



Deflection

TDS 123

Every tile or stone installation will only be as good as the surface over which it is installed. Tile and stone are very rigid materials and do not accommodate movement well. They may potentially break or delaminate from the substrate if it bends excessively under load. No movement should be visible. Every installation needs to have a firm, stable surface over which to be applied. With that in mind, one of the most important things to consider is deflection.

The Tile Council of North America states in the TCNA Handbook for Ceramic, Glass, Stone and Tile Installation that tile installation systems, whether wood framed or concrete, shall be in conformance with the International Residential Code (IRC) for residential applications, the International Building Code (IBC) for commercial applications, or applicable building codes. Maximum allowable floor member live load and concentrated load deflection shall not exceed $L/360$ (for ceramic tile), where “L” is the clear span length of the supporting member per applicable building code.

In addition to deflection considerations, above-ground installations are inherently more susceptible to vibration. Consult grout, mortar, and membrane manufacturer to determine appropriate installation materials for above-ground installations. A crack isolation and higher quality setting materials can increase the performance capabilities of above-ground applications. However, the upgraded materials cannot mitigate structural deficiencies, including floors not meeting code requirements and/or over loading or other abuse of the installation in excess of design parameters.

Surfaces must be structurally sound, stable and rigid enough to support ceramic/stone tile, thin brick and similar finishes. Substrate deflection under all live, dead and impact loads, including concentrated loads, must not exceed $L/360$ for thin bed ceramic tile/brick installations or $L/480$ for thin bed stone installations where L =span length (except where local building codes specify more stringent deflection requirements. The Marble Institute of America (MIA) suggests a more stringent standard of $L/720$ for stone installations.

The tile industry has adopted the following position on the issue of deflection; The owner shall communicate in writing to the project design professional and general contractor the intended use of the tile installation, including in-service loads. This will enable the project design professional and general contractor to make necessary allowances for expected live loads, concentrated loads, impact loads, and dead loads including weight of the tile and setting bed. The tile installer shall not be responsible for any floor framing or sub-floor installation not compliant with applicable building codes, unless the tile installer or tile contractor designs and installs the floor framing or sub-floor per ANSI A108.01 (2.3).

How can we determine what this deflection value actually is? To calculate the maximum allowable movement, divide the number of units in the length of the span by the maximum allowable deflection value (In this case 360).

For example (tile):

L = The length of the span

If the span length is 288 units (i.e. inches, centimeters, etc...), then; $288 \text{ units} \div 360 = 0.8$ units of allowable deflection under total anticipated load. For the installation of either stone or agglomerate using LATICRETE® or LATAPOXY® installation materials deflection should not exceed $L/480$. To calculate, divide the number of units in the length of the span by 480.

For example (stone):

L = The length of the span

If the span is 288 units then; $288 \text{ units} \div 480 = 0.6$ units of allowable deflection under total anticipated load.

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