Technical Bulletin
Tolerances for Tiles

The Concrete Floor Contractors Association was founding in 1971 to represent the interests of the concrete floor industry in Canada.

Technical Bulletins are designed to provide state of the art information to owners, specifiers and contractors to both improve quality and reduce problems.

We hope that this information will assist you in this goal.

If you have any questions, or comments, please feel free to contact us at 905-582-9825 or by e-mail at info@concretefloors.ca

The Best Floors Start With Our Finish !

Background:

The installation of applied finishes on concrete floor surfaces requires different levels of flatness and levelness for success. This can be problematic when concrete floors are constructed to an incorrect tolerance or when unrestrained drying shrinkage curling is permitted to change the constructed "as-built" concrete floor tolerances to unacceptable levels.

Applied finish manufacturers often employ straightedge tolerances which have proven to not be practical for concrete floor construction. The concrete floor trade utilizes a special tolerance system called F-Numbers which relate the flatness (FF) and levelness (FL) of a concrete floor surface. Floor flatness and levelness tolerances are produced by the construction methodology employed and are therefore extremely practical. Using more advanced methods of construction, concrete floor flatness and levelness can be improved to meet any need (costs generally increasing with higher tolerance demands).

Discussion:

CSA A23.1-2009 defines two classifications for conventional surfaces: Class A (FF20) and Class B (FF25). Class A surface tolerances are suitable for most concrete floors subject to foot traffic and thick finishes. Class B tolerances may be employed when enhanced surface flatness is desired or required. Class B tolerances are the upper limit of practical tolerances for most residential, commercial and institutional floors. Note that Class B tolerances require the use of more specialized methodology which may or may not be available or accessible in all areas.

Concrete floor contractors generally take the view of trying to exceed specified tolerances as a best practice. The actual results of using Class B methodology, including suitable concrete materials in adequate ambient conditions, ranges between FF25 to FF35. These Class B flatness tolerances have been shown to be suitable for most thin applied finishes. Concrete floor tolerance requirements in excess of FF35 are generally not possible to achieve unless deferred bonded concrete toppings are employed.

… Page 2

Concrete Floor Contractors Association

Technical Bulletin Tolerances for Tiles

The Concrete Floor Contractors Association was founding in 1971 to represent the interests of the concrete floor industry in Canada.

Technical Bulletins are designed to provide state of the art information to owners, specifiers and contractors to both improve quality and reduce problems.

We hope that this information will assist you in this goal.

If you have any questions, or comments, please feel free to contact us at 905-582-9825 or by e-mail at info@concretefloors.ca

The Best Floors Start With Our Finish !

Concrete Floor Contractors Association

Problem

All jointed, non-continuously reinforced concrete floors on grade will change in surface profile as they dry. This process is called drying shrinkage curling. The influence of drying shrinkage curling of the concrete cannot be understated—this is a significant problem. Without sufficient restraining steel in the concrete, concrete floors will curl upwards at all joints. Without any steel reinforcing, concrete surfaces have been observed to curled more than 25mm at joint intersections.

The US National Tile Association has published floor flatness tolerance recommendations of FF50 and FF60 for tiles larger than 16" or with narrow 1/8" joint seizes (link: https://www.tile-assn.com/CMS/Images/85/86.pdf). This document also include tolerances of FF25 and FF32 which fall within the normal range of results for Class B methodology. Tolerances in excess of FF35 can only be achieved using deferred toppings and the most advanced methods of construction. This is not practical in most residential, commercial and institutional applications.

Recommendations

Specifiers must exercise great care when determining concrete floor tolerances.

Specifiers must design concrete floors to retain the as-built concrete floor tolerances with sufficient restraining reinforcing steel.

Concrete floor tolerances for applied finishes must be discussed and reviewed carefully at pre-construction meetings. Concrete materials for slabs on grade must be designed to reduce drying shrinkage while remaining workable and finishable.

Tolerance losses due to the drying shrinkage curling are a design matter and are not the responsibility of either the concrete floor or tile trade contractor.

Concrete floor tolerances of FF50 and FF60 are not a practical solution. Tile contractors who wish to obtain surface tolerances in excess of Class B (FF25-35) will need to include allowances to level the floor with a mortar bed or self-levelling screed to suit their needs.