

# FACTS ABOUT IMPACT SOUND REDUCTION TESTING

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## The need for impact sound reduction

In multi-family, multi-story dwellings, it is important that the occupants do not hear excessive noise from the room above. With well engineered floors, walls and ceilings, it is possible to minimize the noise from surrounding rooms. Hard surfaces, like ceramic tile, are known for generating loud sounds when impacted. The challenge is to control that sound so that it is not transmitted through the floor and ceiling and into the room below. Overall floor mass will help reduce sound.

According to the Tile Council of North America, a 6-inch thick concrete slab will reduce sound transmission by 24 to 32 decibels (dB) and an 8-inch slab will reduce the sound 25 to 35 dB. Most owners and communities require that the Impact Insulation Class (IIC) of the floor/ceiling is greater than 50 dB. To achieve this, insulation material needs to be placed in the ceiling below or beneath the hard surface flooring. Installation product manufacturers have developed many membrane options that can be installed under ceramic tile to increase the IIC of the floor.

## Understanding sound test results

Laboratory testing is used to rate the effectiveness of a floor assembly to reduce sound transmission. ASTM E492 is used in the laboratory to measure the IIC of a specific floor/ceiling assembly. The value obtained will be dependent on the thickness of the concrete slab, the type of hard surfacing installed, the type of ceiling installed below the floor and any sound insulating material used.

Since it is impossible, and expensive, to test every scenario possible, the industry developed ASTM E2179 which reports the sound reduction contribution of just the insulation membrane alone as the Delta IIC for the membrane. An approximate sound reduction for the assembly can be determined by adding the Delta IIC of the membrane to the existing floor IIC value. For example, adding a membrane with a Delta IIC of 20 dB to a bare 6-inch concrete slab will reduce the sound transmission 44 to 52 dB. Nearly all laboratory testing of construction products will have an uncertainty in the reported test results, due to normal laboratory variance. For ASTM E2179, this can be +/- 3 dB and any reported Delta IIC is actually a range, such as 17 to 23 dB, so when added to a bare 6-inch slab, the total IIC could range between 41 and 55.

To simplify the process of selecting the appropriate membrane, most manufacturers will report in their marketing a single, typical Delta IIC value that one can expect in actual installations. Most often this value is within the range of the laboratory testing and is verified by multiple field tests in actual living spaces. If it is important to know the absolute sound reduction of a specific dwelling, we suggest that a field test of a mock up is performed per ASTM E1007. This will provide an actual total IIC for the structure that is in question.

## Choosing a membrane

CUSTOM offers several membrane options that provide crack isolation for tile in addition to contributing high and credible impact sound transmission reduction.

**EasyMat® Tile and Stone Underlayment** is a lightweight, versatile mat created with SoundGard® Technology. It can be installed over any acceptable subfloor and will not rot, shrink or absorb water. EasyMat comes in a mortar-installed or peel and stick format in three thicknesses to meet the needs of different projects. Here are the respective Delta IIC contributions towards impact sound transmission reduction:

- 4' x 100' x 3 mm – 16 dB
- 4' x 75' x 5 mm – 20 dB
- 4' x 30' x 12 mm – 23 dB
- 4' x 10' x 5 mm – 20 dB

## **CrackBuster® Pro Crack Prevention Mat Underlayment**

is a self-bonding, fabric reinforced, asphaltic membrane that isolates substrate cracks up to 3/8". CrackBuster Pro delivers 18 dB of Delta IIC sound transmission reduction.

## Details of the tests

ASTM E-2179-03 is a test method to determine the effectiveness of floor coverings in reducing impact sound transmission through floors. Three results are noted in the report on following this test:

- IIC of bare floor
- Total IIC of the final assembly with floor covering
- ΔIIC (contributed or Delta IIC value) of the floor covering assembly

This test provides a reliable estimate of the increase in IIC delivered by a floor system.



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Lab testing is based on a room of a specified dimension and construction, with controlled air qualities and limited outside variables to influence results. A lab test report has a variability of +/- 3 IIC points to achieve 95% confidence levels.

"The uncertainty limit of the impact noise test data is less than 3 dB for the 1/3 octave bands centered in the range from 100 to 400 Hz, and less than 2.5 dB for the bands centered on the range from 500 to 3150 Hz."

– ASTM certified lab report from Intertek.

Field test results of a given floor covering can vary from location to location, and even from test-to-test in the same location due to the many variables of a given room/location. These include room size; furnishings in the room; street noise, elevators, and other sources of noise; construction details; and air density, humidity, temperature, etc.

## A note about STC

Sound Transmission Class (STC) is a measure of airborne (such as speaking or music) sound reduction through walls and floors of buildings. STC sound issues in a building are largely influenced by the density of the mass of the structure. ASTM E90-90 is used to measure the effectiveness of a wall or floor assembly to control airborne sound. . To control airborne sound, it is more important that all penetrations are filled with appropriate materials to block sound transmission.

Insulation membranes under ceramic tile do very little to reduce the transmission of airborne sound. There is no test to isolate and determine the contribution (if any) value of a sound reduction underlayment to the STC number. CUSTOM products are designed and installed to address impact noise (IIC). Contact CUSTOM's Technical Service Department at **800.282.8786** if you have questions concerning these methods or products.

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TB29 1/17R

