

Aam Aadmi Series - 7

HOUSE BUILDING DIGEST

(Flooring)



bmtpc

Creating Enabling Environment for Affordable Housing for All

This is an attempt by BMTPC to provide useful but often ignored information about multifarious activities involved in house construction and other technical and non-technical matters associated with building materials and construction technologies. The series is being brought out with a specific rationale to reach out to common people of our nation and make them acquainted about building construction. Every individual has a dream of owning a house and through this series which is aptly named Aam Adami Series, we will slowly unravel myths and misconceptions about building construction. The language used here is lucid and simple to comprehend. The complicated technicalities are explained in a parlance which can be understood by one and all.



Flooring

Floors are amongst the main elements of a house which should have a pleasing appearance and should attract the attention of the people as they enter into the dwelling. They should also be durable, easy to maintain and suit the budget of the home owner.

The decor of the house finds a new expression when the choice of the building material for the floor is appropriate and it matches well with its interior architecture.

A proper flooring type will give good performance & appearance and would be cost effective

1. Flooring Types

There are number of types of floor which are quite common in India like brick floor, mosaic floor, tile floor etc. and accordingly the selection of the same requires careful consideration.

Different types of flooring have to be provided in a house from considerations of use the floor is being put to. For example the flooring in the main living area may be of a superior quality; the bedroom flooring may be of good quality and flooring in wet areas like kitchen, bath and WC may be different to avoid skidding. The type of flooring has to be chosen accordingly.

The type of flooring to be provided can also to be viewed from viewpoint of climatic conditions. In extreme hot or extreme cold conditions it would be inappropriate to go for marble or other such flooring as it would make walking difficult. Similarly, slippery floors are not appropriate for exterior locations like balconies, terrace etc where rainfall is likely to splash.

The type of flooring to be adopted for the house is also dependant on the local availability of materials, especially from the viewpoint of cost.

Similarly, flooring for non residential areas like airports, railway platforms, workshops, factories etc have to be provided in a different





manner as they are subjected to heavy use, spilling of chemicals, stacking and shifting of material etc.

2. Flooring Types

There are many types of flooring and each one is marked with some distinguishing features. The most common types of flooring used in India include :-

- a. Mud Flooring
- b. Brick Flooring
- c. Stone Flooring
- d. Concrete flooring
- e. Terrazzo Flooring
- f. Marble Flooring
- g. Tile flooring
- h. Wooden flooring
- i. Bamboo flooring
- j. Linoleum flooring

Each of the flooring types mentioned above have different performance characteristics and the selection for adoption in the house has to be done with great care. It is advisable to discuss the issue with people who have already constructed their houses including the Architect.

a. Mud Flooring

Mud has been the easiest form of material available for building construction. It has been adopted for various elements in the house in different forms. Floorings in mud have mostly been adopted in village housing as besides being economical, mud is readily available and the flooring is easy to construct and maintain.

The method of constructing mud floors is very simple. Good quality and clean mud is first selected and small quantities of chopped straw





is mixed in it along with water to give a consistent paste. About 25 cm (10") thickness of this paste is then applied upon an already prepared floor bed. The floor thus obtained is then rammed properly to get an even and level surface of about 15 cm (6") thickness. Mud floors have to be maintained at least once or twice a week.

b. Brick Flooring

Brick has been the mainstay of building construction in India since the time of Mohenjodaro and Harappa. It has been successfully used for foundations, walls, roof, floors etc. Brick flooring is advantageous in areas where bricks are available locally. Such floorings are easy to construct with the help of local masons and are also economical.

Flooring in bricks can be provided in the following ways:-

Brick on Edge

Brick on edge flooring is most suited for the ground floor in a house, for interior locations. They can usually be provided as exposed flooring or having a plaster coat on the same. Plastered floors in bricks are better suited for exterior locations like verandah, courtyard etc or for wet locations like kitchen, WC etc.

To construct this type of flooring, the filled-up earth under the flooring is compacted well, followed by laying of about 10 to 15 cm (4" to 6") of cement concrete in a proper slope for draining out water.

Bricks required for flooring are adequately soaked in water for at least 6 hours before use so as to keep them wet. A 12 mm (1/2") mortar is laid on the already prepared concrete base. On this mortar bed, bricks are laid on edge and jointed with mortar.

Bricks can be laid in a pattern if the flooring is to remain exposed. In such a case the joints should be rendered flush and finished to get an





even surface. The surface so obtained should be kept moist for a period of at least seven days.

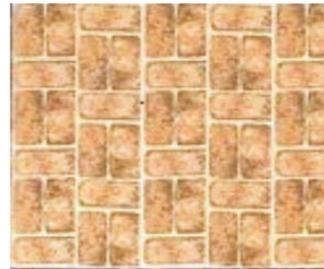
If however, the brick on edge flooring is to be plastered, the joints in brickwork should be raked by about 15 mm during the process of laying the floor and plastering should be done over it.

Plastered brick floors are better in performance as compared to the non-plastered surfaces although plastering adds to the cost of providing the flooring.

Bricks Laid Flat

Flooring with bricks laid flat are prepared in the same manner as the brick on edge flooring. In this case the brick floor thickness is kept at 7.5 cm (3") as against 11.5 cm (4½") in case of brick on edge flooring.

The number of bricks used in such a floor is less than the numbers used in brick on edge flooring as also the quantity of mortar.



Such flooring system is more suited for upper floors as the weight coming on the walls / foundations is comparatively less.

c. Stone Flooring

Stones are available in plenty across the entire stretch of the country. Many of these are suitable for providing floors in residential construction. Stones suited for the purpose should be strong and able to withstand abrasion and impact besides giving a pleasing appearance.

Kota Stone

Kota Stone is a quarried stone which is cut into different sizes for the purpose of providing flooring in residential areas including on steps, risers and landings. The stone used for the purpose should be of good quality free from cracks and other such flaws.





The thickness of the stone may vary from 2 cm to 4 cm depending upon the location it is being used. The top surface of the stone is polished before being brought to the site.

For laying the Kota Stone flooring the base concrete or RCC slab is first cleaned, wetted and mopped. Cement mortar of proportion 1:4 (1 cement : 4 coarse sand) is then spread as a bed, having an average thickness of 2 cm. The stone is cleaned and washed before placing it on the mortar bed. The stone is then tapped with a wooden mallet to enable proper fixing. The process is continued till the flooring is achieved in a proper slope and finish.

Sand Stone

Sand stone is another type of stone having different physical and chemical properties as compared with the Kota Stone. It is usually available in white or red colour. Each stone is cut into the required size and shape for application as flooring. The finished thickness before application is usually 4 cm.

As in the case of Kota Stone flooring the base concrete or RCC slab is cleaned, wetted and mopped. In this case a bedding mortar of proportion 1:5 (1 cement : 5 coarse sand) is first laid. The Sand Stone is then laid over it to the required level and slope.

Granite

Granite is a natural stone, which is immensely used in home construction including for floors. It is available in various forms like tiles, blocks, etc. Its fabrication and polishing is a well defined process, which needs to be executed only by well trained and experienced hands.

The natural shine of granite may last forever if it is treated with care. Flooring with granite is amongst the costliest, although it gives an elegant and pleasant look.

The laying procedure is similar to the ones enumerated above.





d. Cement Concrete Flooring (IPS Flooring)

Cement Concrete Flooring is one of the most common type of flooring provided in houses. This type of flooring is quite durable, easy to construct and maintain besides being economical as compared to tile, marble and other such type of flooring.

When such a type of flooring is to be provided on the ground floor, the earth in the plinth is properly consolidated initially. A layer of clean coarse sand about 10 to 15 cm thick is uniformly spread over the earth filling. During its consolidation care has to be taken that a proper slope as required for the floor is provided.



The base concrete, either in cement or lime, about 7.5 to 10 cm thick is then laid over the coarse sand in the required slope and tamped properly. The top of this base concrete should be leveled to a rough surface and left to set and harden. Upon hardening the surface is thoroughly cleaned.

The top of the floor is then divided into panels, rectangular or square in shape, by using glass or other strips. The area of the panels should preferably be less than 2 square meters.

Once the paneling has been done, the top of base concrete is made damp and cement slurry applied on it. This slurry creates a proper band between the base concrete and topping.

Normally Cement Concrete 1:2:4 (1 cement: 2 sand :4 coarse aggregate) of required thickness (say 40 mm) is provided as topping concrete. The top surface is thoroughly tamped and floated with wooden floats to obtain a smooth surface.





The surface so obtained is cured for about ten days before putting it to use.

When flooring is to be provided on upper floors the topping concrete is laid directly over the RCC slab. At times a cushioning layer of lime mortar is also applied over RCC slab before laying the top concrete.

Cement concrete flooring can also be finished with a plastering layer of 10 mm thick red oxide of iron. This would give a red colour look to the surface. Different designs can be made by making panels in the floor and filling them with plaster of the required colour.

Lately there has been a practice of polishing the cement concrete floors to give a shining finish. Polished concrete is a high-gloss finish attained by using special floor polishers to grind down surfaces to the desired degree of shine and smoothness. The resulting surface requires less maintenance and can be stained to replicate the look of polished stone. Polishing of concrete floors adds to its cost.

e. Terrazzo Flooring (Mosaic Flooring)

Terrazzo flooring is yet another type of flooring that has been commonly used in India. As this type of flooring gives a pleasing look, it has been extensively provided in living rooms, bed rooms etc.

This type of flooring is provided in the same manner in which cement concrete flooring is provided, except that the top layer consists of Terrazzo which is a mixture of marble chips and white and/or coloured cement in the ratio of 3:1.



For a 40 mm thick Terrazzo floor an under layer of concrete 34 mm thick is first provided over the base concrete which is finished with a topping of terrazzo, 6 mm thick. Paneling etc can be done as in the case of cement concrete flooring. The surface obtained after





application of Terrazzo layer is tamped and troweled and left to dry for about a day or so. After this the surface is cured for about 2 to 3 days with standing water.

The grinding of the surface is then done two or three times, either by hand or by grinding machines, using carborundum stones. In case the chips become loose or come out of the surface, repairing is done with cement grout.

The floor is finally polished either manually or with the help of machines. Saw dust is spread on the polished surface before being put to use.

Terrazzo flooring is costlier than the cement concrete flooring although it gives a pleasing appearance and is easy to clean.

f. Marble Flooring

Marble flooring has traditionally been provided in religious places, palaces, havelis etc as it enhances the look of the structure. Lately such flooring has been used extensively in residential buildings also.

Marble floorings are costly and can be used preferably for living rooms and bedrooms. The cost of the quarried marble is dependant upon its quality as well as the size to be used. Large sized slabs are usually costlier than the smaller sized slabs. The thickness of these slabs varies from 20 to 40 mm.



Marble flooring is laid on the prepared sub grade or RCC slab. Upon cleaning the sub grade a 20 mm thick mortar in cement and coarse sand in the ratio 1:4 is first applied. Each marble slab is then placed and pressed on the bed mortar.

The marble slab is then lifted and mortar filled up in the hollow portions. Upon slight hardening of the bed mortar, cement slurry is





applied on the surface. The marble slab is laid back and cement slurry applied on the sides of the slab. The process is continued to obtain the floor of the required finish and slope.

The surface so obtained is cured for a period of about ten days and if need be polishing is carried out on the top surface.

g. Tile Flooring

Flooring Tiles in India have over the years gained popularity over the cemented and concrete flooring. Tiles are available in different patterns, designs and utility options. Usually they are costlier than the cement concrete flooring and its cost depends upon the type of tile being used.

Various types of flooring tiles in India include the terrazzo tiles, Chequered tiles, Glazed tiles, Vitrified tiles, PVC tiles etc. Some of these are briefly dealt in this booklet for the information of the home owner.

A wide variety of tiles are currently available in the market and the home owner has to make a choice depending upon the finishing to be provided in the house, the location, local availability as well as the budget for putting up the floor.



Terrazzo Tiles

Terrazzo tiles are available in the market with sizes varying from 20 cm x 20 cm to 30 cm x 30 cm and thickness varying between 2 cm to 3 cm. Such tiles can be used in the living room, bed rooms etc as also in the treads and risers of the stairs.

The tiles are laid on the base concrete or RCC slab usually by providing a cement sand mortar of average 3 cm thickness. Before





putting the tile on this mortar bed, they should be thoroughly cleaned and ultimately laid in the desired slope. Tiling should be done with care such that they are laid in a straight line. The floor should be kept wet for about 7 days and finally ground and polished as in the case of Terrazzo flooring.

It is advisable to keep some extra tiles in the house which may be required as and when some of them require replacement.

Chequered Tiles

The chequered tiles are similar to the terrazzo tiles except that they have grooves of about 2.5 cms in both directions. The method of laying such tiles is similar to that of laying other tiles. Care has to be taken to finish the grooves in a proper manner.

Chequered tiles can also be provided on the walls to give a different look. Usually they are costlier than the plain terrazzo tiles.

Glazed Tiles

Glazed tiles are available in the market having either a glossy finish or a mat finish. Tiles having a mat finish are usually provided in wet locations in the house like kitchen, bath, WC or in exterior locations like balconies etc to reduce the chances of slipping.

They are usually available in sizes of 10 cm x 10 cm, 15 cm x 15 cm or 10 cm x 20 cm in white or different colours. Tiles having patterns are also available in the market. They are laid in the same manner as any other type of tile. The joints between the tiles are flush pointed to give an even surface. Such tiles do not require grinding and/or polishing.

Vitrified Tiles

Vitrified tiles are increasingly being adopted for construction of floors in residential buildings. They are quite sturdy and can be provided with equal ease both on a new surface or on an existing





flooring. Although they give a good look and can be cleaned easily, they are quite costly as compared to the other type of tile flooring.

Vitrified tiles are available in glossy or mat finish having different design and patterns. Sizes upto 60 cm x 60 cm are also available and accordingly each tile covers a large area. The flooring is provided in the same manner as that of other types of tiles, however care has to be taken to match the patterns while laying the same.

PVC Tiles

PVC tiles are being used for flooring in residential as well as non residential buildings. They can be provided for decorating the floors.

These tiles are costly and acoustically they have a superior performance although they are combustible. They are however easy to clean and maintain.



PVC tiles are usually square in shape having sides of 30 cm, 60 cm or 90 cm. Sheets and rolls of PVC are also available for providing larger floors. These tiles are fixed to the floor tops with the help of adhesives, especially recommended for the purpose.

h. Wooden Flooring

Wooden flooring is most commonly used in hilly regions of the country where the temperatures are quite low. At present they are also being provided in floors of high end housing to give a good appearance.



To provide such a type of flooring a cement concrete layer of about 15 cm





thickness is usually provided as a base with a view to prevent ingress of moisture.

Timber joists are then placed over the surface and properly secured in order that there is no movement, once the top layer has been laid. The top layer can be laid in timber planks, boards etc in the desired pattern. The top surface is then polished.

Wooden floors are usually quite costly and require regular maintenance.

i. Bamboo Flooring

Bamboo flooring is very commonly used in areas where bamboo is available locally. However such floorings have recently become quite popular due to its aesthetics, being uniquely attractive, strong and resilient, dimensionally stable, moisture and stain resistant and being environmentally-friendly. It is also said to have better properties than hardwood.

Other outstanding property of bamboo is its dimensional stability and moisture resistance. Accordingly, it is suitable for use in areas like bathrooms and kitchens where hardwood flooring is usually not recommended.



It is also less expensive than many hardwoods and is readily available for nailing down or glued down installations.

j. Linoleum Flooring

Linoleum flooring is usually provided on a floor base which is already smooth and plain. It is suitable for interior locations in a building. Linoleum is a combustible material and should not be used in areas prone to fire etc. It should also not be used in areas which are likely to become damp over a period of time. For residential areas the thickness of linoleum usually recommended is 3.2 mm.





Linoleum is available in rolls and should be first cut to size slightly more than the floor size. It should then be left for 2-3 days to allow it to shrink. It is then cut to the actual size and stuck to the finished clean and dry floor surface with the help of adhesives. For a longer life linoleum flooring should be kept dry when in use.

3. Skirting

Skirting is the process of covering the lowest part of an interior wall and is a part of the flooring. It is usually provided after completion of the flooring in the house. Its prime purpose is to cover the joint between the wall surface and the floor.

Skirting protects the wall from abrasion and knocking and reduces the chances of the floors getting damaged at its edges and corners. It also provides a decorative finishes to the floor/wall besides covering the blemishes, if any, in the floor/edges at the junctions and corners.

Skirting is usually provided upto 10 cm to 15 cm above the floor level and is mostly of the same material and specifications of the flooring itself. If provided in cement concrete or terrazzo etc, the thickness is kept as 12 mm. From considerations of aesthetics the colour of the skirting may be different from that of the flooring. Skirting can also be provided by the use of wooden planks or boards meant for the purpose.

Presently a large number of designer skirting tiles are also available in the market which provide a good decorative finish.



These tiles can be stuck to the walls with the help of mortar. Bigger size of tiles/marble/stone can be cut to the required size to provide the skirting. Care should be taken that the skirting is of a uniform thickness and height.





In case of wet areas like WC/Bath etc larger heights of walls require protection and accordingly the skirting has to be done differently and it is termed as 'dado'. Dado can be provided in the same manner as the skirting except that the height is usually kept as 2.1 m (7').

If however, there are any blemishes in the plaster, it can be covered by adjusting the thickness of the skirting/dado.

4. Maintenance of Floors

Having constructed the floor the next important thing is to maintain it properly in order to retain the original look for a longer time and prevent damages. Simple, do-it-yourself flooring maintenance is important for keeping the floor looking good, so is calling a professional once in a while for giving advice on maintenance.

Brick floorings usually require maintenance of the joints. The damaged joints should be raked properly and filled up with mortar as and when required. Similarly broken bricks should be replaced immediately or other bricks of the flooring may become loose, thereby damaging the floor. Similarly the damaged portions of concrete flooring would require immediate repairs thereby preventing further damages to the floor.

Marble floor on one hand is hard, durable lasting for years whereas on the other, polished surface can be damaged by chemicals, stains and abrasion. Such floors should therefore be used and maintained properly.

Timber floors also require good maintenances. Moving or dragging furniture on timber floor causes damage. Accordingly, protective pads should be fitted beneath furniture legs to prevent scratches. Such floors should be cleaned using as little water.

To help keep floors clean, place door mats outside and preferably inside each external door to trap dirt.





5. Conclusion

Flooring can be provided in a number of ways in the house. The choice of the flooring is dependant on the local availability of the material and skills of manpower; the choice of the home owner as well as the budget available. It is advisable to discuss the issue with the Architect before finalization of the specifications.

There are a large number of agencies which specialize in providing flooring in a house. The home owner is advised to look into their websites, which will give an idea of different types of flooring as also their costs etc. The matter can also be discussed with the persons who have had their houses constructed.

Whatever be the type of flooring to be provided, some of the precautions that should be observed during their construction are as follows:-

- a. The base and the sub-base of the floor at the ground floor should be prepared with great care, strictly following the construction specifications and procedure.
- b. The required slope for the floor should be given in the base course itself.
- c. Metallic or other strips, as may be required to lay the flooring, should be laid in a straight line.
- d. Curing of floors including that for base concrete should be carried out properly such that the required strength is obtained.
- e. Tiles for flooring should be laid on the mortar bed in a manner that no gap is left between the mortar and the tile at any place.



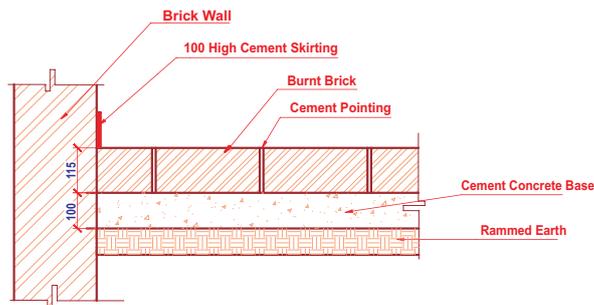


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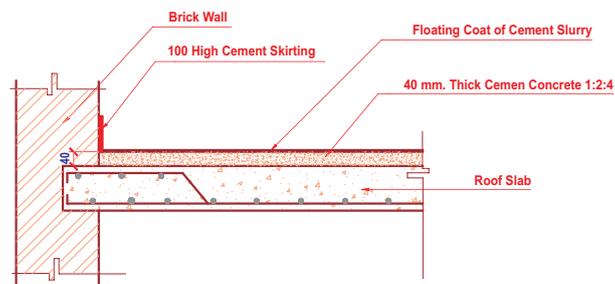
- f. Tiles should be tapped properly in the mortar bed to ensure a proper level.
- g. Wooden or bamboo floor finishing should be stuck to the base with the help of a prescribed adhesive.

If the above precautions are taken the floors will perform well and would require less maintenance over a period of time.

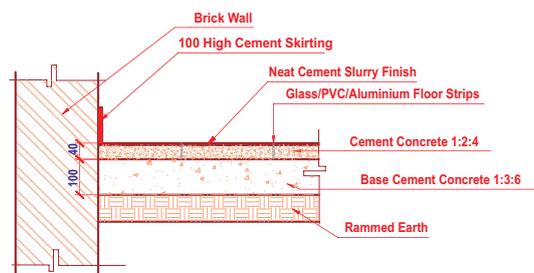




BRICK ON EDGE FLOORING



CEMENT CONCRETE FLOORING AT FIRST FLOOR



IPS FLOORING

Typical Flooring Sections

BMTPC is bringing out a series of 'House Building Digest Series' for Common Mans Know-how. This is Seventh in the Series.



BMTPC

The Building Materials & Technology Promotion Council (BMTPC) was setup in 1990 as an inter ministerial organisation under the Ministry of Housing and Urban Poverty Alleviation to bridge the gap between the laboratory research and field level application.

VISION

BMTPC to be world class knowledge and demonstration hub for providing solutions to all with special focus on common man in the area of sustainable building materials, appropriate construction technologies & systems including disaster resistant construction.

MISSION

To work towards a comprehensive and integrated approach for promotion and transfer of potential, cost effective, environment-friendly, disaster resistant building materials and technologies including locally available building materials from lab to land for sustainable development of housing.

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