



tenance, polishing technology (e.g. static head vs. sliding head), and consumer expectations can all affect the quality of the finished product, with a high incidence of polishing problems being reported on tiles from Asia. Even when the highest quality materials and polishing technology are used, optical hazing can occur on tiles with less dense “porcelain” bodies.

TCNA’s laboratory has found that some materials sold as “residential porcelain” have water absorption values in excess of 3%. Higher porosity can result in more microscopic cracks and

# Optical Hazing on Polished Porcelain Tiles

By Bill Griese

## What is optical hazing?

While the term “hazing” is repeatedly used by observers to describe inconsistencies noticed in the reflective properties of polished surfaces, it can encompass a broad range of visual observations. Most times these inconsistencies are invisible under normal lighting, and are only noticed when polished surfaces are illuminated by light coming in from the side at a low angle. In such lighting conditions, a variety of inconsistencies have been reported, including light-colored cloudy spots, dark shadow spots, dark shadow ribbons that run across the entire tile, and wavy regions of inconsistent reflectivity. Additionally, observers have reported fuzzy spots or distorted lines in a polished surface’s reflected image.

## What is the relevance of optical hazing to consumers?

With polished porcelain, consumers expect surfaces that are smooth, clean and shiny, much like they would expect with polished granite or marble. Understandably, consumers are not happy when “fuzziness,” “cloudiness,” or “haziness” are observed on such surfaces. At first glance, it may seem as if these surfaces can be easily cleaned or shined with household products. Consumers are even less happy when they proceed

with such steps, only to discover that the situation is not resolved.

Consumers can be quick to consider optical hazing, which can be difficult to detect in showrooms, to be manufacturing “defects.” Certainly, the consumer has every right to expect a polished product to be shiny and reflective. However, the quality of such polishing can be a subjective assessment. Currently, there is no consensus standard for polishing quality. As a result, it is incorrect to state that products exhibiting optical hazing are “sub-standard.” The absence of a standard can make handling customer inquiries and possible litigation confusing. Until a standard can be written, it is important to appropriately manage consumers’ expectations of the aesthetic properties of polished porcelain tile.

## What causes optical hazing?

In most cases, hazing effects can either be attributed to the polishing procedures or the quality of the materials being polished. North American and European factories have developed proprietary procedures to produce uniformly consistent and high quality polished surfaces with sliding head polishing machines. These machines incorporate a transverse oscillating motion to increase overall uniformity. Polishing materials, machine main-

voids that reflect light differently, making them more susceptible to optical hazing. True porcelain has water absorption of 0.5% or less.

To compensate for the lower quality of polishing on less dense porcelain bodies, some manufacturers apply a wax or other surface coating. This wax is also intended to protect the polished tile during shipping. Such waxes and coatings improve the apparent polishing and can make optical hazing harder to detect. This is because they can add reflective qualities to a surface that may not ordinarily have such qualities. However, such wax is not permanent, and is partially removed through the grouting process.

## How can problems associated with optical hazing be prevented?

Prior to accepting polished porcelain tiles, they should be examined for any wax or surface coating. Such coatings must be removed on enough pieces to allow for a proper evaluation, with some distributors recommending cleaning 10

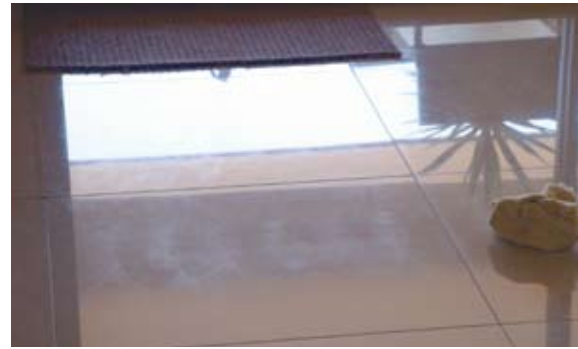
**Non-uniform polishing can result in alternating bands of reflective and non-reflective regions on a polished tile’s surface.**

to 20 square feet. After the wax or coating is fully removed, examine the tile under both direct and side lighting.

Finally, it is critical that consumers' expectations of polished porcelain tiles are properly managed. Overwhelmingly, North American

**Top Right: When illuminated by light coming in from the side at a low angle, cloudy non-reflective spots might be observed.**


**Bottom Right: Optical hazing can also result in a distorted, non mirror-like reflected image.**



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and European polished porcelain products do not have problems, but it should be understood that there is currently no polishing standard. Efforts are underway to develop such a standard in both the United States and internationally. **TILE**



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### About the Author

Bill Griese, Standards Development and Green Initiative Manager for the Tile Council of North America, is involved in the development and revision of ASTM, ANSI, ISO, and other industry-specific standards, and the coordination of TCNA's environmental efforts. He serves as Chairman for the ASTM C21 Committee on Ceramic Whitewares and Related Products, and also works closely with TCNA's Product Performance Testing Laboratory. Griese is a LEED Accredited Professional and earned a Bachelor of Science degree in Ceramic and Materials Engineering from Clemson University in Clemson, SC.

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