Designation: E989 – 06 (Reapproved 2012)

Standard Classification for Determination of Impact Insulation Class (IIC)[1]

This standard is issued under the fixed designation E989; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This classification provides a method for determining a rating that can be used to compare the levels of impact noise generated by a standard tapping machine and transmitted through different floor-ceiling assemblies.

1.2 The name given to the rating is assigned by the test method that invokes this classification.

1.3 This classification is applicable only to one third octave band impact noise data obtained using the standard tapping machine described in Test Methods E492 and E1007.

1.4 Test methods that invoke this classification include:

1.4.1 *Test Method E492* — the single-number rating is called impact insulation class (IIC).

1.4.2 *Test Method E1007* — the single-number rating is called field impact insulation class (FIIC).

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C634 Terminology Relating to Building and Environmental Acoustics

E492 Test Method for Laboratory Measurement of Impact Sound Transmission Through Floor-Ceiling Assemblies Using the Tapping Machine

E1007 Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures

3. Terminology

3.1 The following terms used in this classification are defined in Terminology C634.

decibel sound
impact insulation class
level
octave band
sound insulation
sound pressure
sound pressure level

4. Significance and Use

4.1 The rating increases as the impact sound attenuation of the floor ceiling structure increases. The rating can be used by architects, builders, and specification and code authorities for acoustical design purposes in building constructions.

4.2 The rating strictly only applies to excitation by the standard tapping machine defined in Test Methods E492 and E1007. It does not deal with low frequency sounds below 100 Hz that are typically generated below lightweight joist floors when they are walked on. Nor does it deal with the squeaking, crunching or rattling sounds that can occur in joist construction when elements in the construction are loose and occupants walk on the floor.

4.3 This classification shall only be used with one-third octave band data.

5. Basis of Classification

5.1 Table 1 lists the sound pressure levels defining the shape of the reference contour, *C(f)*, for the sixteen one-third octave bands from 100 to 3150 Hz.

5.2 To determine the impact insulation rating of a floor ceiling assembly, the impact sound pressure levels, *L(f)*, must first be rounded to the nearest decibel (dB).

5.3 The reference contour, *C(f)*, is then fitted to the impact sound pressure levels for the specimen by adding a constant *T* to all values of *C(f)* until the sum of positive differences between the data and the fitted contour for all frequencies is less than or equal to 32 dB. Stating this criterion as a formula, gives:

$$D = \sum_{f=100}^{f=3150} ifpos\left[L_n(f) - \{C(f) + T\}\right] \quad (1)$$

where the function ifpos returns the value of the expression inside the square brackets if the value is positive. If the

[1] This classification is under the jurisdiction of ASTM Committee E33 on Building and Environmental Acoustics and is the direct responsibility of Subcommittee E33.10 on Vibration.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.