Zircon: Cooler, more energy efficient buildings

Why Zircon is helping to address the urban heat island (UHI) effect

As cities get hotter, the materials we use to build them matter more than ever. Zircon can play an important role in helping buildings stay cooler and more comfortable, thereby reducing the UHI effect.



Photo credit: Smithbrook Building Products

What is the UHI effect?

The UHI effect occurs when cities and built-up areas become noticeably warmer than the surrounding rural areas because materials such as asphalt, concrete and steel absorb and store solar heat.

The UHI effect can mean:

- Greater reliance on air conditioning
- Higher energy consumption
- Increased CO_2 emissions
- Reduced thermal comfort

11%

The UHI effect will cost cities an average of 5.6% of gross domestic product (GDP) globally by 2100, with losses reaching up to 11% in the hardest-hit cities.

Source: Pirta

19%

Urban heat increases median building cooling energy consumption by 19%, according to ScienceDirect publications.

Source: ScienceDirect

How does Zircon help?

Zircon can improve the thermal performance of glazed ceramic roof and façade tiles. When incorporated into ceramic glazes, zircon increases solar reflectance, allowing tiles to reflect more of the sun's energy and absorb less heat.

The result is straightforward

- Lowered tile surface temperatures
- Reduced heat transfer into buildings
- Demand for cooling lowered
- Improved thermal comfort

Zircon's impact is significant

Research commissioned by the Zircon Industry Association (ZIA) and conducted by Centro Ceramico in Bologna measured the Solar Reflectance Index (SRI) of 36 glazed ceramic tile samples containing zircon, used both as an opacifier and as a frit.

The study found that zircon increased the SRI of glazed surfaces, with the effect becoming more pronounced when zircon was used as an opacifier and even greater when used as a frit.

When zircon was added as an opacifier, the reported increase in SRI varied significantly by glaze colour:

+90% BLACK	+45% BLUE	+43% BROWN
+33% GREEN	+23% YELLOW	+21% WHITE

Outdoor testing also showed that zircon-containing glazes can provide measurable cooling. Under the test conditions, black glazed tiles with 3.3% zircon in the frit had surface temperatures up to 5°C lower than the other black-glazed samples.

What does this mean for architects?

Architects, specifiers and their clients are increasingly looking for building-envelope materials with high reflectance properties to help mitigate heat.

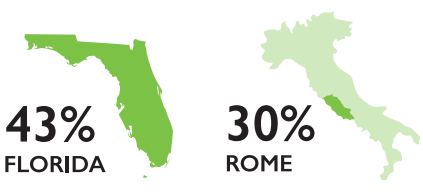




Photo credit: Smithbrook Building Products

Research shows that roofing materials combining high solar reflectance and thermal emissivity, including zircon-containing tiles, can **reduce indoor building temperatures by around 2.5°C.**

An indoor temperature **reduction of around 2.5°C** reduces a building's summer cooling energy requirements, for example by as much as **43% in Florida** and **30% in Rome.**



Source: ZIA

Zircon-containing coloured roof tiles offer more than aesthetic choice. Across a range of colours, they can combine solar reflectance with:

- Cooling performance
- Energy conservation
- Durability
- Resistance to atmospheric damage
- Low maintenance
- Resistant to freeze-thaw cycles and thermal shock

"Zircon helps manufacturers develop coloured ceramic tiles with improved solar-reflectance performance, including darker colours that would otherwise tend to absorb more solar energy."

Zircon for more sustainable buildings

As urban temperatures rise, improving the performance of the building envelope will become increasingly important.

By improving the solar reflectance of glazed ceramic tiles, zircon can help architects, designers and specifiers explore building-envelope solutions and address the Urban Heat Island effect.

- **Reflects** solar energy
- **Reduces** heat absorption
- **Supports** lower cooling demand
- **Improves** thermal comfort

For more information on ZIA-commissioned research studies, visit the **ZIA website** or **contact us** directly.

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