realistic approach is to increase the insulation of furnace superstructures, but it also increases the inner refractory temperature and will strongly challenge the refractoriness under load, especially at higher temperatures. When applied to a glass furnace melter crown, thicker insulation means greater weight and higher constraints on each block of the crown. As the maximum acceptable load decreases with temperature, the risk is consequently exposure of the crown material to a load above its mechanical limit given by the nil creeping curve. The crown may start sagging, and the creeping resistance is challenged. A concrete example of how the SEFPRO BP Mullite REC allows 60 percent heat losses reduction while securing the crown against risk of sagging:

SEFPRO BP Mullite REC provides safer operation against risk of creeping and reduces heat loss by more than half with the use of much thicker insulation. The high refractoriness property of BP Mullite REC ensures a continuous operation without sagging even at very high temperature. ■