JECRC Foundation

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE

JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE
DEPARTMENT OF CIVIL ENGINEERING

Class – III Semester /II Year
Subject –Building Materials And Construction
Chapter – **8(DPC)**
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CUASES OF DAMPNESS

Definition

"Dampness is the presence of hygroscopic or gravitational moisture"

- Building should remain dry or free from moisture travelling through waals, roofs and floors.
- Dampness gives un hygienic conditions apart from reduction in strength of structural components.
- Provision of damp proof courses prevent entry of moisture in the building.

(1) Moisture rising up the walls from ground.

a) All structures are founded on soils
b) If the soil is pervious, moisture constantly travels through it.
c) Even in the impervious soil, lot of soil moisture may be present.
d) This moisture rise up into wall & floor through capillary action.
e) Ground water rise also result in moisture entry into the building through walls.

(2) rain travel trough wall tops:

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

(3) Rain beating against external walls :

- Heavy showers of rain may beat against the external faces of walls & if the walls are not properly treated, moisture will enter the wall causing dampness in the interior.
- If balconies and chajja projections do not have proper slope, water will accumulate on these & will enter the walls through their junctions.
- Moisture will completely damage interior paints of walls.

(4) Condensation

- Due to condensation of atmospheric moisture, water is deposited on the walls, floors & ceilings.
- This moisture causes dampness.

EFFECTS OF DAMPNESS

Following are ill effects of entry of dampness:

1. Dampness gives rise to breeding of mosquitoes & create unhealthy conditions.
2. Travel of moisture on wall causes unsighty patches.
3. It may cause softening & crumling of plasters.
4. Wall decoration or paint is damaged.
5. Continuous presence of moisture in wall may cause florescence which result in disintegration of bricks, stones,tiles

EFFECTS OF DAMPNESS

6. Flooring gets loosened due to reduction in adhesion when moisture enters through the floor.
7. Timber fittings such as doors, windows almira etc coming in contact with damp walls, damp floors get deteriorated because of warping etc.
8. Electrical fittings get deteriorated, giving rise to leakage of electricity & danger of short shirtings.
9. Floor coverings are damaged.
10. Dampness promotes & accelerated growth of termites.
11. Dampness breeds germs of disease like tuberculosis, neuralgia, rheumatism.
12. Moisture causes rusting & corrosion of metal fittings.

METHODS OF DAMP PROOFING

(1) use of damp proofing course (DPC) : Membrane damp proofing.

(2) Integral Damp Proofing

(3) Surface Treatment

(4) Cavity wall construction

(5) Guniting

(6) Pressure Guniting

(1) Membrane Damp Proofing (Use of DPC)

(1) Membrane Damp Proofing (Use of DPC)

- In this method water repellent membrane or damp proof course (DPC) between the source of dampness and part of building adjacent to it.
- DPC may be bitumen, mastic asphalt, bituminous felts, plastic sheet, metal sheets, cement concrete
- DPC may be provided horizontally or vertically in floors, walls etc.

(1) Membrane Damp Proofing (Use of DPC)

Following general principles should be applied while providing DPC:

a) DPC should cover full thickness of wall.

b) Mortar bed supporting DPC should be levelled & even and should be free from projections, so that DPC is not damaged.

c) At junctions & corners of walls, the horizontal DPC (on floor) should be laid continuous.

d) When a horizontal DPC is continued to vertical face, a cement concrete fillet of 7.5 cm radius should be provided at junction.

e) DPC should not be kept exposed on wall surface otherwise it may get damaged during finishing.

(2) INTEGRAL DAMP PROOFING

This consists of adding certain water proofing compounds of materials to the concrete mix, so that it becomes impermeable These water proofing compounds may be in three forms:

1. Compounds made from chalk, talk,fullers earth, which may fill the voids of concrete under the mechanical action principle
2. Compounds like alkaline silicates, aluminium sulphate, calcium chlorides etc which reacts chemically with concrete to produce water proof concrete.
3. Compounds work on water repulsion principle. like soap, petroleum, oils fatty acid compounds such as Stearates of calcium, sodium, ammonia etc. When they are mixed with concrete becomes water pepellant.
4. Commercially available compounds like Publo, Permo, Silka etc.

(3) SURFACE TREATMENT

- The surface treatment consists of application of layer of water repellant substances on the surface through which moisture enters.
- The use of water repellant metallic soaps such as Calcium & Aluminium Oletes and Stearates are effective against rain water penetration.
- Pointing & plastering of the exposed surfaces must be done carefully using water proofing agents like Sodium or Potassium silicates, Aluminium or Zinc sulphates, Barrium hydroxide and magnassium sulphate.
- Surface treatment is successful when moisture is superficial.

(4) Cavity Wall Construction

- In this method of damp prevention in which main wall of building is sheilded by an outer skin wall, leaving a cavity between the two.

(5) Guniting

- This consists of depositing layer of rich cement mortar by pressure to the exposed surface of wall, pipes.
- Cement mortar is 1:3 cement sand mix.
- Mortar is shot on clean surface with cement gun under 2 to 3 kg/cm2 pressure.
- Nozzle of machine is kept at a distance about 75 to 90 cm from wall.
- Curing of mortar is done for 10 days.

(6) Pressure Grouting

- In this method, cement grout is filled in cracks, voids in the structure of building by pressure.
- Foundation of building are subjected to grouting to make water-penetration-resistant.
- This method is effective to control entry of ground water through foundations

MATERIALS FOR DPC

- Ideal DPC should have following quality:
- Should be perfectly impervious
- Should not permit moisture penetration
- Material should be durable with life equal to building life.
- Material should be strong to resist superimposed load/ pressure.
- Material should be flexible to accommodate the structural movements without any craks.
- Material should not be costly.
- Material should remain steady in its position.

MATERIALS FOR DPC

(1) Hot bitumen:

- This is highly flexible.
- Can be applied with a minimum thickness of 3 mm.
- It is placed on bedding of concrete in hot condition

MATERIALS FOR DPC

(2) Mastic Asphalt

- It is made by mixing bitumen & sand & mineral fillers
- It is semi rigid material.
- It is squeezed out in hot climate or under pressure.

MATERIALS FOR DPC

(3) Bituminous Asphalt:

- It is ready made roll of dry asphalt sheets
- It is laid on levelled flat layer of cement mortar.
- An overlap 10 cm provided at joints.
- The laps is sealed with bitumen.
- It can not resist heavy load.
- It can accommodate slight movement.

MATERIALS FOR DPC

(4) Metal Sheets

- Sheets of lead,copper,aluminium is used as DPC.
- Lead sheet is more flexible.
- Thickness of sheet should be such that its weight is not kless than 20 kg/m2.
- They are laid similar to bitumnous felts.
- Lead sheet is completely impervious, resistant to atmospheric corrosion, can take complex shaperesistant to sliding action.

MATERIALS FOR DPC

(4) Metal Sheets

- Lead will have corrosion if comes in contact with cement/lime. It is covered by bitumen.
- Copper Sheets of 3 mm thickness are embeded in cement /lime mortar.
- It has high resistance to dampness, sliding and pressure.
- Aluminium sheets is also used for DPC but not better than copper & lead.

MATERIALS FOR DPC

(5) Combination of sheets & bituminous felts

- Lead foils sandwiched between asphaltic or bitumious felts cabn be used as DPC.
- The combination known as Lead Core can be laid easily, is durable, efficient,economic & resistant to cracks.

MATERIALS FOR DPC

(6) Bricks

- Special bricks, having water absorption not less than 4.5 % of their weight can be used as DPC where dampness is excessive.
- Bricks are laid in 2 to 4 courses in cement mortar.
- The joints of bricks are kept open.

MATERIALS FOR DPC

(7) Stones

- Dense & sound stones, such as granite, trap,slates etc are laid in cement mortar 1:3 in two layer to form effective DPC.

- Stone should be extended to full width of wall.

MATERIALS FOR DPC

(8) Mortar

- Cement mortar 1:3 is used as bedding layer for housing other DPC.
- Small quantity of lime may be added to increase workability of mortar.
- In water used for mixing, 75 gm soap is dissolved per liter of water.
- This Mortar can be used for plaster of outer walls

MATERIALS FOR DPC

(9) Cement Concrete

- Concrete 1:2:4 mix or 1:11/2:3 mix is provided at plinth level to work as DPC.
- The thickness may vary from 4 cm to 15 cm.
- This layer prevent water rise in wall by capillary action.
- Where dampness is more two layer can be made.

MATERIALS FOR DPC

(10) Plastic sheets

- This is new type of DPC material made of black polythene sheet of 0.5 mm to 1 mm thickness.
- Available in 30 m length in market.
- The treatment is cheaper but not permanent.

DPC Treatment in Buildings

(1) Treatment to foundations against gravitational water :

- Foundation may receive water percolating from adjacent ground and this moisture may rise in walls.
- This can be checked by providing air drain parallel to the external wall.
- The width of air drain may be about 20 to 30 cm.
- The outer wall of the drain is kept above ground to check the entry of surface water.
- RCC cover is provided
- Openings with gratings are provided at regular interval for passage of air.
- Usual DPC are also provided horizontally and vertically.

DPC Treatment in Buildings

(2) Treatment to basements

When basement in dump soils are constructed, following methods are followed:

a) Provision of foundation drains and DPC.
b) Provision of RCC raft & slab.
c) Asphalt tanking

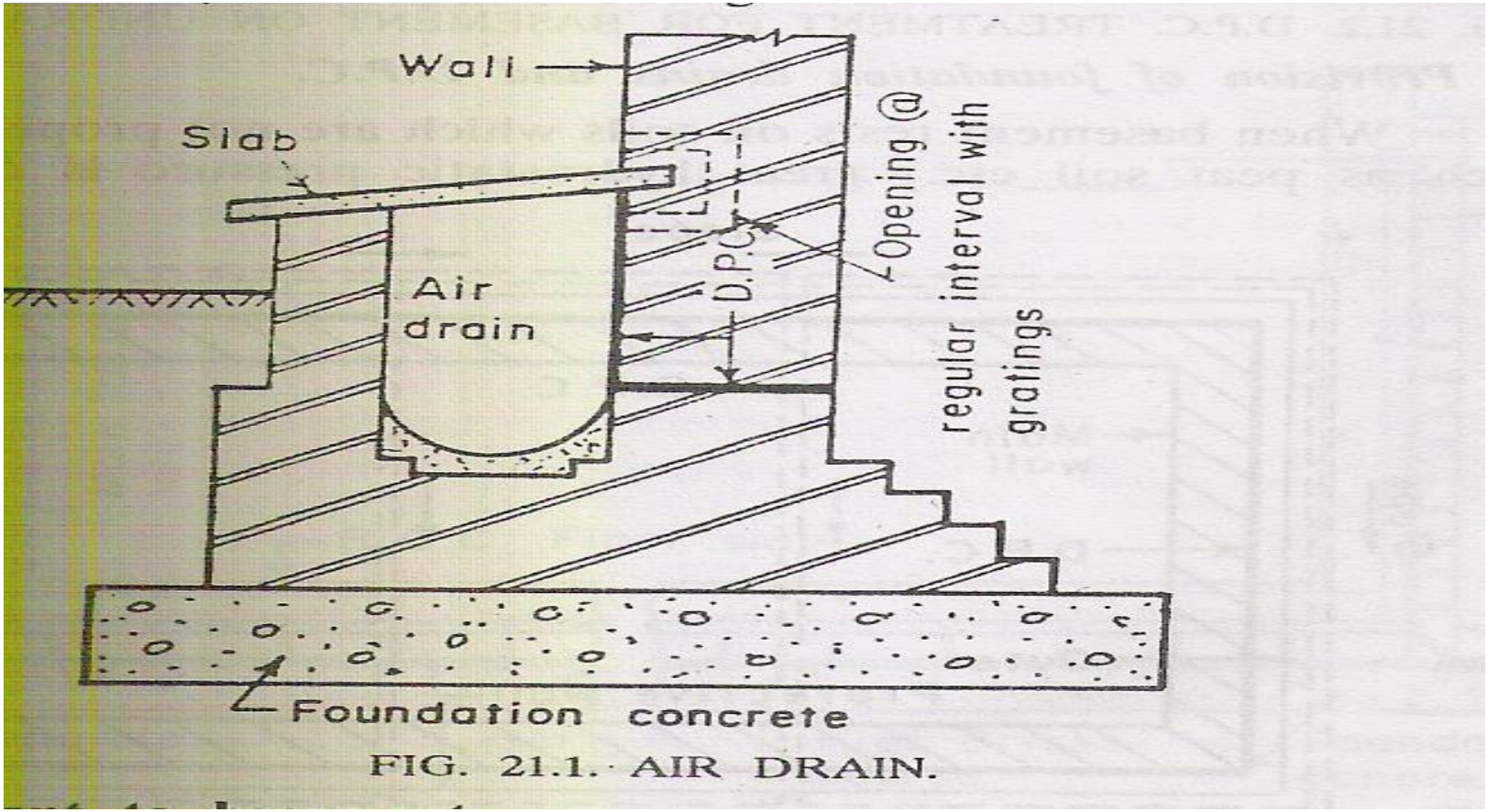
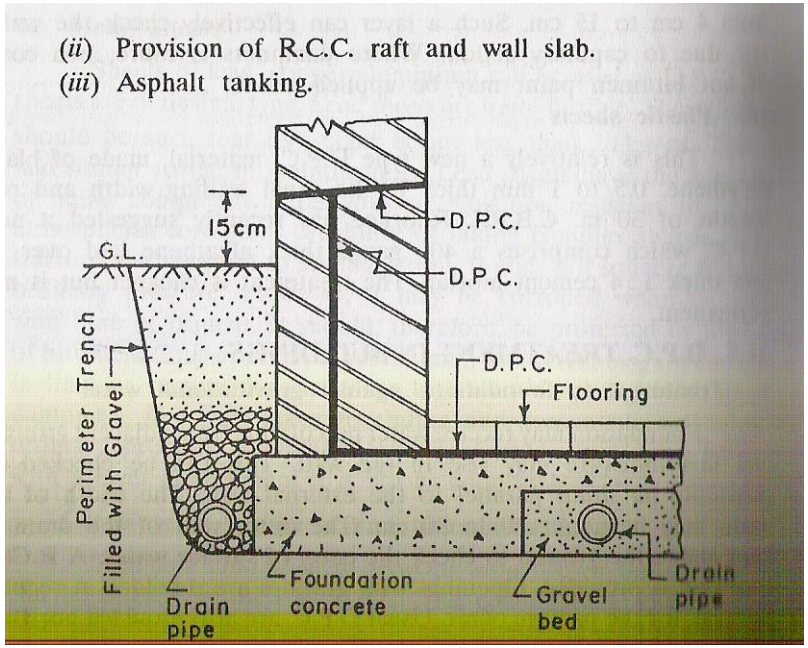


FIG. 21.1. AIR DRAIN.

(*ii*) Provision of R.C.C. raft and wall slab.
(*iii*) Asphalt tanking.



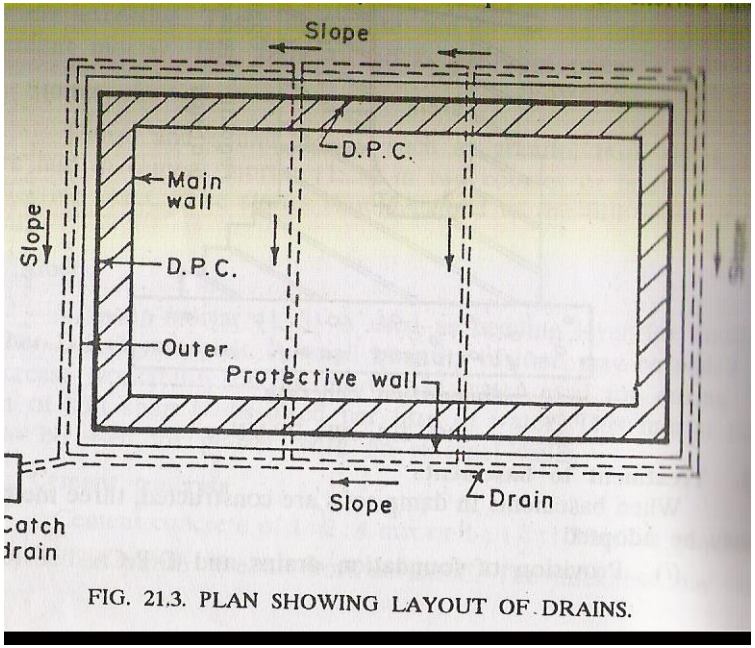


FIG. 21.3. PLAN SHOWING LAYOUT OF DRAINS.

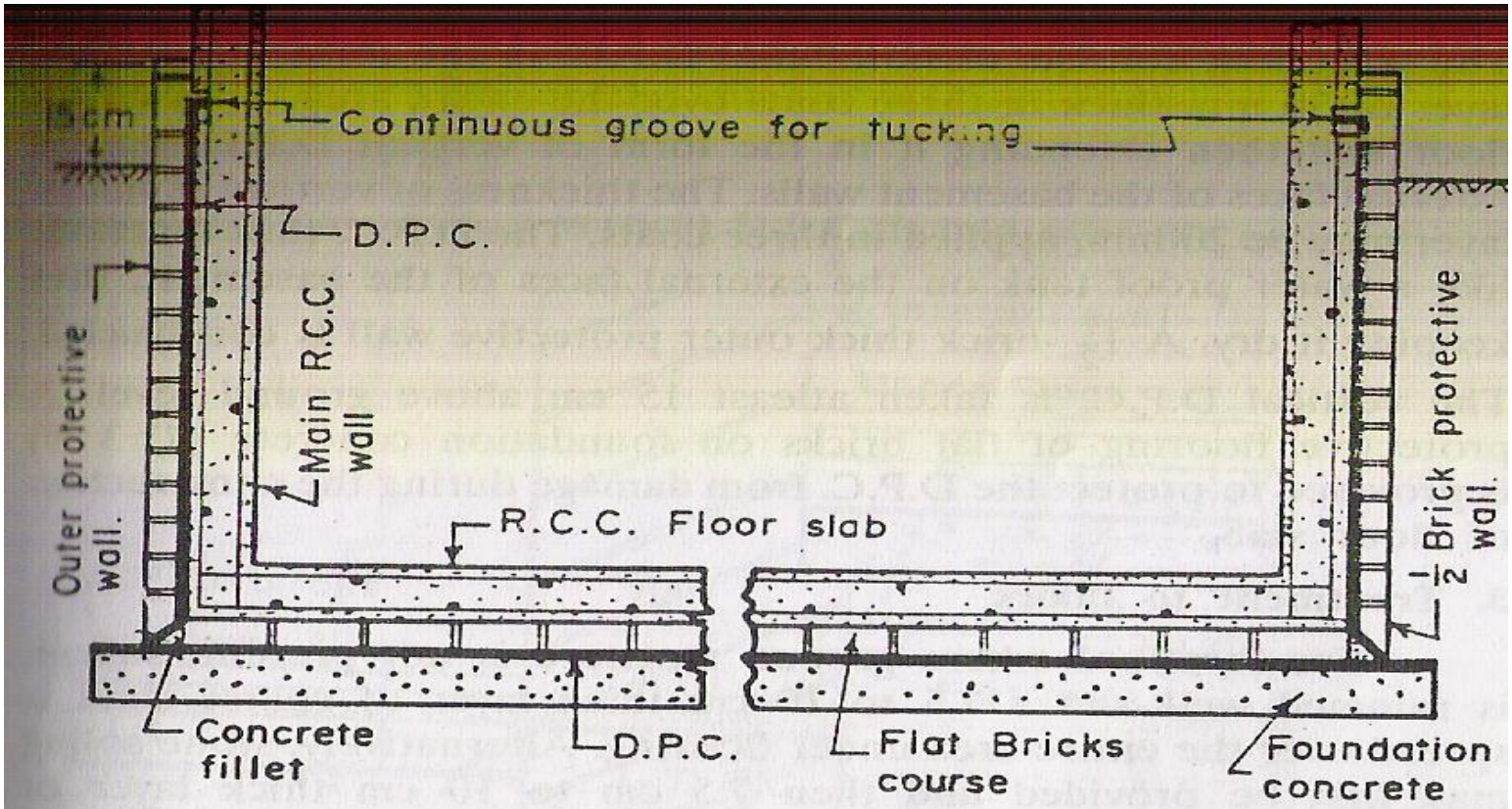
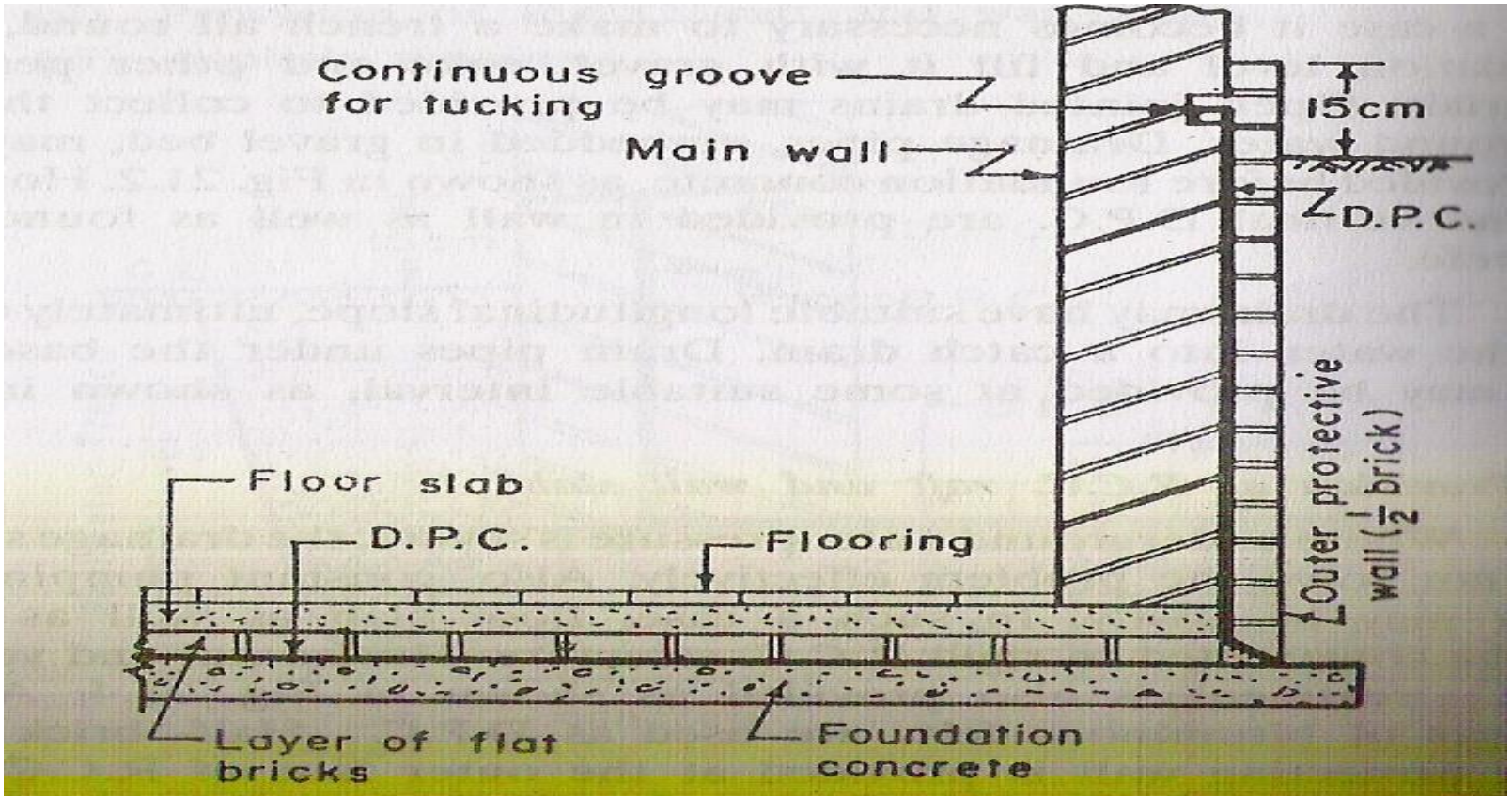


FIG. 21.4. D.P.C. TREATMENT FOR BASEMENT IN DAMP SOIL.

(c) ***Asphalt tanking*** **(Fig. 21.5)**


Continuous groove for tucking
Main wall
15cm
D.P.C.
Outer protective wall ($\frac{1}{2}$ brick)
Floor slab
D.P.C.
Flooring
Layer of flat bricks
Foundation concrete

(2) Treatment to basements

a) Provision of foundation drains and DPC.

- When basement rests on soils which are not properly drained, (such as peat soil) great hydrostatic pressure is exerted and the floor as well as wall receive water continuously oozing out.
- In such case it is necessary to make a trench all around upto foundation level & fill it with gravel, coke,
- Open jointed drains may be provided to collect the underground water.
- Drainage pipes,embeded in gravel bed, may also be provided before foundation concrete.
- Horizontal & vertical DPC are provided in wall as well as foundation concrete.
- Drain may have suitable longitudnal slope,ultimately draining water into catch drain.
- Drain pipes under basement slab may be provided at some interval.

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Thank you!

STAY HOME, STAY SAFE