



Kiln Shelves for Top-Loading Electric Kilns

Debunking concerns related to silicon carbide kiln shelves and electrical conductivity.

By Marshall Browne

President, Smith-Sharpe Fire Brick Supply

Advancer® kiln shelves in multi-sided shapes designed for top-loading electric kilns were first introduced in 2003. These thin and lightweight kiln shelves are made from an advanced nitride-bonded silicon carbide composition that is distinguished from conventional nitride-bonded silicon carbide in that it is significantly stronger, thinner and much more resistant to oxidation. Advancer kiln shelves are 19 times stronger and weigh 50% less than conventional 1-in.-thick cordierite kiln shelves. In addition, they are made flat to stay flat so there's no warping, even after many firings under heavy loads.

Benefits such as high thermal conductivity, low mass, light weight, stability (i.e., no warping), and resistance to glaze sticking and penetration have gained these shelves increasing acceptance from artists, educators, production potters, and tile manufacturers. Despite their popularity, questions are often raised regarding the appropriateness of the shelves' use in resistance element electric kilns. Specifically, "Are they safe to use in my electric kiln?"



Electrical conductivity test setup at Northboro R&D Center.



Intentional element contact with the shelf was designed to test the potential for damage from kiln element and controller electrical feedback.

The electrical conductivity value of an Advancer kiln shelf is low enough to be considered safe for use in top-loading electric kilns.

While it is true that some forms of silicon carbide are specifically designed to conduct electricity (such as heating elements), the internal bond matrix—and especially the glassy, oxide layer that is intentionally fired onto the surface of Advancer shelves—dramatically lowers their electrical conductivity compared to other types of silicon carbide kiln shelves. As a result, the electrical conductivity value of an Advancer kiln shelf is low enough to be considered safe for use in top-loading electric kilns.

Prior to offering Advancer shelves for sale to the electric kiln market, Saint-Gobain conducted a variety of tests at its Northboro Research & Development Center to verify that the capacity of Advancer to conduct electricity would not present a significant safety hazard under average operating conditions. For testing purposes, electric current was intentionally forced through Advancer plates in a way that was unlikely to occur under average operating conditions. Even under these somewhat extreme test conditions, it was determined that while Advancer does conduct a low amount of electric

current (as might be the case with direct element contact), the measured amount of current on "as-manufactured" shelves was not enough to pose a serious threat to operator health or safety. It was also recorded that the use of coatings such as kiln wash would further reduce the shelves' electrical conductivity.

In addition, as the shelves are fired repeatedly in an electric kiln's oxidizing atmosphere, the glassy layer continues to accumulate and further reduces the

rate of conductivity. The use of cordierite or similar post compositions also eliminates the possibility of current being conducted from one level of shelves to another, should element contact occur on a lower shelf.

The next question we sought to answer was whether there was any possibility of damage to the electric kiln or controller from element contact with an Advancer shelf. Jim Skutt of Skutt Kilns provided the opportunity for some *in-situ* testing at the company's Portland, Ore., facility, and several worst-case, "don't try this at home" test setups were developed. Under no circumstances were we able to create a situation where there was a potential for shorting out a kiln or damaging its controller by misusing Advancer shelves. We also did a limited amount of electrical conductivity testing that confirmed our previously documented results.

Based on the test results and with input from Skutt, a "Common Sense

Warning" was developed that accompanies each order of multi-sided shelves that we ship.* The condensed version of this warning is permanently fired on to each multisided Advancer shelf. What we have found is that the majority of customers who purchase Advancer shelves tend to keep their kiln elements and brick walls in good repair, so the possibility of strayed element contact is minimal. It was also verified through testing that an energized glowing ele-

ment laid directly on the Advancer surface does not stick or fuse to the shelf on cooling.

In summary, the precautions for using Advancer shelves vs. cordierite shelves are essentially no different. Mainly: Do not open or put your hands into an energized kiln! ☒

For additional information, contact the author at (866) 545-6743 or marshall@ssfbs.com, or visit www.kilnshelf.com.

Advancer Benefits

- Increased load capacity
- Easier lifting in and out of kilns due to lighter weight
- Easier on operators' hands since all edges and corners are smooth and rounded
- Less need for full shelves since half shelves remain flat indefinitely
- Significantly less (if any) scraping, grinding and other time-consuming messy or dusty prep work between firings
- Reduced firing costs over time
- Faster firing cycles, if desired