

# CERAMIC TILE FLOORS AND EDGE® AND EDGE GOLD™ OSB STRUCTURAL PANELS

For over 35 years, builders have found success using Weyerhaeuser Edge® and Edge Gold™ oriented strand board (OSB) floor panels in a growing number of applications. Even in demanding applications such as ceramic tile floors, Edge® and Edge Gold™ OSB is increasingly the panel of choice for subfloors. However, subfloor material isn't the only factor that contributes to success in ceramic tile applications. Proper floor design, surface preparation, and tile installation also help ensure a quality finished product.

**Most tile floor problems can be minimized by following all industry guidelines for floor design, construction, and tile installation.**

## Floor Design

Tile is brittle by nature and may crack if not properly supported or if applied to a structurally inadequate floor. A stiffer floor will reduce the deflection in the tile system when the floor is loaded. Limiting the subfloor deflection between joists is particularly important. A thicker floor panel and/or closer on-center joist spacing is recommended to reduce potential problems such as broken tile, cracking grout, and tile bond failures.

Tile system failures can also occur when changes in thermal or moisture conditions cause the floor panels or tiles to expand or contract, so all building materials should be protected from exposure to weather during construction. Tile bodies are typically not waterproof and will take in moisture. Waterproof membranes, available from a number of suppliers, can be installed to protect the subfloor from any moisture absorbed through the tile.

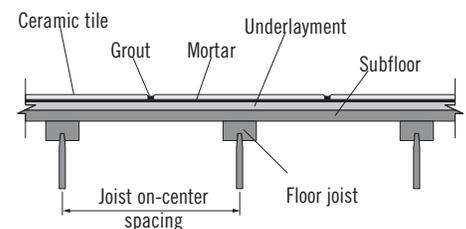
Most tile floor problems can be minimized by following all industry guidelines for floor design, construction, and tile installation. The publications below are two good industry guidelines for ceramic tile installation.

- The *2023 TCNA Handbook for Ceramic, Glass, and Stone Tile Installation* published by the Tile Council of North America, Inc.
- *American National Specifications for the Installation of Ceramic Tile* published by the American National Standards Institute (ANSI)

## Ceramic Tile Applications over a Wood Floor System

The *TCNA Handbook for Ceramic, Glass, and Stone Tile Installation* lists several wood floor assemblies that are acceptable for use with ceramic tile. These assemblies specify various subfloor, underlayment, and maximum joist spacing combinations, and take into consideration the allowable panel deflection for ceramic tile applications when specifying the subfloor and underlayment thickness. *Figure 1* shows the components typically found in a wood floor ceramic tile application.

Six of TCNA's systems using a wood subfloor under ceramic tile application are summarized in the table on page 2. Refer to the TCNA handbook for more assembly options. TCNA floor assemblies have demonstrated acceptable performance in the field, and the tile installation in these assemblies has been evaluated using ASTM C-627 test methods.



*Figure 1*

TCNA Assemblies Using a Wood Subfloor

TCNA Number	Service Classification	Joist Spacing	Subfloor Thickness and Span Rating	Underlayment Layer	Other Requirements
RH130-12	Light commercial	16" o.c.	19/32", 20" o.c. T&G plywood	19/32" minimum thickness, exterior glue, plywood	Movement joints
F142-12	Residential	16" o.c.	19/32", 20" o.c. T&G plywood or 1" nominal boards		
F143-12	Light commercial	16" o.c.	19/32", 20" o.c. T&G plywood or 1" nominal boards		
F149-12	Residential	24" o.c.	23/32", 24" o.c. T&G plywood		
F150-12	Light commercial	16" o.c.	19/32", 20" o.c. T&G plywood		
F155-12	Residential	24" o.c. <sup>(1)</sup>	23/32", 24" o.c. T&G OSB		

(1) Although TCNA allows the use of OSB at 24" on-center, Weyerhaeuser recommends 16" on-center spacing with Weyerhaeuser Edge® and Edge Gold™ OSB.

According to TCNA specifications, floor assemblies with tile applications must meet the deflection limits set by local building codes.

The TCNA handbook specifies products on a generic basis; however, Weyerhaeuser Edge® and Edge Gold™ flooring can be used whenever OSB subfloor is specified in a double-layer floor system (two layers of wood panels). See Assembly F155-12 in the table above. When a floor assembly specifies plywood as an acceptable subfloor material, Edge® and Edge Gold™ flooring that is a minimum of 23/32" thick can be substituted for joists spacings up to 16" on-center and 7/8" thick for joist spacings up to 24" on-center. However, in no case should Weyerhaeuser floor panels be substituted for underlayment.

All ceramic tile assemblies shown in the TCNA handbook specify the use of tile that meets specifications outlined in ANSI A137.1. Some porcelain tiles meet these specifications, however, porcelain is more difficult to bond to because it is nonporous and very dense. Therefore, TCNA recommends using a premium, latex-modified thinset that meets the requirements of ANSI A118.11 when installing porcelain tile.

The floor assemblies listed also require that movement joints be specified and installed according to method EJ171 in the TCNA

handbook. Joints of this type allow for the differential movement between the tile and underlayment layers—usually caused by changes in thermal or moisture conditions. In addition, a gap should be left wherever tile, underlayment, and subfloor materials abut restraining surfaces (see installation information in the next section).

**Subfloor, Underlayment, and Tile Installation**

The methods and materials used when installing a floor are just as important as the floor's design. Many common problems associated with ceramic tile applications can be prevented by following these recommendations:

- Limit subfloor deflection. Improve the performance of the floor system by reducing the TCNA-specified on-center joist spacing or, if practical, by using a thicker floor panel. Weyerhaeuser recommends using a maximum joist spacing of 16" on-center when 23/32" thick Edge® and Edge Gold™ floor panels are used in any tile application. 7/8" thick Edge® and Edge Gold™ floor panels are recommended for joist spacing greater than 16" on-center.
- When installing the subfloor and underlayment, align the panel's strength axis (surface orientation or face grain) perpendicular to the floor joists. This will

**General Notes**

- When a floor assembly specified plywood as an acceptable subfloor assembly, Edge® and Edge Gold™ that is a minimum of 23/32" thick can be substituted for joists spaced up to 16" on-center and 7/8" thick for joists spaced up to 24" on-center.
- Weyerhaeuser Edge® or Edge Gold™ cannot be substituted for underlayment.

provide the highest level of stiffness between the joists. Locate the underlayment end joints at quarter points of the joist spacing. See Figure 2 on page 3.

- At a minimum, follow code fastening requirements for floor panels and use subfloor adhesive. Weyerhaeuser recommends using a subfloor adhesive that has been qualified as a Class 1/8 in., Type P/O subfloor adhesive in accordance with ASTM D3498-19 to bond the subfloor to the joists. A bead of adhesive applied in the groove of the floor panel is also recommended.
- Maintain a 1/8" gap between all panel edges to allow for linear expansion. Edge® and Edge Gold™ floor panels are manufactured with self-gapping tongue-and-groove joints that automatically allow for this gap along the long panel edge as panels are installed.
- When a cementitious backer unit (CBU) is used, follow the manufacturer's recommendations for attachment. Avoid fastening CBU and wood underlayment where fasteners will penetrate into the floor joists.

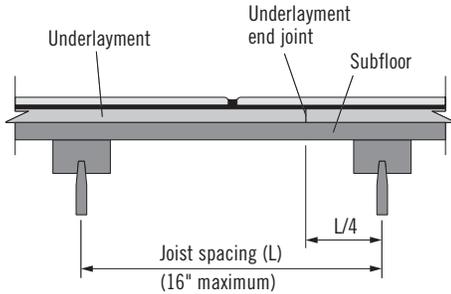


Figure 2

- Tile and grout are typically not waterproof, so appropriate waterproofing must be installed for any applications that will be exposed to water. Weyerhaeuser does not recommend untreated sheathing or joists for tiled areas outside the building envelope.
- Prior to installing tile, make sure both subfloor and underlayment panels are clean, dry, and free of any debris and have no protruding nails or screws. Low areas should be filled and high spots sanded level to provide a smooth, flat surface for the tile. Crawlspace areas should be covered with a vapor barrier. A flat, properly installed subfloor is critical to a successful ceramic tile application.
- Follow the manufacturer's instructions when mixing the mortar. Mortar that is mixed with improper amounts of water or additives may not bond properly.
- Make sure the substrate is clean and apply the mortar in small sections so that it does not skin over prior to the installation of the tile. Inspect the tile before placing it in the mortar; the back of the tile should be clean and free from debris or coatings, which may interfere with the bond. Stone and porcelain tile, in particular, often contain a thin coating of dust that should be removed prior to installation.
- To achieve maximum contact and ensure adequate support, tiles must be properly embedded in the mortar. Tiles that sit on top of troweled mortar ridges are not properly embedded and won't bond correctly to the mortar. Back-butter large tiles and use a trowel depth that will ensure full support and bond coverage. Once the tile is installed, allow sufficient time for curing before grouting the tile or exposing it to construction traffic.
- Leave a ¼" minimum gap wherever tile, underlayment, and subfloor materials about restraining surfaces such as columns, perimeter walls, and dissimilar floors, or wherever changes occur in backing materials. Install tile movement joints according to method EJ171 specified in the TCNA handbook.

### Conclusions

Weyerhaeuser Edge® and Edge Gold™ floor panels have proven successful as subfloor material in floor assemblies with a ceramic tile finish. To ensure optimum performance, follow the guidelines presented here and in the *TCNA Handbook for Ceramic, Glass, and Stone Tile Installation* or the *American National Specifications for the Installation of Ceramic Tile*, in addition to any specific recommendations from the manufacturer.

**For more information about storage, safety, and installation of Edge® and Edge Gold™ floor panels, see the Technical Resource Sheet, Floor, Roof and Wall Panel Installation OSB-4004 or contact your Weyerhaeuser representative.**

