

## 2.7 SOUND INSULATION AND ITS MEASUREMENT

**The art of preventing the transmission of noise inside or outside the hall or rooms of a building is known as sound insulation.**

**It is also called sound proofing and it is a measure used to reduce the level of sound when it passes through the insulating building component.** The basic principle of sound insulation is to suppress the noise.

### **Sound Insulation and Measurement**

Sound is transmitted through most walls and floors by setting the entire structure into vibration. This vibration generates new sound waves of reduced intensity on the other side. The passage of sound into one room of a building from a source located in another room or outside the building is termed “sound transmission”.

The **sound reduction index** is used to measure the level of **sound insulation** provided by a structure such as a wall, window, door, or ventilator.

Transmission loss or Sound Reduction Index,  $R$  dB, is a measure of the effectiveness of a wall, floor, door or other barrier in restricting the passage of sound. The transmission loss varies with frequency and the loss is usually greater at higher frequencies. The unit of measure of sound transmission loss is the decibel (dB). The higher the transmission loss of a wall, the better it functions as a barrier to the passage of unwanted noise.

There are two types of sound insulation in buildings: airborne and impact.

Airborne sound insulation is used when sound produced directly into the air is insulated and it is determined by the sound pressure level in the adjacent room.

1. Direct sound transmission
2. Flanking transmission
3. Overhearing
4. Leakage

## Methods of sound insulation

The method of sound insulation will depend on the type of noise to be treated and the degree of sound insulation required. The methods of sound insulation can thus be classified into three main categories.

1. **When the source of noise is in the room itself.**
2. **When noise is air-borne.**
3. **When noise is structure-borne.**

### 1. When source of noise is in the room itself

Following are the methods of sound insulation which are commonly used when the source of noise is situated in the room to be treated for sound insulation.

#### (i) Improvement in working methods

- (a) A working method creating less noise may be adopted. For instance, welding may be preferred to riveting.
- (b) The machinery like type writers etc. should be placed on absorbent pads.
- (c) The engine should be fitted on the floor with a layer of wood or felt between them.

#### (ii) Acoustical treatment

- (a) The walls floors and ceilings should be provided with sound absorbing materials.
- (b) The sound absorbing materials should be mounted on the surfaces near the source of noise.
- (c) The acoustical treatment of the room considerably reduces the noise level in the room.

### 2. When noise is air-borne

Sound insulation for the reduction of air-borne noise can be achieved by the following methods.

1. By avoiding opening of pipes and ventilators.
2. By allotting proper places for doors and windows.

3. Using double doors and windows with separate frames and having insulating material in them.
4. Using heavy glass in doors, windows and ventilators.
5. By making arrangements for perfectly shutting the doors and windows.

### 3. When noise is structure-borne

Sound insulation for the reduction of structure-borne noise is done by the following ways.

1. Treatment of floors and ceilings with suitable sound absorbing material and anti-vibrations mounts.
  - (i) By using floating floors and suspended ceilings.
  - (ii) Soft floor finish (carpet, cork, vinyl, rubber, etc.)
  - (iii) Resilient (anti vibrations) mounts help considerably in reducing structure-borne sound.
2. Using double walls with air space between them.
3. Insulation of machinery.