

Impact and Airborne Sound

Impact Sound Transmission

Impact sound is the sound arising from the impact of an object on a building element (wall, floor, or ceiling). Typical sources are footsteps, jumping, and dropped objects. Impact sound transmission occurs because the impact causes both sides of the building element to vibrate, which generates sound waves.

Impact Insulation Class

Impact Insulation Class (IIC) rates the impact sound transmission performance of an assembly. The higher the IIC rating, the better the impact noise control of the element. For the case of a floor, IIC is the transmission of impact sound from the room above to the room below.

IIC is measured in decibels (dB). An IIC of 60dB is usually reported as IIC60.

Gauging the Significance of an IIC Rating:

Many acousticians adopt the following guidelines for intertenancy floors:

- IIC 55 – bare minimum (many occupants dissatisfied)
- IIC 60 – medium quality
- IIC 65 – high quality (most occupants satisfied)

Test Method (ASTM E492):

A standard tapping machine impacts the source room floor. A microphone measures the sound level in the receiving room. As sound insulation changes with frequency, the receiving room sound level is measured at 16 one-third-octave band centre frequencies. The frequencies range from 125Hz to 4000Hz. The measurement data is then adjusted to take into account the characteristics of the receiving room (the room absorption). The sound level is then plotted resulting in a measurement curve. A standard IIC reference curve is then fitted to the measurement curve. Rules are followed to fit the IIC curve to the measurement curve to obtain the IIC value. The rules are described in ASTM E989.

Delta IIC (Δ IIC)

The IIC difference between a floor measured with an overlay and with no overlay.

Airborne Sound Transmission

When sound waves travelling through the air reach a building element they cause it to vibrate. These vibrations travel through the element and are radiated out the other side. Typical airborne transmission sources are speech, stereos, and appliances.

Sound Transmission Class

Sound Transmission Class (STC) rates the airborne sound transmission of building element. The higher the STC rating, the better the airborne noise control of the element.

STC is measured in decibels (dB). An STC of 60dB is usually reported as STC60.

Gauging the Significance of an STC Rating:

Many acousticians adopt the following general guidelines for intertenancy walls:

- STC 55 – bare minimum (many occupants dissatisfied)
- STC 60 – medium quality
- STC 65 – high quality (most occupants satisfied)

Test Method (ASTM E90):

A loud speaker fills the source room with noise. A microphone measures the sound level in both the source and receiving rooms, and the level difference is calculated. As sound insulation changes with frequency, the receiving room sound level is measured at 16 one-third-octave band centre frequencies. The frequencies range from 125Hz to 4000Hz. The measurement data is then adjusted to take into account the characteristics of the receiving room (the room absorption). The sound level is then plotted resulting in a measurement curve. A standard STC reference curve is then fitted to the measurement curve. Rules are followed to fit the STC curve to the measurement curve to obtain the STC value. The rules are described in ASTM E413.