Designing for Ceramic or Stone Tile Floor Finishes

Tile setting methods can be grouped into two general categories – thin-set and full mortar bed. Thin-set methods can be used next to other floor finishes without changing the elevation of the subfloor under each finish. On the other hand, framing that supports a full mortar bed is usually recessed to accommodate the mortar bed (typically 1¼" to 2"). This is best accomplished by using shallower joists under the area to be tiled.

Special considerations apply when sizing floor joists to support ceramic or stone tiles (marble, granite, limestone, slate, etc.).

- Tile industry associations recommend that floor joists be spaced 16 inches on center or less
- The dead load in the tiled area will be higher than the typical 10 psf associated with carpet or vinyl finishes
- Tile industry associations recommend special total load deflection limits

The following tables list the components and weights of typical floor systems, along with the deflection limits that apply. The Tile Council of North America (TCNA) recommends that deflection be limited to L/360 (L = span length in inches) under total load for ceramic tile. The Natural Stone Institute (NSI) recommends that total load deflection be limited to L/720 for spans up to 14'-0" or follow TCNA Handbook guidelines on load sharing design for spans greater than 14'-0".

Terrazzo Tile and Marble Association of Canada (TTMAC) is the Canadian equivalent of TCNA & NSI, and the tile setting standards in the U.S. and Canada are closely aligned.

Stone tiles may be installed with thin-set methods (a 14 foot maximum span is recommended by the Natural Stone Institute) and ceramic tiles may be set on a full mortar bed. Adjust the dead load as required to reflect the actual system components if they differ from those shown in these tables and apply the appropriate deflection limit for the type of tiles to be used.

Thin-Set Ceramic Tile	
⅜" ceramic floor tile	4.7 psf
½" cementitious backer board	3.0 psf
¾" wood structural panel subfloor	2.3 psf
BCI/AJS joists at 16" on center	2.5 psf
½" gypsum board ceiling	2.2 psf
miscellaneous	2.3 psf
dead load	**17 psf**
total load deflection limit	**L/360**

Stone Tile on Full Mortar Bed	
½" stone tile	8.0 psf
2" mortar bed	24.0 psf
¾" wood structural panel subfloor	2.3 psf
BCI/AJS joists at 16" on center	2.5 psf
½" gypsum board ceiling	2.2 psf
miscellaneous	2.0 psf
dead load	**41 psf**
total load deflection limit	**L/720**

Detailed information about tile installation can be obtained by contacting:

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