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Structural Clay Tile (Structural Terra Cotta)

Introduction:

Structural clay tile describes a category of **burned-clay building materials** used to construct roofing, walls, and flooring for structural and non-structural purposes, especially in fireproofing applications. Also called building tile, structural terra cotta, hollow tile, and clay block, the material is an extruded clay shape with a substantial depth that allows it to be laid in the same manner as other clay or concrete masonry.

Structural clay tiles grew in popularity towards the end of the nineteenth century because they could be built faster, were lighter in weight. Each unit is generally made of clay or clay with cavities or cells inside. This material is commonly used in building arches, fire retardants, and partition walls. It continues to be used in Europe to build fire resistant walls and partitions. In North America, the materials have largely been replaced by **concrete building units**



Manufacturing of Clay Tile

Structural clay tile is still manufactured according to historical processes: clay is kneaded to an appropriate consistency, pressed into molds, and fired in large kilns. Different molds and forms are used for each type and shape of structural clay tile



Classification

Structural clay tile is classified into three grades: **hard, semi-porous, and porous**. Each classification is differentiated by the length of time the tile is fired during the manufacturing process, and each classification is used for different purposes. **Hard tile** has the greatest structural strength of the three categories and is used largely in engineering applications. Its hardness resists moisture, as it is less porous than other classifications. However, hard tile is less fireproof as it is prone to cracking in high heat.

Semi-porous tile has moderate strength and is resistant to moisture.

Porous tile is made by mixing clay with straw, sawdust, or other materials that are burned out during the manufacturing process making it highly porous and lighter, in addition to reducing structural dead loads. **The porous tile** was preferred among builders for fireproofing since it behaved well in high heat.

Standard Sizes :

Structural clay tiles are manufactured in a variety of standard sizes, including 4 inches (10 cm), 6 inches (15 cm), 8 inches (20 cm), 10 inches (25 cm) and 12 inches (30 cm) thicknesses, and typically 12 inches (30 cm) x 12 inches (30 cm) or 12 inches (30 cm) x 8 inches (20 cm) face dimensions. Structural clay tile was used as a permanent form material to reduce the bulk and weight of structural concrete floor slabs.

What are Terracotta Tiles?

Terracotta translates from Italian as "baked earth," and as a category of ceramic tile, it refers to tiles created from a particularly porous and easily shaped clay with a high iron content that gives the tiles their characteristic reddish/brown color.

Terracotta is fired at a relatively low temperature (600 to 1,000 degrees Fahrenheit), and its surface remains quite porous unless it is glazed. Terracotta tile is readily available and less expensive than many other forms of ceramic. Its popularity stems largely from its attractive natural colors, which are the very epitome of earth-tones.



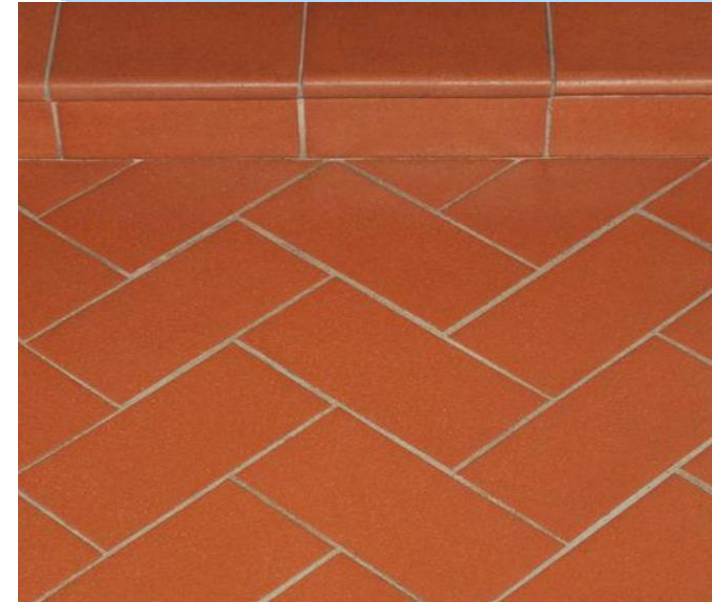
Low-Density and High-Density Tiles

Terracotta tiles are sometimes categorized as high-density or low-density materials, though it is the "high density" label that is more often touted by manufacturers. High-density terracotta will be more resistant to cracking and is a better choice for heavy-use areas. Low-density terracotta is usually a bargain material that may not hold up well under heavy use. **Low density terracotta** also is more **porous**, so it is not a good choice for wet areas or areas prone to stains, such as bathrooms and kitchens.

Color Variations

Terracotta tile is a natural material with color variations determined by the location where the clay is obtained.

Typically, terracotta tiles range from yellow to dark brown, with a wide range of reddish hues between the extremes. **Saltillo terracotta** is a very **popular** form, made from clay found in Saltillo, Mexico. Saltillo tiles have a unique and identifiable blend of yellow and reddish tones.



Natural, Burnished, or Sealed Tile

In their natural state, terracotta tiles are a lovely mix of red and earthen hues, which give swooping clouds of color, creating unique yet subdued images across the surface of every tile fired. But it is this attribute that makes terracotta very porous in its natural, unglazed state. That means that water and liquids can seep easily down into its core, causing mold or stains to set in. For this reason, **natural terracotta is usually periodically treated with a sealant to protect it against those hazards.** Another process, known as **surface burnishing**, can also reduce the absorbency of natural terracotta. Burnishing is done during the manufacturing process and consists of rubbing or polishing the surface with fine abrasives to create a denser, smoother finish.

Glazed and Unglazed Tiles

As with any ceramic tile, terracotta can be glazed—a process by which a glass-like surface finish is bonded to the clay tile during a second firing process.

This is how standard ceramic tiles obtain their color, through dyes that are blended with the glazing material. The process also creates a waterproof surface to the tile, making them impervious to stains.

But when glazing is applied to terracotta, it also hides the beauty of the earthy colors of the tile.

It is also possible to buy hand-glazed or hand-painted terracotta tiles to provide some balance of appearance and function.

Hand-glazed or hand-painted terracotta allows some of the natural beauty of the tile to show through, while also improving its stain- and water-resistance.



Production and properties of Tiles

The most common method of production is to take an appropriate refined clay, then form it to the desired shape. Alternatively, it may be made with one or more molds. After drying, it is placed in a kiln or atop the combustible material in a pit and then fired. The typical firing temperature is around 1,000 °C (1,830 °F), though it may be as low as 600 °C (1,112 °F) in historic and archaeological examples. The iron content, reacting with oxygen during firing, gives the fired body a reddish color, though the overall color varies widely across shades of yellow, orange, buff, red, "terracotta", pink, gray, or brown.

Fired terracotta is not watertight, but surface-burnishing the body before firing can decrease its porousness and a layer of glaze can make it watertight. It is suitable for use below ground to carry pressurized water, for garden pots or building decoration in many environments, and for oil lamps, or ovens. Most other uses, such as tableware, sanitary piping, or building decoration in freezing environments, require the material to be glazed. **It has been very widely used, but the paint is only suitable for indoor positions and is much less durable than fired colors in or under a ceramic glaze.**

Machine-Cut vs. Handmade Terracotta Tiles

When buying terracotta floor tiles, you can choose between machine-cut or handmade products.

1-Machine-cut tiles are produced by a factor-based process that fires, cuts, and offloads terracotta tiles into precise, computer-guided geometric forms. These tiles still retain the natural beauty of the iron-laced clay colors, but they are more consistent in shape and dimension, making it easier to install them. This also produces a more consistent look in the final installation.

2-Handmade terracotta is an art form that is indigenous to several particular regions, including Mexico and much of southern Europe. This process is an imprecise method that produces pieces with slight irregularities that enhance the earthen appeal of the material. The drawback to handmade terracotta tile flooring is that it can be quite expensive since handcraftsmanship takes far longer than machine productions. The results can also be a little erratic, and size discrepancies of the tiles can sometimes make installation difficult.

Clay Tile Flooring Uses:

1- **Terracotta tiles**, it has an old rustic style when it is used as the flooring material. It's also a good material when local home styles are desired - matching terracotta is ideal for Mexican or Mediterranean interiors.

2- **This material** is a great choice for any rustic or natural features, as well as log cabin style decors. It is popular in closed living rooms and porches. Warmer than stone or glazed ceramic, terracotta is also ideal for home and home décor, or earthy hues.

3- **Terracotta tiles** can be used in some limited outdoor applications, but only in climates that do not get regular freezing temperatures. In cold climates, the water absorbed into the clay can freeze and crack the tiles.



How to tile a Floor with Terracotta Tiles

<https://youtu.be/LndJzveeg8k>

<https://youtu.be/Fbo1a9dKbAM>

How to Install Terracotta Tiles on the Field - Construction Techniques of Residential Buildings

<https://youtu.be/oNC7-Hdb8c>