

## Measurement Definitions

*Impact Isolation Class (IIC)* is a single number rating of the laboratory-derived impact sound transmission through floor-ceiling assemblies.

*Apparent Impact Isolation Class (AIIIC)* is a single number rating for the impact sound transmission through floor-ceiling assemblies and associated support structures. Measurements are taken in a receiving unit while the tapping machine operates in the source room. The receiving room reverberation time is calculated for each frequency, and the receiving room noise level is adjusted to have an amount of absorption equivalent to 108 sabins. The adjusted noise levels of the receiving room over a set range of frequencies is the Absorption Normalized Impact Sound Pressure Level (ANISPL). The ANISPL is applied to a reference contour to determine the AIIIC.

*Normalized Impact Sound Rating (NISR)* is a single number rating for the impact sound transmission through floor-ceiling assemblies and associated support structures. Measurements are taken in a receiving unit while the tapping machine operates in the source room. The receiving room reverberation time is calculated for each frequency, and the receiving room noise level is adjusted to meet a reverberation time level of 0.5 seconds in each frequency band. The adjusted noise levels of the receiving room over a set range of frequencies is the Reverberation Time Normalized Impact Sound Pressure Level (RTNISPL). RTNISPL is applied to a reference contour to determine the NISR.

*Impact Sound Rating (ISR)* is a single number rating for the impact sound transmission through floor-ceiling assemblies and associated support structures. Measurements are taken in a receiving unit while the tapping machine operates in the source room. The noise levels of the receiving room over a set range of frequencies is the Impact Sound Pressure Level (ISPL). The ISPL is applied to a reference contour to determine the ISR.

*Reverberation Time (RT60)*: The reverberation time of a space is defined as the time required for the sound level to decay 60 dB. The decay of 60 dB corresponds to a noise level that is relatively loud that diminishes to a noise level that is barely audible. The RT60 is measured for each frequency band in the set range of frequencies to properly adjust the receiving room levels.

*Sound Pressure Level (SPL)*: Sound can be described by small vibrations traveling through the air that are sensed by the human ear. The ear perceives these vibrations as changes in pressure and as a result sound levels are often referred to as Sound Pressure Levels (SPL)

*Absorption*: The absorption within a space is a measure of the equivalent area that fully absorbs sound within a frequency band. Material finishes have an absorption coefficient between 0 (no sound energy absorbed) to 1 (perfect absorption with all incident sound energy absorbed). Taking the total area of all of the finishes and multiplying by their respective absorption coefficients gives the absorption. The amount of absorption within a space and its volume can be used to determine the Reverberations Time (RT60).

*Decibel (dB)*: A basic term for describing the magnitude of sound. A division of a uniform scale based upon 10 times the logarithm to the base 10 of the relative value being compared (sound intensity, pressure squared, or power) to a specified reference value.

*Frequency (Hz)*: The number of complete cycles per second of a vibration. Humans speech is in the frequency range from 500 Hz to 2000 Hz. Stereos and mechanical equipment can produce low frequency below 63 Hz.

## Measurement Methodology

### AIIC:

Impact noise measurements are based on ASTM E 1007-13 *Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures*. The AIIC test uses a mechanical tapping machine that repeatedly lifts and drops five flat-faced hammers onto the floor. The noise created in the floor/ceiling assembly from these hammer drops is then measured in the unit below. Additionally, the ambient noise levels are measured in the receiving room to account for noise not related to the testing. Reverberation time measurements were conducted in the receiving room to account for various acoustical environments. The measured sound levels were then adjusted based on the ambient noise levels, receiving room volume, and reverberation time.

Note: The results stated in this report represent only the specific construction and acoustical conditions present at the time of the test. Measurements performed in accordance with this test method on nominally identical constructions and acoustical conditions may produce different results.

Single number rating calculations were based on ASTM E 989-06 *Standard Classification for Determination of Impact Insulation Class*. The single number rating is derived from the difference in noise levels compared to a reference contour.

### RT60:

Reverberation time measurements were based on ASTM E 2235-04 *Standard Test Method for Determination of Decay Rates for Use in Sound Insulation Test Methods*. The test uses a loudspeaker system driven by a power amplifier. The input to the amplifier is a random noise containing an approximately continuous distribution of frequencies over each test band. We used a pink electronic noise source built into the Svantek 979 as the source. The speaker is driven in the room until the sound pressure level reaches a steady state, and then the sound is stopped. The time it takes for noise levels to decay and reach near ambient noise levels is measured. This time is then used to calculate the time it takes for the source noise level to decay 60 dB for each frequency.

## Equipment Used

The following table presents the equipment used for testing.

Table 2 - Test Equipment Used

Equipment	Serial Number	Last Calibration
Svantek 979 Type 1 Sound and Vibration Analyzer	34077	4/22/2016
Svantek sv30A Calibrator	32509	4/22/2016
Yamaha MSR400 Self-Powered Speaker	Not Applicable	Not Applicable
Look Line EM50 (Impact Tapping Machine)	F1.090168	Not Applicable

The Svantek 979 Sound Level Meter was calibrated to 114.0 dB at 1 kHz before testing commenced and the calibration was checked at the conclusion of testing to confirm performance.