3.7 Acoustics and Sound Insulation – Damp Proofing

- In order to achieve more comfortable interior spaces on an acoustic level, it is necessary to control the openings in the enclosure, as well as the ambient sound waves that surround the building.
- Noise control inside a building can be achieved by following construction techniques while construction of a building. The construction techniques of walls, windows, doors and floors and selection of appropriate building materials are discussed for better acoustic control in buildings.
- The discomfort of noise within the building goes on increasing if the structural elements within the building too don't show any resistance against the noise. It is found that the noise transmission is intercepted when it passes through the walls, floors, windows, ceilings and the building doors

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.

- By avoiding opening of pipes and ventilators.
- By allotting proper places for doors and windows.
- Using double doors and windows with separate frames and having insulating material in them.
- Using heavy glass in doors, windows and ventilators.
- 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.

Damp Proofing

Damp proofing in construction is a type of moisture control applied to building walls and floors to prevent moisture from passing into the interior spaces. Dampness problems are among the most frequent problems encountered in residences. The damp proof course (DPC) is generally applied at basement levels, which restricts the movement of moisture through walls and floors

Properties of Materials for DPC

An effective damp proofing material should have the following properties;

1. It should be impervious.
2. It should be strong and durable and should be capable of withstanding both dead as well as live loads without damage.
3. It should be dimensionally stable.
4. It should be free from deliquescent salts like sulfates, chlorides, and nitrates.

Types of Materials for Damp Proof Course

The materials commonly used to check dampness can be divided into the following three categories:

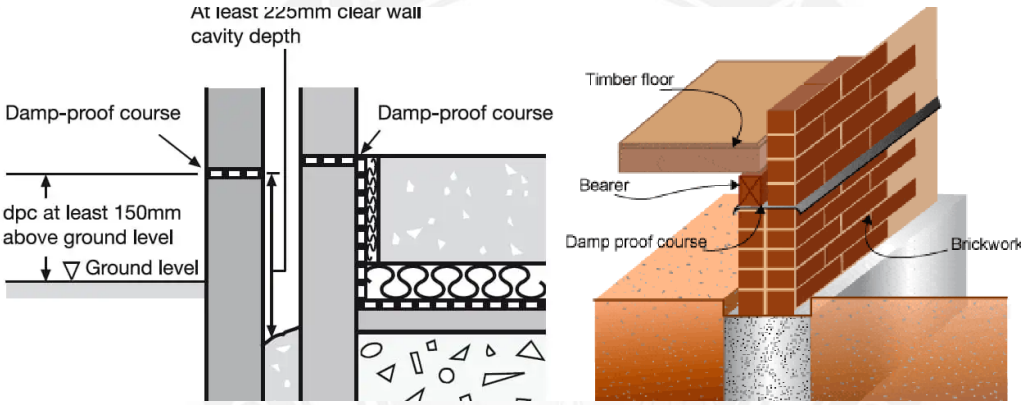
1. Flexible Materials: Materials like bitumen felts (which may be hessian based or fiber/glass fiber-based), plastic sheeting (polythene sheets), etc.

2. Semi-rigid Materials: Materials like mastic, asphalt, or a combination of materials or layers.
3. Rigid Materials: Materials like first-class bricks, stones, slate, cement concrete, etc.

Selection of Materials for Damp Proof Course in Buildings

- The choice of material to function as an effective damp proof course requires a judicious selection. It depends upon the climate and atmospheric conditions, nature of the structure

- The damp proof course prevents damp from the ground rising up the walls and damaging your property. Properties which have no appropriate damp protection layer or has a damaged damp course may be affected by excess moisture rising from the ground. DPC is to be provided.



1. DPC above ground level

For DPC above ground level with wall thickness generally not exceeding 40 cm, any one of the types of materials mentioned above may be used. Cement concrete is however, commonly adopted material for DPC at plinth level, 38 to 50mm thick layer of cement concrete M15 (1:2:4 mix) serves the purpose under normal conditions.

In the case of a damp and humid atmosphere, a richer mix of concrete should be used. The concrete is further made dense by adding waterproofing materials like Pudlo, Impermo, Waterlock, etc. in its ingredients during the process of mixing. It is used to apply two coats of hot bitumen over the third surface of the concrete DPC.

2. DPC Material for floors, roofs etc.

For greater wall thickness or where DPC is to be laid over large areas such as floors, roofs, etc., the choice is limited to flexible materials that provide a lesser number of joints like mastic, asphalt, bitumen felts, plastic sheets, etc.

The felts, when used, should be adequately bonded to the surface with bitumen and laid with joints properly lapped and sealed.

3. DPC Material for situations where differential thermal movements occur

In parapet walls and other such situations, materials like mastic, asphalt, bitumen felts, and metal (copper or lead) are recommended.

It is vital to ensure that the DPC material is flexible to avoid any damage or puncture of the material due to differential thermal movement between the material of the roof and the parapet.

4. DPC material for Cavity Walls

In cavity wall construction, like cavity over the door or window should be bridged by flexible material like bitumen felt, strips or lead, etc.

Methods of Damp Proof Course Installation in Construction

The general principles to be observed while laying a damp proof cours**e** are:

1. The DPC should cover the full thickness of the walls, excluding rendering.
2. The mortar bed upon which the DPC is to be laid should be made level, even and free from projections. Uneven base is likely to cause damage to DPC.
3. When a horizontal DPC is to be continued up a vertical face, a cement concrete fillet 75mm in radius should be provided at the junction before the treatment.
4. Each DPC should be placed in correct relation to other DPC to ensure a complete and continuous barrier to the passage of water from floors, walls, or roof.