

Building Construction



Damp Proofing

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INTRODUCTION

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- ❑ One of the basic requirements of a building is that it should remain dry or free from moisture passing through walls, roofs or floors.
- ❑ Dampness is the presence of **hygroscopic** or **gravitational** moisture.
- ❑ It leads to unhygienic conditions affecting badly the health and comfort of the inhabitants.
- ❑ It also seriously deteriorates the stability of the building.
- ❑ **Damp prevention** is therefore one of the

SOURCES OF DAMPNESS

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The following causes are considered to be the **main sources of dampness** in buildings

1. **Rain travel from wall tops**

1. If the wall tops are not properly protected from rain penetration, rain will enter the wall and will travel down.
2. Leaking roofs will also permit water to enter.

2. **Moisture rising up the walls from the ground**

- ✓ Heavy showers of rain may beat against the external faces of walls and if the walls are not properly treated, moisture will enter the wall, causing dampness in the interior.

3. **Condensation**

- ✓ Due to condensation of atmospheric moisture, water is deposited on the walls, floors and ceilings. The moisture may cause dampness.

SOURCES OF DAMPNESS

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4. Miscellaneous causes

- ❑ Moisture may also enter due to the following miscellaneous causes
 - ✓ **poor drainage** at the building site,
 - ✓ **Imperfect orientation**: walls getting less sunlight and heavy showers may remain damp,
 - ✓ **Imperfect roof slope**: specially in the case of flat roofs,
 - ✓ **Defective construction**: imperfect wall jointing, joints in roofs
 - ✓ **shrinkage of wooden frames** permits an entry of rain,
 - ✓ **Poor material choice**, e.g. use of porous bricks in chimneys.

EFFECTS OF DAMPNESS

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- ❑ The following are some of the effects of dampness in buildings:
 - A. Dampness gives rise to breeding of mosquitoes and create unhealthy living conditions.
 - B. Travel of moisture through walls and ceiling may cause unsightly patches.
 - C. Moisture travel may cause softening and crumbling of plaster, especially lime plaster.
 - D. Wall decoration (i.e. painting, etc) is damaged, which is very difficult and costly to repair.
 - E. Continuous presence of moisture in the walls may cause efflorescence resulting in disintegration of bricks, stones, tiles, etc., and consequent reduction in strength.

EFFECTS OF DAMPNESS

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- F. Timber fittings, such as doors, windows, wardrobes, etc., coming in contact with damp walls, damp floors, etc, get deteriorated because of warping, buckling, dry-rotting, etc. of timber
- G. Electrical fittings get deteriorated, giving rise to leakage through electrical fittings and consequent danger of short-circuiting.
- H. Floor covering are damaged. On damp floors, one cannot use floor coverings.
- I. Dampness promotes and accelerates growth of termites.
- J. Dampness together with warmth and darkness breeds germs of dangerous diseases. Occupants may even be asthmatic.
- K. Moisture causes rusting and corrosion of metal

METHOD OF DAMP PROOFING

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- ❑ The following methods are used to make a building damp proof :
 - A. Use of damp proofing course (D.P.C):
membrane damp proofing
 - B. Integral damp proofing
 - C. Surface treatment
 - D. Cavity wall construction
 - E. Guniting
 - F. Pressure grouting

METHOD OF DAMP PROOFING

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A. Membrane damp proofing: use of D.P.C

- This consists of introducing a water repellent membrane or damp proof course (D.P.C) between the source of dampness and the part of building adjacent to it.
- D.P.C may consist of flexible materials such as bitumen, mastic asphalt, bituminous felts, plastic or polyethylene sheets, metal sheets, etc.
- Damp proofing courses may be provided either horizontally or vertically in floors, walls, etc.

METHOD OF DAM PROOFING

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B. Integral damp proofing

- ❑ This consists of adding certain water proofing compounds of materials to the concrete mix, so that it becomes impermeable.
- ❑ This water proofing compounds may be in either of the following forms:
 - 1) Compounds made from chalk, talc, fullers earth, which fill the voids of concrete under the mechanical action principle.
 - 2) Compounds like alkaline, calcium, chlorides, etc. Which react chemically with concrete to produce water proof concrete.
 - 3) Compounds, like soap, petroleum, oils, fatty acid compounds etc. Work on water repulsion principle. When these are mixed with concrete the concrete becomes water repellent.
 - 4) Commercially available compounds like Publo, Permo, silka, etc

METHOD OF DAM PROOFING

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C. Surface treatment

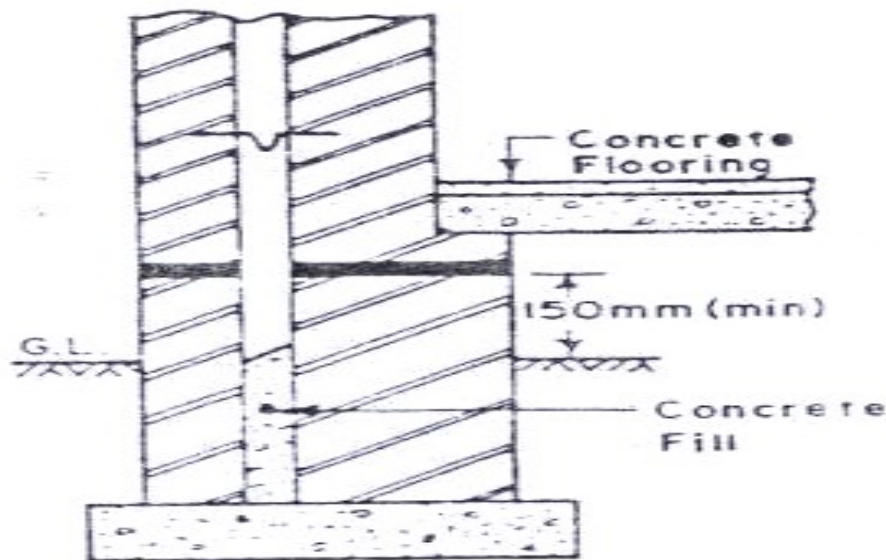
- ❑ The surface treatment consists of application of layer of water repellent substances or compounds on these surfaces through which moisture enters.
- ❑ The use of water repellent metallic soaps such as calcium and aluminium oletes and stearates are much effective against rain water penetration.
- ❑ It should be noted that surface treatment is effective only when the moisture is superficial and is not under pressure.
- ❑ Sometimes, exposed stone or brick wall face may be sprayed with water repellent solution.

METHOD OF DAMP PROOFING

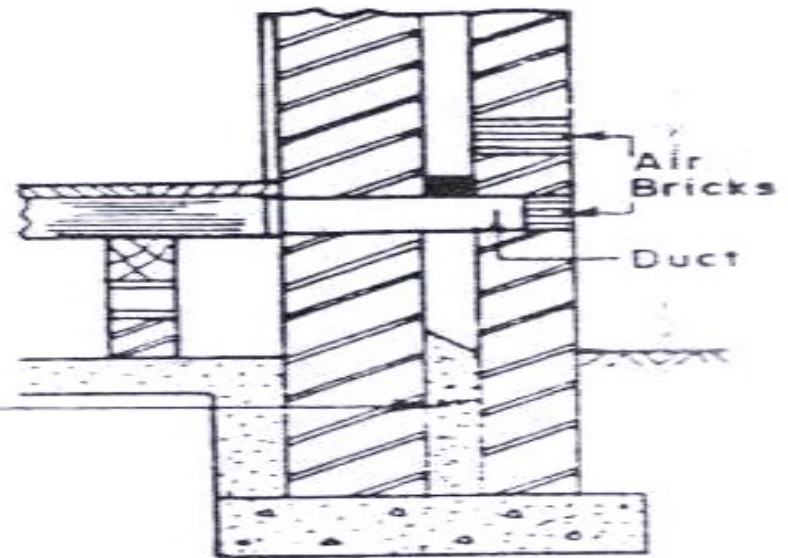
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D. Cavity wall construction

- This is an effective method of damp prevention, in which the main wall of a building is shielded by an outer skin wall, leaving a cavity b/n the two.



(c) Cavity Concreted Upto G.L.



(d) Ventilation Provisions

METHOD OF DAM PROOFING

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E. Guniting

- ❑ This consists of depositing under pressure, an impervious layer of rich cement mortar over the exposed surfaces for water proofing or over pipes for resisting water pressure.
- ❑ Cement mortar consists of 1:3 cement sand mix, which is shot on the cleaned surface with the help of a cement gun, under high pressure.
- ❑ The mortar mix of desired consistency and thickness can be deposited to get an impervious layer.
- ❑ The layer should be properly cured.

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E. Pressure grouting

- ❑ This consists of forcing cement grout, under pressure, into cracks, voids, fissures etc. present in the structural components of the building, or in the ground.
- ❑ This method is quite effective in checking the seepage of raised ground water through foundations and sub-structure of a building.

MATERIALS USED FOR DAMP PROOFING COURSE

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- ❑ An ideal damp proofing material should have the following characteristic:
 - ✓ The material should **be perfectly resistant** and it should not permit any moisture penetration or travel through it.
 - ✓ The material should **be durable**, and should have the same life as that of the building.
 - ✓ The material should **be strong**, capable of resisting superimposed loads/pressure on it.
 - ✓ Material should **be flexible**, so that it can accommodate the structural movements without any fracture.
 - ✓ The material should **not be costly**.
 - ✓ The material should be such that **leak-proof jointing** is possible.
 - ✓ The material should **remain steady** in its position when once applied. It should not allow any movement in itself.

MATERIALS USED FOR DAMP PROOFING COURSE

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- ❑ The following materials are commonly used for damp-proofing

1. Hot bitumen

- ❑ This is a *highly flexible* material, which can be applied with a minimum thickness of 3mm.
- ❑ It is placed on the bedding of concrete or mortar, while in hot condition.

2. Mastic asphalt

- ❑ Mastic asphalt is *semi rigid* material which is *quite durable* and *completely impervious*.
- ❑ It is obtained by heating asphalt with sand and mineral fillers. However it should be laid very carefully, by experienced persons.
- ❑ It can withstand only very slight distortion. It is also liable to squeeze out in very hot climate or under heavy pressure.

MATERIALS USED FOR DAMP PROOFING COURSE

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3. Bituminous or asphaltic felt

- ❑ This is a flexible material which is available in rolls of various wall thickness.
- ❑ An overlap of 10cm is provided at joints and full width overlap is provided at angles, junctions and crossings. The laps should be sealed with bitumen.

4. Metal sheets

Lead sheets

- Lead sheets are quite flexible. They are laid similar to the bituminous felts.

Copper sheets

- Copper sheets of minimum 3mm thickness, are embedded in lime or cement mortar

MATERIALS USED FOR DAMP PROOFING COURSE

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5. Bricks

- ❑ Special bricks, which have less water absorption capacity, may be used as D.P.C. in locations where damp is not excessive.
- ❑ These bricks are laid in two to four courses in cement mortar.

6. Stones

- ❑ **Dense** and **sound** stones, such as granite, can be laid in cement mortar (1:3) in two courses or layers to form effective D.P.C.
- ❑ The stones should extend to the full width of the wall.

7. Mortar

- ❑ Cement mortar (1:3) is used as bedding layer for housing with other D.P.C. materials.

MATERIALS USED FOR DAMP PROOFING COURSE

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8. Cement concrete

- ❑ Cement concrete of 1:2:4 mix or 1:1½:3 mix is generally provided at plinth level to work as D.P.C. The thickness may vary from 4cm to 15 cm.
- ❑ Such a layer can effectively check the water rise due to capillary action.

9. Plastic sheets

- ❑ This relatively a new type of D.P.C. Material, made of black polyethylene, 0.5 to 1mm thick in the usual walling width and wall length of 30m.
- ❑ The treatment is ***cheaper*** but is ***not permanent***.

