



**APPROVED**

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## Glass Tile: Ancient Art Form, Expanding Applications What Guidelines Apply?

A visit to a museum often increases one's awareness that glassmaking dates back thousands of years and was practiced in multiple locations around the globe. Stained glass window masterpieces in ancient European churches are stunning in their brilliance and vibrant spectrum of colors. Spinning the clock to the 21st century finds us in a rapidly growing market with a multitude of glass tile applications — from tiny mosaics less than one square to glass tiles having multiple square feet of surface area.

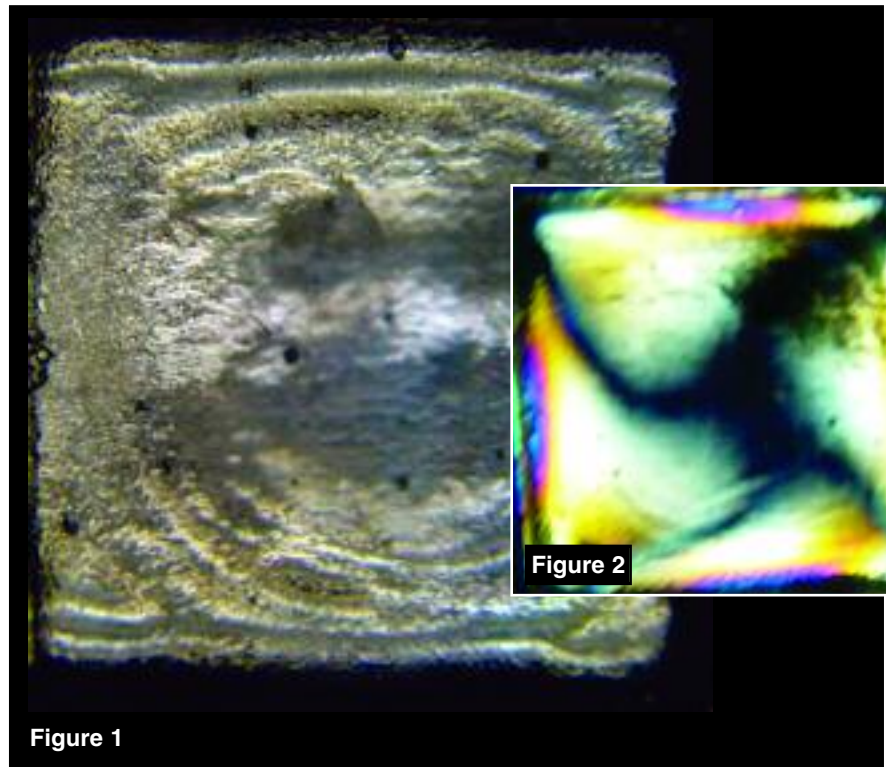
Definitions of glass vary widely. One text states that glass is a non-crystalline solid that softens upon heating rather than showing a sharp melting point. The “structure” is often composed of small bonded atomic units of silicon and oxygen atoms that are linked to each other or to other atomic species, thus forming a three-dimensional network. That is a wordy way of saying that there is a very large family of materials that is classified as glasses. Each distinct combination of elements yields unique properties. For that reason, glass tiles often have prop-

erties very different from conventional ceramic tiles and, as such, must be dealt with in a different way when setting them.

The brief question and answer discussion below is not intended to be all-inclusive; rather, it presents a small number of topics. Numerous articles dealing with general glass technology are available as are product-specific literature from glass tile and installation materials manufacturers.

### How Do Glass Tile Selection and Installation Practices Differ From Those of Conventional Ceramic Tiles?

There are multiple methods used to fabricate glass tiles and to modify them for particular purposes or applications. Manufacturing methods often dictate how large or small, and how thick or thin the tiles may be. Where the tiles are used, whether it is on walls or floors, in dry or wet (in showers or pools) areas dictates, at least in part, the substrate, adhesives, and grouts to use. For example, many manufacturers recommend white polymer-modified mortars for use with their glass tiles, but some glass tiles allow less-expensive gray thinset to be used. In all cases, suggestions should be sought from both the glass tile and installation materials manufacturers. Glass tile installation often requires considerations beyond those used for conventional ceram-



**Right (Figure 1): A two-inch glass tile viewed with light transmitted through parallel polarizers.**

**Right Inset (Figure 2): The same glass tile in Figure 1 is viewed using 90-degree crossed polarizers. The dark pattern indicates the presence of internal stresses**

ic tiles. For example, glass' having a larger expansion upon heating requires modifications of guidelines for placement of "expansion" or movement joints.

### What Should Be Included on Glass Tile Installation Checklists?

The following list is not all-inclusive but can serve as a guide to useful information specific to a selected glass tile and its installation.

- Physical and mechanical characteristics to verify suitability for the application
- Chemical resistance to contaminants likely to be encountered in use
- Tile manufacturer's suggestions for adhesive and grout types
- Subsurface/substrate type and preparation
- Expansion joint size and placement
- Guidelines for cutting the particular type of glass
- Setting techniques and mortar curing/drying time before grouting
- Type of grout and joint width

### What Installation Standards or Guidelines Are Available?

In 2007, the American National Standards Institute (ANSI) A108 committee published three new methods for the installation of glass mosaics. They are A108.14, A108.15 and A108.16.

The Tile Council of North America's Handbook for Ceramic Tile Installation includes multiple methods/guidelines for glass tile installation.

A committee effort is currently underway to provide Specifications for Glass Tile (A137.2), likely similar in scope and importance to A137.1 that provides specifications for ceramic tile.

### What Scientific Measurements/Approaches Can Be Used to Help Prevent Glass Tile Installation Problems or to Determine the Cause(s) of Problems That Might Occur?

The TCNA Product Performance Testing Laboratory has capabilities to perform the following tests on glass tile and related installation materials:

- Thermal expansion coefficient
- Freeze-thaw and thermal shock behaviors

- Abrasion/scratch resistance
- Bond strength of adhesives and grouts to tile under wet and dry conditions
- Light reflection and color differences
- Reaction of tile and grout to strong UV radiation
- Optical distribution of stresses in glass tile
- Lead (Pb) content

In conclusion, it should be noted that many experienced tile installers would volunteer that glass tiles are not more difficult to work with than other tile products. However, they will usually add that glass tile requires special attention to the unique properties of glass to ensure successful and long-lasting installations. Instructive information is readily available. **TILE**



**Sonny Irick**

### About the Author

Virgil (Sonny) Irick is Director of Laboratory Services for Tile Council of North

America's Product Performance Testing Laboratory. He is responsible for testing of tile, stone, adhesives, grouts and membranes to ASTM, ANSI and ISO standards. Additionally he directs development of non-standard tests for solution of raw materials and processing problems, analyses of special chemical and microstructural problems, etc. Dr. Irick earned B.S. and M.S. degrees in ceramic engineering from Clemson University and a Ph.D. in ceramic engineering from The Ohio State University.