

AR12 – 52 BUILDING CONSTRUCTION MATERIALS & STRUCTURAL SYSTEM- IV

MODULE 1(10HRS)

FLOORING

- Floor covering is a term to generally describe any finish material applied over a floor structure to provide a walking surface.
- Flooring is the general term for a permanent covering of a floor, or for the work of installing such a floor covering. Both terms are used interchangeably but floor covering refers more to loose-laid materials.
- Materials almost always classified as floor covering include carpet, area rugs, and resilient flooring such as linoleum or vinyl flooring.
- Materials commonly called flooring include wood flooring, laminated wood, ceramic tile, stone, terrazzo, and various seamless chemical floor coatings.

FLOOR SYSTEMS

- For proper selection of floor systems, designers should take into account many factors, including
- use of lightweight-concrete slabs, subfloors in direct contact with the ground, radiant heating, air conditioning, possible necessity for decontamination, dustlessness, traffic loads, and maintenance costs-all of which have an important bearing on floor selection.
- Consideration should be given to current standards of styling, comfort, color, and quietness.
- The primary consideration of the designer of a flooring system is to select a floor covering that can meet the maximum standards at reasonable cost.
- To avoid the dissatisfaction that would arise from failure to select the proper flooring, designers must consider all the factors relevant to flooring selection.
- This session summarizes **the characteristics of the major types of floor coverings and describes briefly methods for the proper installation of these materials.**

FLOOR SYSTEMS

Tile flooring

- It includes Ceramic tiles, Vitrified tiles, Mosaic tiles, Cement tiles
- **Ceramic tiles**-Ceramics for tile include earthenware (terracotta), stoneware or porcelain.
- Stoneware is harder and more durable than earthenware, and so more suitable for floors, but there is a slight difference between porcelain and ceramic tiles.
- Terracotta is traditionally used for roof tiles, but other manufactured materials including types of concrete may now be used.

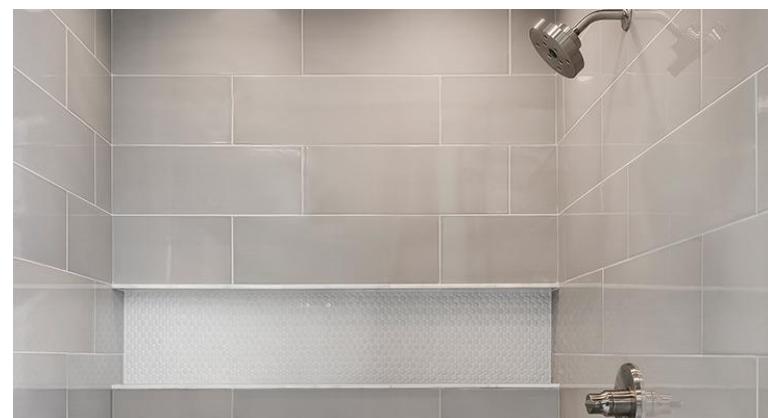
MATERIALS FOR FINISHES

Cement tiles

- This is one the oldest types of flooring tiles in use.
- It is made of , as name suggests, cement. In India, such tiles were common choice for flooring in homes and other buildings till late 1990s until when ceramic floor tiles were introduced.

Ceramic tiles

- Ceramic tile is made of clay and silica, which is permanently hardened using kiln at high temperature (Up to 1250 degree Celsius).
- Ceramic tiles can be glazed or used without glazing. Glaze is lustrous material which gives smooth finish to a tile.



Ceramic tile comes in a wide array of sizes, shapes, textures and finishes to give you the creative freedom to update any wall of your room. Natural hues and bright shades can enhance indoor and outdoor areas with the look you choose. This wall tile is durable, fire- and moisture-resistant, and easy to clean, which makes it a smart option for your bathroom, kitchen or fireplace.

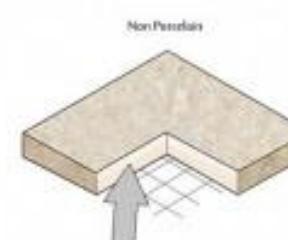
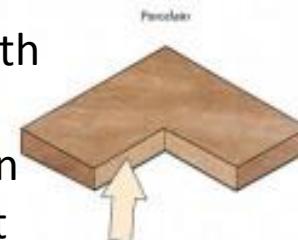
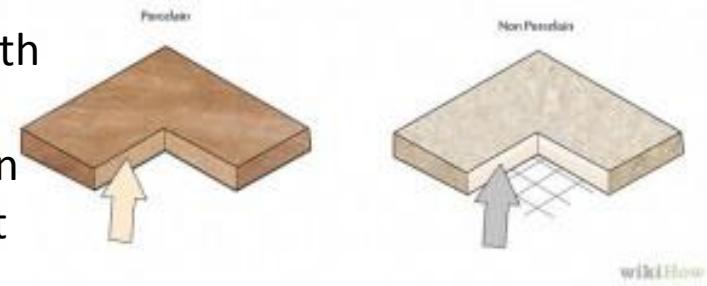
MATERIALS FOR FINISHES

Glazed tiles (or Glaze tiles)

Glazed tiles or Glaze tiles are nothing but ceramic tiles with glaze coating.

As explained above ceramic tiles are coated with glaze to give it better smooth lustrous finish.

It can glossy or bit matt finish depending up on materials used to prepare glaze. Glaze makes it possible to create various prints and colors.



wikiHow

MATERIALS FOR FINISHES

Vitrified tiles

- Vitrified tiles are created through process of vitrification. Which is again process where the composition of clay and silica is hardened to become non-porous (having very low water absorption rate).
- Vitrified tiles are **mostly are mixed in the complete body full body tiles where pigments** so the pattern on the surface can remain intact against wear and tear.

Porcelain tiles

- Porcelain tiles can be considered vitrified tiles. Porcelain tiles are made using dust firing method to produce more density and hardness. Since porcelain tiles has water absorption rate of 0.5% it is considered to be vitrified tiles.

MATERIALS FOR FINISHES

Glazed vitrified tiles

- Vitrified tiles sometime are glazed just like normal ceramic tiles.
- So there's additional glaze coating which makes it even harder. Glazed vitrified tiles enables more colour and designs on tiles body compared to non-glazed vitrified tiles where pigments are randomly mixed in the body and there's not much creative control on design patterns.

Polished vitrified tiles

- Vitrified tiles are sometime polished at last stage in production. Polishing wheel remove very thin layer of vitrified tiles surface which gives glossy finish just like natural stone.

Digital tiles

- In recent times digital printing technology was introduced which works in similar fashion to how inkjet printer work for paper based printing. Specially made inks are used to print the glazed ceramic and vitrified tiles. Printer has micro precision and thus it is able to print very high resolution images on the tiles surface.

MATERIALS FOR FINISHES

Glass tiles

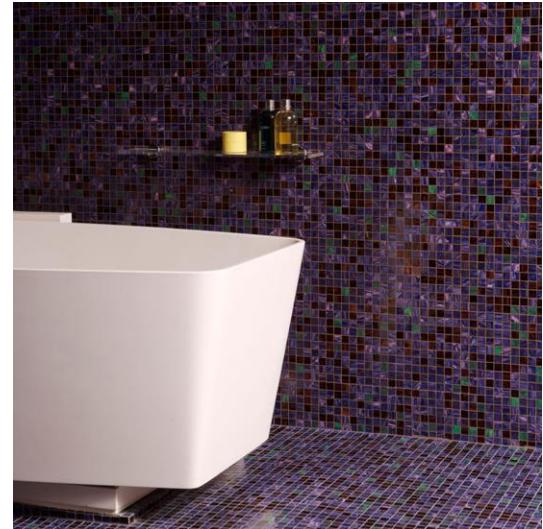
- Glass tiles as the name suggest are made of glass.
- Color is either fused with the molten glass , which gives the color to complete body of glass tiles, or it is layered on one side of glass tiles. In either case color will never fade.
- Glass tiles are almost always used in form of mosaic tiles. Which mean they are cut into smaller pieces and then laid on the surface in mosaic format which gives better creative freedom in creating pattern by laying pieces.



MATERIALS FOR FINISHES

Mosaic tiles

- Mosaic tiles are one of the most attractive wall coverings.
- The very small size of the tiles can create great compositions by pieces with different hues.
- Can also be used as wall decorative element and be combined with ceramic tiles of more big size.



- The size of the one glass tile is 10×10 mm and before application these tiles are mounted on berglasssheet of 327 x 327 mm.
- Mosaic tiles are more difficult to fix than usual ceramic wall tiles but these glass tiles can create an amazing energizing effect and give unlimited creative freedom.

MATERIALS FOR FINISHES

10x60 RECTIFIED TILES

- The 10x60 is a long and rectangular rectified size used for floors and walls. It can be combined in infinite flooring compositions.



22.5x45 tiles

- Designed especially for walls, the 22.5x45 size provides perfect aesthetic continuity between floor and walls.



10x10 tiles

- The 10x10 size is ideal for walls, especially for tiles behind kitchen units and for walls that are not perfectly straight.



MATERIALS FOR FINISHES

30x60 tiles

- Rectangular 30x60 cm tiles can be used either alone or in combination with the 60x60 size, on floors and - above all - on walls to play with shapes and colours to great effect.

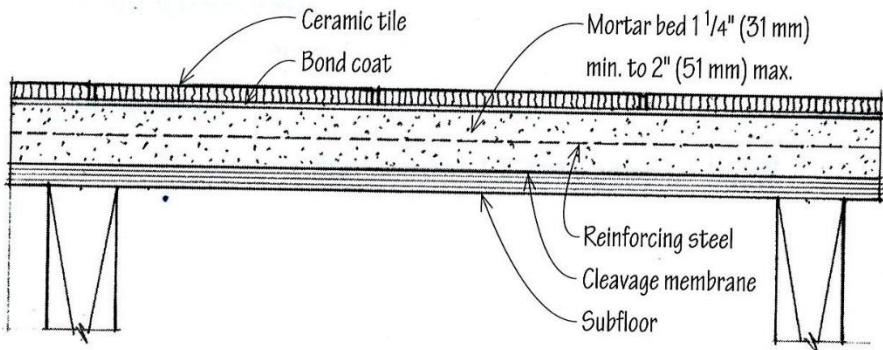


1-Inch Square Mosaic

- Mosaic tile is individual tesserae in 1-inch by 1-inch squares. Typically, twelve rows by twelve columns of mosaic tiles are joined to form a sheet that is roughly 1-foot by 1-foot square.

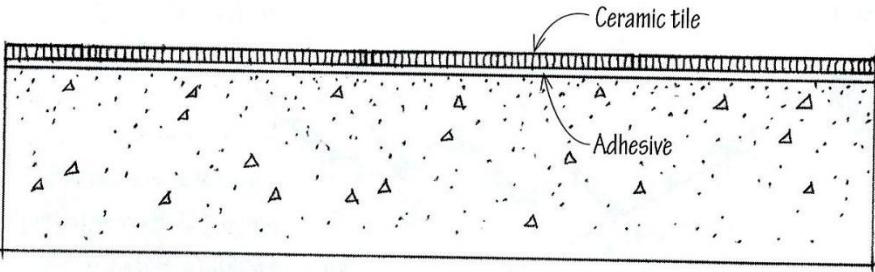
TILE INSTALLATION

Tile installations are either thinset or thickset. Thinset installation uses adhesive to attach the tile. Thickset installation is used over floors subject to bending and deflection. The tile is set on a layer of mortar that helps prevent cracking.



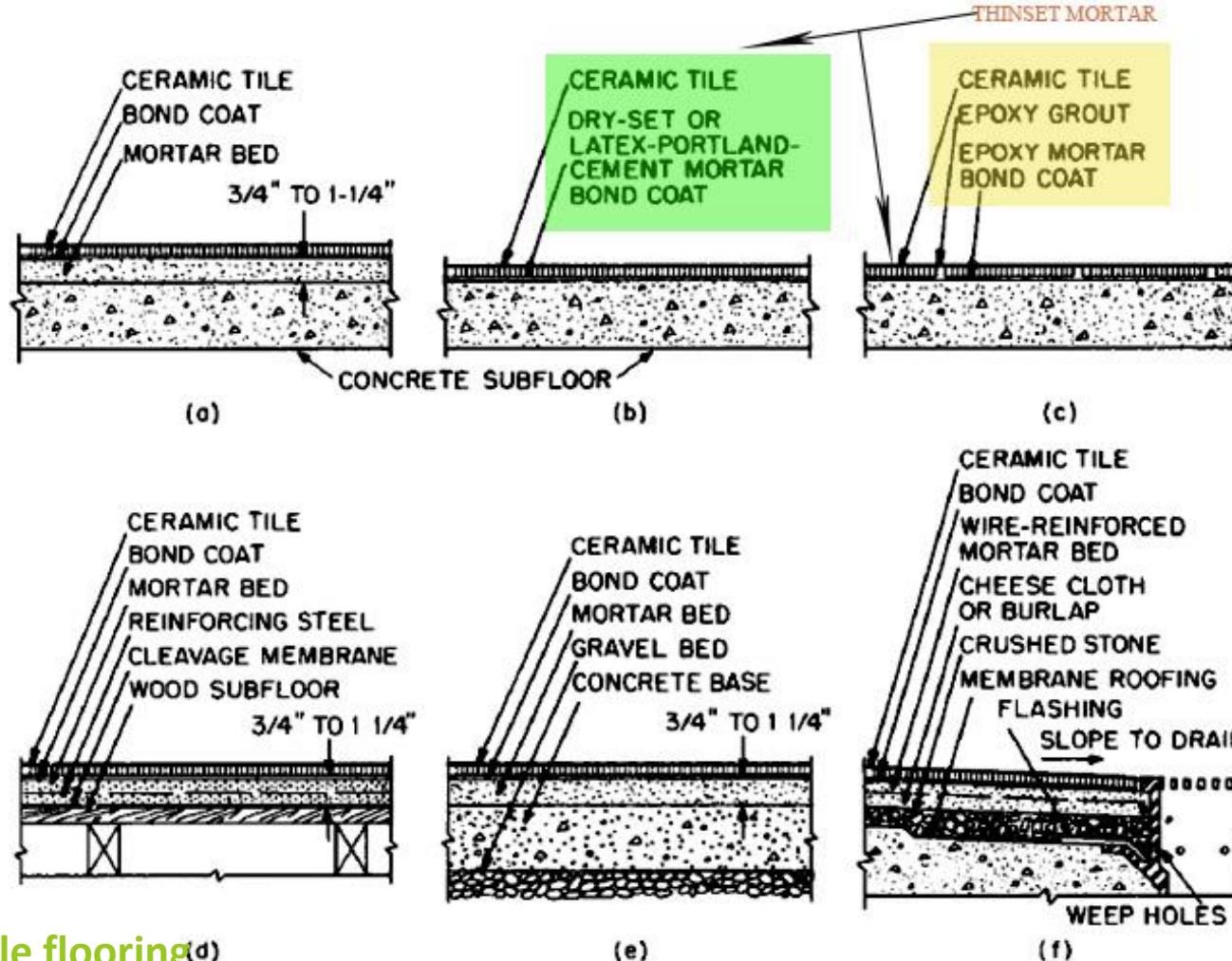
Thickset Tile Installation

Tile or stone flooring is set in grout. Grout is available in a variety of colors and can be selected to blend or contrast with the flooring material.



Thinset Tile Installation

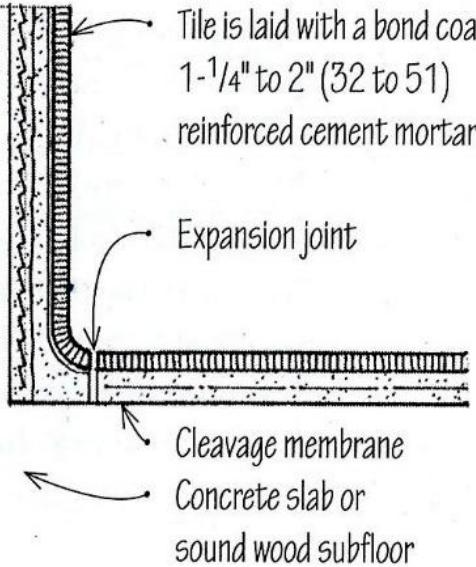
APPLICATION



Tile flooring^(d)

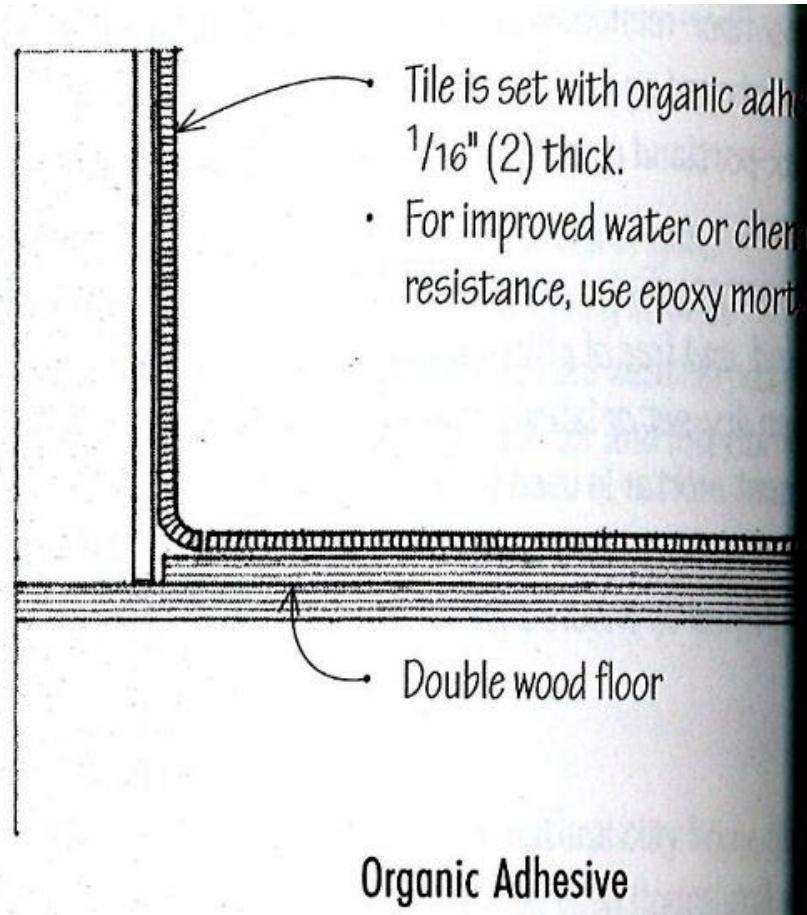
- Ceramic tile construction. For interior floors: (a) portland-cement mortar bed on a concrete subfloor (18MM TO 28MM) ; (b) bond coat of dry set or latex portland-cement mortar on a concrete subfloor; (c) epoxy bond coat on a concrete subfloor; (d) reinforced mortar bed on a wood subfloor. For an outdoor walkway: (e) portland-cement mortar bed on a concrete base.
- For roofs: (f) reinforced mortar bed on crushed stone.

APPLICATION



Cement Mortar

Interior Floor Applications



Organic Adhesive

Organic Mastic – 2-3mm thick

The oldest tile adhesive still on the market today is organic adhesive, or mastic. Mastic is used primarily for ceramic tiles, with compounds available for both wall and floor installations. Mastic comes pre-mixed. Mastic is used for ceramic tiles and must be applied quickly to avoid losing its adhesive properties through premature drying.

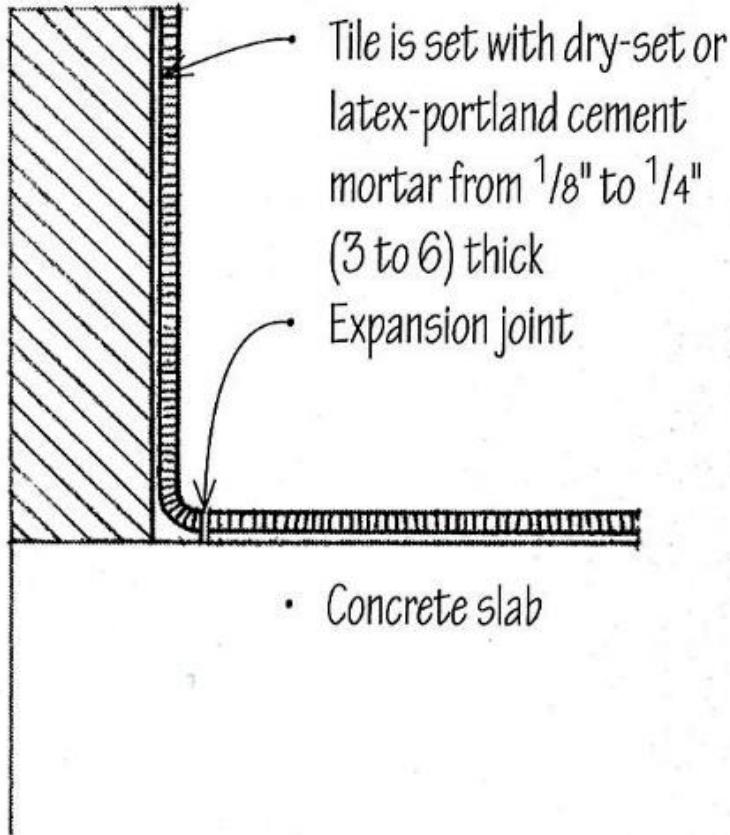
For certain tiling jobs, **adhesives(MASTIC)** offer an easy to apply alternative to traditional thin-set mortars. Using a tile adhesive instead of a mortar depends on several things.

- **Floor Tile Adhesive** - is a single component ready to use polymer modified grey tile adhesive introduced for fixing tiles on floors in interiors.
- Ensure that old tiles are perfectly joint and having uniform level. If any hollow space is present same should be filled by the mortar
- Tiles should be rinse with water to remove dust & loose particles
- Take Floor Tile Adhesive in a mixing tub, add water to make lump free mortar consistency (Adhesive water mixing ratio 3:1 by volume)
- Wait for 4 minutes and then mix it with the help of a trowel
- Apply mix material on the surface at **3-5 mm** thickness, spread it with the help of notched trowel, do not spread in more than 1sq m of area at a time. Press the tile firmly, hammer gently with soft mallet to ensure perfect bond
- Clean the excessive adhesive from the joints
- grout of required color to fill the gaps between the tiles but same should be strictly done after 24 hrs of tile application
- Leave the tile applied area untouched for 24 hrs
- Clean the tools & equipment's with potable water immediately after use

APPLICATION

Thinset Mortar

Thinset mortar is a mixture of Portland cement, sand, water and additives to retain moisture. Latex is added by many companies to varying degrees for use with different types of tile. Thinset mortar differs from mastic or "mud set" adhesives in its application. A thin layer of mortar is used to hold the tile down, and small amounts of mortar can be mixed at a time to ensure the mortar does not dry prematurely.



Thinset Mortar

Resilient Floors -

(able to recoil or spring back into shape after bending, stretching, or being compressed.)

Resilient flooring materials provide an economical, relatively dense, nonabsorbent flooring surface that is durable and easy to maintain. Their degree of resilience enables them to resist permanent indentation and contributes to their quietness and comfort underfoot. How comfortable a resilient floor covering is, however, depends not only on its resilience but also on its backing and the hardness of the supporting substrate.

- Floors made from materials such as PVC, linoleum, rubber etc are called resilient floors. Resilient floors are generally laid in offices, computer rooms, showrooms etc.
- Resilient floors are very much used nowadays in places such as libraries, computer rooms etc. They should be carefully laid by workmen experienced in such jobs.
- They are not as permanent as concrete, stone, terrazzo floors but are ideally suited for special situations.

Resilient Floors -

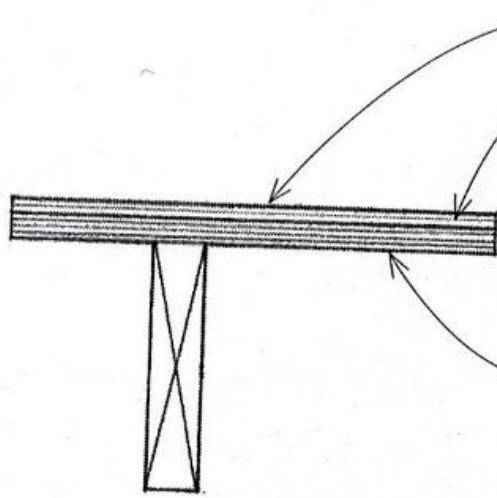
(able to recoil or spring back into shape after bending, stretching, or being compressed.)

None of the resilient flooring types is superior in all respects.

Listed below are the types that perform well in specific areas.

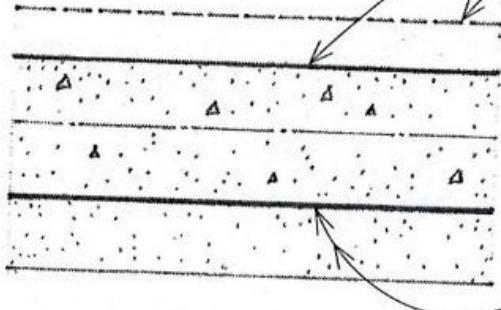
- Resilience and quietness: cork tile, rubber tile, homogeneous vinyl tile
- Resistance to indentation: homogeneous vinyl tile, vinyl sheet, cork tile w/ vinyl coating
- Stain resistance: rubber tile, homogeneous vinyl tile, vinyl composition tile, linoleum
- Alkali resistance: cork tile w/ vinyl coating, vinyl sheet, homogeneous vinyl tile, rubber tile
- Grease resistance: vinyl sheet, homogeneous vinyl tile, cork tile w/ vinyl coating, linoleum
- Durability: homogeneous vinyl tile, vinyl sheet, vinyl composition tile, rubber tile
- Ease of maintenance: vinyl sheet, homogeneous vinyl tile, vinyl composition tile, cork tile w/ vinyl coating

Resilient Floors



- Surface must be smooth, firm, clean, and dry.
- Double layer wood floor consists of hardboard underlayment at least $\frac{1}{4}$ " (6) thick or sanded plywood underlayment at least $\frac{3}{8}$ " (10) thick, laid with the face grain perpendicular to floor joists or to flooring boards.
- Single layer wood floor consists of combination subfloor/underlayment panels at least $\frac{5}{8}$ " (16) thick, laid with the face grain perpendicular to floor joists or to flooring boards; see 4.32.

Wood Subfloors



- Surface must be smooth, dense, clean, and dry.
- Provide a 2" to 3" (51 to 75) reinforced concrete topping over precast slabs; over lightweight concrete slabs, provide a 1" (25) concrete topping.
- Provide a moisture barrier and a gravel base under concrete slabs on grade.
- For concrete slabs below grade, provide a waterproofing membrane and a 2" (51) mudslab.

Concrete Subfloors

Resilient Floors – study min 3 no's

Flooring Type	Components	Thickness	Sizes
Vinyl sheet	vinyl resins w/ fiber back	.065" to .160" (2 to 4)	6' to 15' (1830 to 4570) wide
Homogeneous vinyl tile	vinyl resins	1/16" to 1/8" (2 to 3)	9" x 9" (230 x 230)
Vinyl composition tile	vinyl resins w/ fillers	.050" to .095" (1 to 2)	12" x 12" (305 x 305) 9" x 9" (230 x 230)
Cork tile	raw cork and resins	1/8" to 1/4" (3 to 6)	12" x 12" (305 x 305) 6" x 6" (150 x 150)
Cork tile w/ vinyl coating	raw cork, vinyl resins	1/8", 3/16" (3, 5)	9" x 9" (230 x 230) 9" x 9" (230 x 230)
Rubber tile	rubber compound	3/32" to 3/16" (2 to 5)	12" x 12" (305 x 305) 9" x 9" (230 x 230)
Linoleum sheet	linseed oil, cork, rosin	1/8" (3)	12" x 12" (305 x 305)
Linoleum tile	linseed oil, cork, rosin	1/8" (3)	6' (1830) wide 9" x 9" (230 x 230) 12" x 12" (305 x 305)

FLOOR SYSTEMS

- **RUBBER FLOORING**

- Rubber flooring is composed of natural rubber with various filling compounds. Because of the high cost of rubber, it is rather expensive.
- They are produced in sheets and also in tile form. An even subfloor is very essential for successful rubber flooring and the laying of these floors is a specialized job.
- All these floors should be laid on a thoroughly damp-proof surface as otherwise moisture slowly rots the base and damages the adhesive resulting in the sheets/tiles being separated from the base.
- Then they tend to curl up. The subfloor drying can be determined accurately by electrical resistance test or hygrometer test.



FLOOR SYSTEMS

- **RUBBER FLOORING**
- The moisture content should not be more than 5 to 6 percent for good results.
- A qualitative determination can be made by sealing a sheet glass of 300X300mm on the surface of the floor to be tested by putty (or any other suitable sealing material) and observing the surface after 24 hours. If the covered area of the glass is darker than its uncovered area, the floor is considered too wet and should be allowed to dry.
- Unless it is specifically required, it is better to avoid these materials for use in ground floors. PVS and linoleum are not used for skirting and dados. Wood is preferred for such works with these floors.

FLOOR SYSTEMS

RUBBER FLOORING

- Rubber flooring is intended for use on rigid subfloors, such as smooth-finished or screeded concrete supported above grade, or on structurally sound plywood or hardwood subfloors.
- Rubber is not recommended for use below grade. When used at grade, it must be applied with an alkaline, moisture-resistant adhesive.
- Rubber mats or runners may be laid without adhesive over relatively smooth surfaces.
- Large mats generally are installed in a recess in the concrete floor at building entrances. The mats are ribbed or perforated for drainage.
- Most rubber flooring is produced from styrene-butadiene rubber. Reclaimed rubber is added to some floorings. The flooring also contains mineral pigments and mineral fillers, such as zinc oxide, magnesium oxide, and various clays.
- Another synthetic-rubber flooring, chlorosulfonated polyethylene (Hypalon), also is available.
- Rubber floorings can be obtained in thicknesses of 3/32, 1/8, or 3/16 in. They have excellent resistance to permanent deformation under load. Yet they are resilient and quiet under foot.

FLOOR SYSTEMS

- **ASPHALT TILES**
- These tiles are intended for use on rigid subfloors, such as smooth-finished or
- screeded concrete, structurally sound plywood, or hardboard floors not subject to
- excessive dimensional changes or flexing. The tiles can be satisfactorily installed
- on below-grade concrete subject to slight moisture from the ground.
- Low cost and large selection of colors and designs make asphalt tile an economically
- desirable flooring.
- Asphalt tile is composed of mineral fibers, mineral coloring pigments, and inert
- fillers bound together. For dark colors the binder is Gilsonite asphalt; for
- intermediate
- and light colors, the binder may consist of resins of the cumarone indene type
- or of those produced from petroleum. Tiles most commonly used are 9 9 in and
- 1/8 in thick.
- Colors are classified into groups A, B, C, and D, graded from black and dark
- red (A) to cream, white, yellow, blue, and bright red (D). Cost is generally lower
- for the darker colors.
- .

FLOOR SYSTEMS

ASPHALT TILES

- To avoid permanent indentations in asphalt tiles, contact surfaces of furniture or equipment should be smooth and flat to distribute the weight. This is particularly necessary for installations over radiant-heated floors and on areas near windows exposed to sun.
- Never use on asphalt tiles waxes containing benzene, turpentine, or naphtha type solvents and free fats or oils.
- Avoid strong detergents or cleaning compounds containing abrasives or preparations not readily soluble in water.
- These may soften the tiles and cause colors to bleed. Grease, oils, fats, vinegar, and fruit juices allowed to remain in contact with asphalt tiles will stain and soften them.
- Because of these restrictions, asphalt tiles are not recommended for use in kitchens or bathrooms

FLOOR SYSTEMS

CORK TILES

- Cork flooring is intended for use on rigid subfloors, such as smooth-finished or screeded concrete supported above grade and free of moisture, or on structurally sound plywood or hardboard.
- Cork tile is not recommended for application below grade. When it is installed at grade, moisture-free conditions must be ensured.
- Cork tile is manufactured by baking cork granules with phenolic or other resin binders under pressure.
- Four types of finishes are produced: natural, factory prefinished wax, resin-reinforced wax, and vinyl cork tile (Art. 14.8).
- The tiles are generally 6 6, 6 12, 9 9, 12 12, 12 24, or 36 36 in and 1/8, 3/16, 5/16, or 1/2 in thick.
- Natural cork tile must be sanded (to level), sealed, and waxed immediately after installation.
- Unless the exposed surface of cork floors is maintained with sealers and protective coatings, permanent stains from spillage and excessive soiling by heavy traffic will result.
- Cork tiles are particularly suitable for areas where quiet and comfort are of paramount importance

FLOOR SYSTEMS

- **Linoleum**
- It is the mixture of an oxidised linseed oil, pulverized cork, wood flour, pigments and colours, all spread in a uniform layer on canvas, the surface of which may be painted in different patterns. The surface is then afterwards, water-proofed with the help of an oil paint.
- It is available in different guages(i.e., thickness 6.7, 6.0, 4.5, 3.2, 2.0 and 1.6 mm), and is easily cleaned with soap water.
- It is not affected by oil but slightly affected by acids.
- Linoleum is available in rolls as well as in tiles.
- Linoleum is used for floor coverings of hospitals, canteens, residences, offices and industrial buildings.

FLOOR SYSTEMS

VINYL FLOORING

- Flooring of this type is un backed.
- It is intended for use on rigid subfloors, such as smooth-finished or screeded concrete supported above grade, or structurally sound plywood or hardboard floors.
- Vinyl floors are not recommended for use below grade. They must be applied with an alkaline, moisture-resistant adhesive when used at grade.
- Vinyl mats or runners may be laid without adhesive over relatively smooth surfaces.
- Large mats generally are installed in a recess in the concrete floor at building entrances.
- The mats are ribbed or perforated for drainage.
- Vinyl flooring consists predominantly of polyvinyl chloride resin as a binder, plasticizers, stabilizers, extenders, inert fillers, and coloring pigments. Because of its unlimited color possibilities and opaqueness to transparent effects, it is widely used.
- Common thicknesses are 0.080, 3/32, and 1/8 in. Since vinyl resins are tough synthetic polymers, vinyl flooring can withstand heavy loads without indentation, and yet is resilient and comfortable under foot.
- It is practically unaffected by grease, fat, oils, household cleaners, or solvents. But unless given a protective finish, it is easily scratched and scuffed.

FLOOR SYSTEMS

VINYL FLOORING

- ***Backed Vinyl.***
- The family of backed-vinyl flooring comprises vinyl wearing surfaces from 0.02 to 0.050 in thick, laminated to many different backing materials.
- In some products, the vinyl surfaces are unfilled transparent films placed over a design on paper, cork, or degraded vinyl.
- Filled vinyl surfaces with a 34% vinyl resin binder are placed over plastic composition backing or asphalt-saturated or resin-impregnated felt. The asphalt-felt type may be used in moist areas. Foamed rubber or plastic is incorporated in some of these materials to increase comfort and decrease impact noise.
- Asphalt-felt-backed vinyl materials may be applied with a moisture-resistant adhesive on concrete at or below grade.

FLOOR SYSTEMS

VINYL VS LINOLEUM FLOORING

- Vinyl and linoleum are resilient flooring materials that share a number of characteristics. In fact, many flooring dealers use the terms interchangeably, because of the similarities between the two finished products. However, there are a number of vital differences that are both inherent to the production of the materials, and conspicuous in their long terms use.

MATERIAL DIFFERENCES BETWEEN VINYL AND LINOLEUM

- Vinyl: A manufactured man-made product that is produced using petroleum, a non-renewable resource.
- Large amounts of energy are required in its production in order to extract and process the chlorine which is a vital component of its chemical makeup.
- Linoleum: A material that is comprised largely of linseed oil, a naturally occurring substance that is extracted from flax seeds. This is mixed with other natural and renewable materials such as cork dust, wood flour, and rosin.

INSTALLING VINYL FLOOR TILES

Vinyl floor tiles one of the most versatile floors available . It is quiet and warm underfoot, easy to clean like other hard surfaces. It is great around water easy in installing.



MATERIALS NEEDED FOR THE JOB

Vinyl tiles, Adhesive, Trowel, Tape measure

Utility knife, Self-leveling compound

Floor roller, Hammer, Chalk line

Step 1- Measure the Floor

Step 2- Prepare the Room

Step 3- Center the Tile

Step 4- Cut to Fit

Step 5- Finish Up



FLOOR SYSTEMS

INSTALLATION OF THIN COVERINGS

- Most manufacturers and trade associations make available instructions and specifications for installation and maintenance of their floorings.
- The most important requirement for a satisfactory installation of a thin floor covering is a dry, even, rigid, and clean subfloor.
- Protection from moisture is a prime consideration in applying a flooring over concrete.
- Moisture within a concrete slab must be brought to a low level before installation begins.
- Moisture barriers, such as 6-mil polyethylene, 55-lb asphalt saturated and coated roofing felt, or 1/32-in butyl rubber, should be placed under concrete slabs at or below grade, and a minimum of 30 days' (90 in some cases) drying time should be allowed after placement of concrete before installation of the flooring.
- Particular care should be taken with installations on lightweight concrete. It always has a higher gross water requirement than ordinary concrete and therefore takes longer to dry.
- So a longer drying period should be allowed before installation of flooring. Flooring manufacturers provide advice and sometimes also equipment to test for moisture.

FLOOR SYSTEMS

INSTALLATION OF THIN COVERINGS

- As indication of dryness at any given time is no assurance that a concrete slab at or below grade will always remain dry. Therefore, protection from moisture from external sources must be given considerable attention.
- All concrete surfaces to receive adhesive-applied, thin flooring must be smooth.
- Also, they should be free from serious irregularities that would “telegraph” through the covering and be detrimental to appearance and serviceability.
- For rough or uneven concrete floors, a troweled-on underlayment of rubber latex composition or asphalt mastic is recommended. It can be applied from a thickness of 1/4 in to a featheredge. Small holes, cracks, and crevices may be filled with a reliable cement crack filler.

FLOOR SYSTEMS

TABLE 11.12 Adhesives Used to Install Flooring*

Flooring	Concrete below grade	Concrete on grade	Concrete above grade	Plywood or hardboard
Asphalt and vinyl-asbestos tiles	Asphalt, cutback Asphalt, emulsion	Asphalt, cutback Asphalt, emulsion	Asphalt, cutback Asphalt, emulsion	Asphalt, cutback Asphalt, emulsion
Rubber and vinyl	Chemical set Latex	Latex	Latex	Latex
Linoleum, cork, and vinyl backed with felt or cork	Do not install	Do not install	Linoleum paste	Linoleum paste
Vinyl backed with asbestos felt	Latex	Latex	Latex Linoleum paste	Linoleum paste
Laminated wood block	Do not install	Asphalt, hot melt Asphalt, cutback Rubber base	Asphalt, hot melt Asphalt, cutback Rubber base	Asphalt, hot melt Asphalt, cutback Rubber base
Solid unit wood block	Do not install	Asphalt, hot melt Asphalt, cutback	Asphalt, hot melt Asphalt, cutback	Asphalt, hot melt Asphalt, cutback

FLOOR SYSTEMS

CARPETS

- Extending from wall to wall, carpets are frequently used as floor coverings in residences, offices, and retail stores.
- They are often selected for the purpose because they offer foot comfort and, being available in many colors, patterns, and textures, attractive appearance. Rugs, often used as an alternative in residences, differ from carpets chiefly in being single pieces of definite shape and usually not covering an entire floor between walls.
- A carpet is a thick, heavy fabric that is usually piled but could be woven or felted. Pile consists of closely placed loops of fiber, or tufts, that produce a raised surface on a backing to which they are locked.
- The tufts may be sheared to produce a soft, velvety surface with a wide variety of patterns and textures.
- Sheared or unsheared, the piled fabric is very resilient, thus contributing to foot comfort.

- 1.BASE- Lay Base Coat Of 100 Mm Thick In The Ratio Of Cement Concrete 1:8:16 (1 Part Of Cement, 8 Parts Of Fine Sand And 16 Parts Of Brick Blast) Or 1:4:8 On Compacted Earth Under The Floor. The base is same for all types of floors.
- 2. FINSHING- Then finishing of the floor is carried on, for different flooring materials. As we will discuss here the finishing of terrazzo, brick, stone and cement concrete floor.

FLOOR SYSTEMS - STONE PAVING

- **NATURAL STONE FINISHES** includes Shahabad, Kota, Cuddapah, different types of Marble, Granite, Sandstone, limestone, slate, quartzite etc.
- **Shahabad stone** - Shahabad town in Gulbarga district is a centre for Shahabad stone activities. Shahabad is a variety of limestone from this part of Karnataka bordering Andhra Pradesh.
- Easy to work with and economical, traditionally it has been popular in public buildings.
- Being fairly hard, it lasts long without surface blemishes. Generally available in grey shades, the neutral colour helps in masking dust and easy maintenance.



FLOOR SYSTEMS

STONE PAVING

- **Cuddapahstones**, again from Andhra Pradesh, with the place name extended to the material. With its near-black colour, Cuddapah offers a great contrast at an affordable price.
- Comparatively softer, it is safe to use it in conjunction with Shahabad or in areas of lesser wear and tear.
- With its tendency of surface layering and pitting, it may not be ideal in all contexts, but goes well with rustic needs and other uses like storage shelves or counter tops.
- Flooring finished with unpolished Cuddapah side on top creates a textured look, to contract with the possibly smooth looks elsewhere.



FLOOR SYSTEMS

STONE PAVING

Kota Stone -is a fine-grained variety of limestone, quarried at Kota district, Rajasthan, India.

- The rich greenish-blue and brown colours of this stone are most popular. It is an excellent building stone.
- It is mainly used for exteriors, pathways, corridors, driveways, balconies, commercial buildings etc. It is also suitable for use in chemical industries as flooring, wall fixing and lining. Other colors—black, pink, grey, beige.
- Non slippery, water resistant, non-porous can be rough finished or polished.
- Can be used indoors and outdoors



FLOOR SYSTEMS

Granite is a common type of igneous rock that is granular in texture. Granites can be predominantly white, pink, or gray in color, depending on their mineralogy.

Granite comes in different finishes, mostly polished granite is used for interior purposes.

Marble -Different types of marble will bring different looks to a foyer, hallway, bathroom, or any room where it is present –and there are thousands of different types of marble in nearly every color imaginable. With hues in black, brown, green, red, white and even pink.

Each slab of stone will have its own unique vein patterns and streaks of color. Depending on the type of marble it's classified as, tones will vary stone to stone



MARBLE

- Variety of marble available is tremendous:
- Albeta
- Dungri
- Aranga
- Kumari
- Chak dungri
- Costliest and best marble is the Makrana white: Very soft, snow white and high quality finishing.
- Chittor brown, Jaisalmer Yellow, Udaipur green, Baroda green, Teak Grain marble, Banswana.
- White base marble price ranges from :
- Rs.30/- to Rs.400/- sq. ft. STONE FLOORING

INSTALLATION

- Ensure that the tiles are of regular shape
- Base mortar 1:5 or 1:6 with low water cement ratio.
- Min. thickness of base mortar is 25mm
- Fix the marble tiles temporarily then press it using wooden handle of the hammer to bring them in a level.
- After fixing them in pattern remove the tiles and spread white cement slurry(2:1) and refix the tiles.
- Press with wooden handle.
- Fill up joints with white cement.
- First grinding min. after 5 days of fixing.
- Apply white cement slurry over marble floor after first grinding and cure for a day.
- Minimum 3 grindings required.

CARPET TYPES AND LAYING TECHNIQUES

FLOOR SYSTEMS

CARPETS

- Fibers used for tufting indoor carpets include wool, acrylic, polyester, continuous-filament or heat-set spun nylon and nylon with antistatic treatment for high resistance to soiling.
- In selection of carpeting, consideration should be given to the intensity of traffic
- to which the covering will be subjected; availability of desired colors, patterns, and
- textures; colorfastness; resistance to crushing and matting; soil resistance; cleanability;
- resistance to fuzzing, beading, and pilling; as measured by bundle wrap and
- latex penetration on the underside of the primary backing; subfloor conditions; and
- installed cost of the carpet.

CARPETS

TYPES OF CARPET

- The manufacturing of carpet (carpet styles / types of carpet) –which can be described as sewing strands of yarn into a backing material-creates thousands of yarn loops.
- When the loops are cut, we create a CUTPILE carpet, often known as PLUSH or texture carpet and even friezes.
- When the loops remain uncut, we create a LOOP carpet.
- These two options can be combined to create various CONSTRUCTION possibilities:
 - 1.PILE
 - In textiles, **pile** is the raised surface or nap of a fabric, which is made of upright loops or strands of yarn.
 - Examples of pile textiles are carpets, corduroy, velvet, plush and Turkish towels.

The types of pile include

1. **looppile**
2. **Uncut pile**
3. **Cut pile**
4. **Knotted pile**
5. **Tufted pile**
6. **Woven pile**
7. **Cord pile**
8. **Twist pile**

CARPETS

- 1.Cut pile



When the loops are cut, you
create a cut pile carpet



MILFORD SOUND

35 COLORS



CONFIDENT SMILE

28 COLORS



LASTING IMPRESSIONS (S)

40 COLORS



INNER CITY TEXTURE

8 COLORS

CARPETS

- 1. Loop pile



When the loops remain uncut, you create a loop pile carpet.



REAL ACHIEVEMENT

9 COLORS



INNER CITY LOOP

9 COLORS



TAKE ON THE TREND (B)

8 COLORS



MERINO

9 COLORS

CARPETS

- 1. Patterned Loop pile



When the loops remain uncut and the loops have multiple heights, the result is a patterned loop carpet.

LUXE

18 COLORS

POLISHED IMAGE

50



CARPETS

- 1. Cut and Loop pile



When cuts and loops are combined, you can create a wide range of patterns.



YOUR WORLD



IT'S YOU



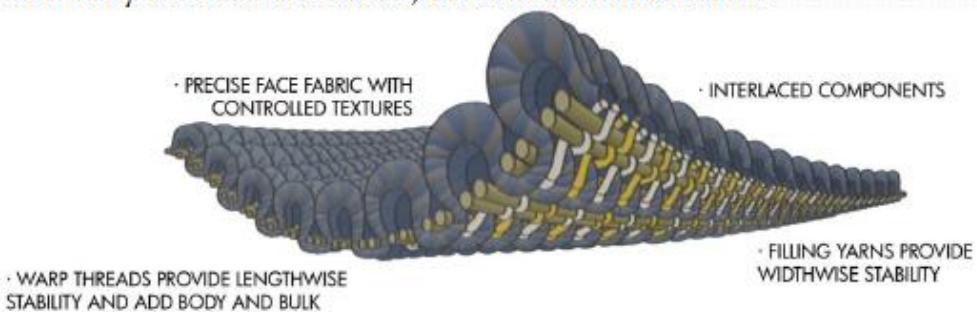
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CARPETS

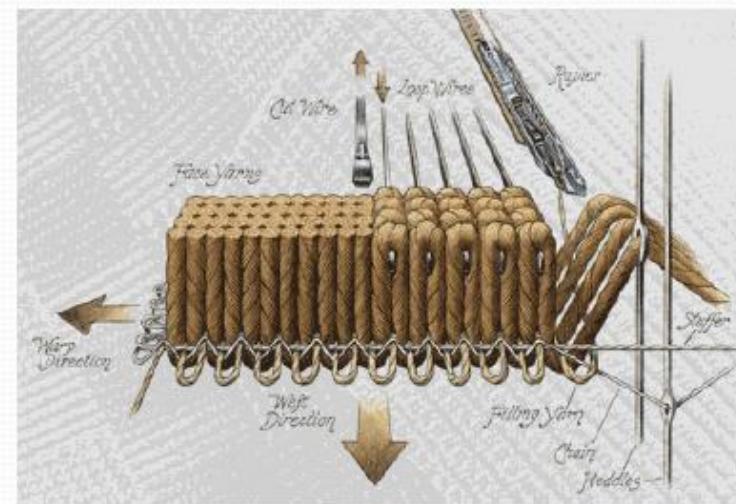
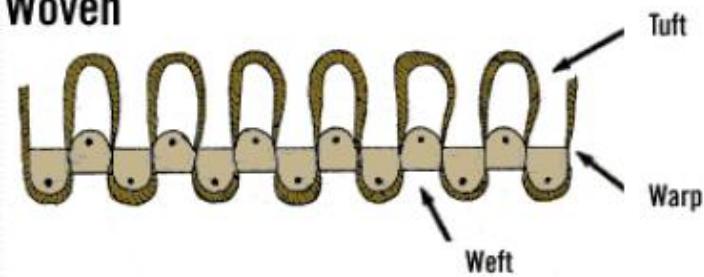
• 1. Types of carpets

Woven

- The carpet is produced on a loom quite similar to woven fabric.
- The pile can be plush or Berber. Plush carpet is a cutpile and Berber carpet is a loop pile.
- There are new styles of carpet combining the two styles called cut and loop carpeting.
- Normally many coloured yarns are used and this process is capable of producing intricate patterns from predetermined designs (although some limitations apply to certain weaving methods with regard to accuracy of pattern within the carpet).
- These carpets are usually the most expensive due to the relatively slow speed of the manufacturing process. These are very famous in India, Pakistan and Arabia.



Woven



CARPETS

- 1. Types of carpets

Needle felt

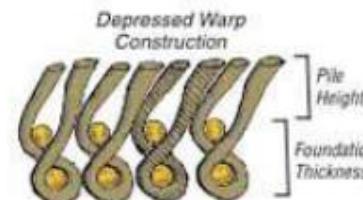
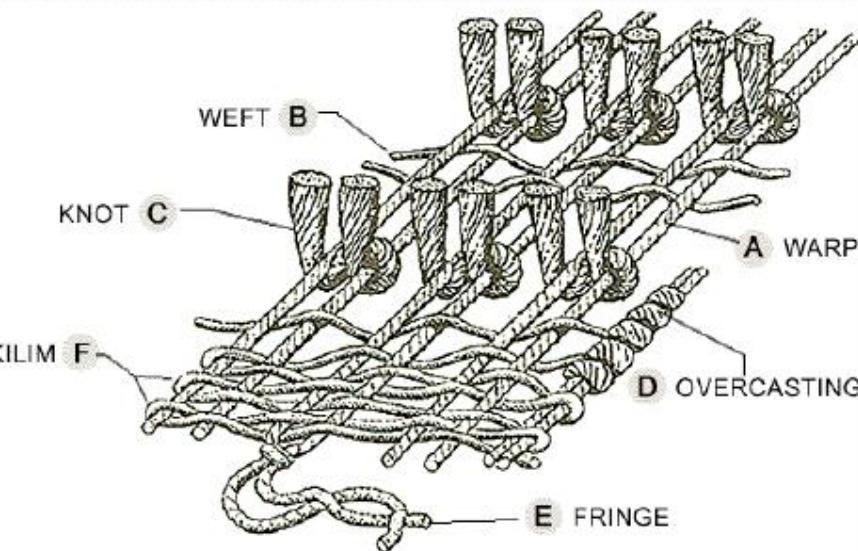
- These carpets are more technologically advanced.
- Needle felts are produced by intermingling and felting individual synthetic fibres using barbed and forked needles forming an extremely durable carpet.
- These carpets are normally found in commercial settings such as hotels and restaurants where there is frequent traffic.



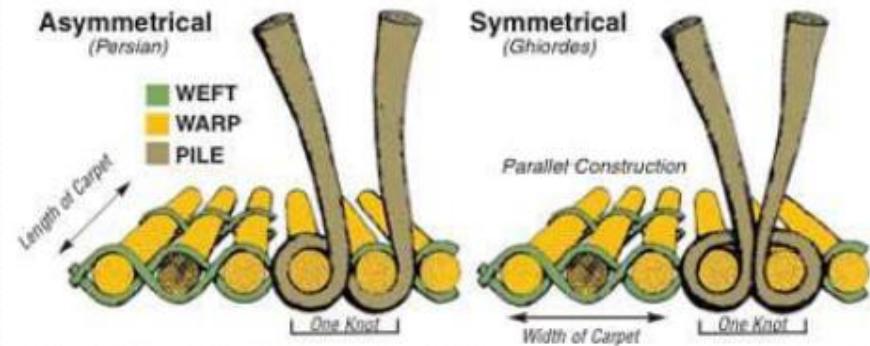
CARPETS

- Knotted

- On a **knotted pile carpet** (formally, a **supplementary weft cut-loop pile carpet**), the structural weft threads alternate with a supplementary weft that rises at right angles to the surface of the weave.
- This supplementary weft is attached to the warp by one of three knot types (see below), such as shag carpet which was popular in the 1970s, to form the pile or nap of the carpet.
- Knotting by hand is most prevalent in oriental rugs and carpets. Kashmir carpets are also hand-knotted.



Asymmetrical and symmetrical knots are the most widely used types in hand knotted rugs. The drawing above shows asymmetrical knots with warp yarns oriented on two different planes. Rugs with this type of construction show half as many bumps on the back of the rug when compared with parallel construction.



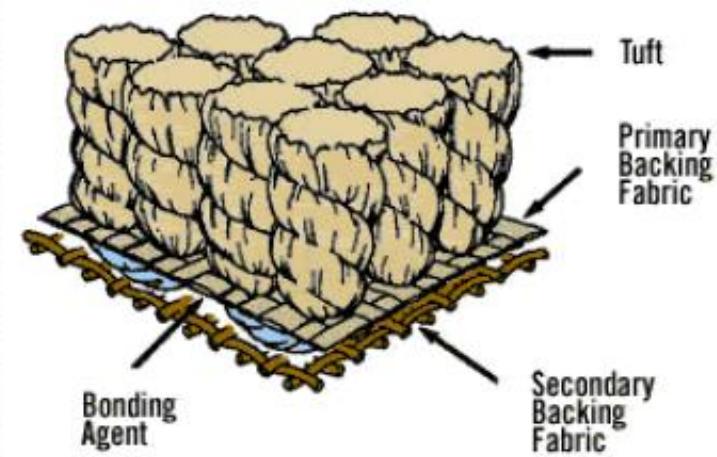
CARPETS

- Tufted carpets

- These are carpets that have their pile injected into a backing material, which is itself then bonded to a secondary backing made of a woven hessian weave or a man made alternative to provide stability.
- The pile is often sheared in order to achieve different textures. This is the most common method of manufacturing of domestic carpets for floor covering purposes in the world



Tufted



*Tuft-a bunch or collection of threads, grass, hair, etc., held or growing together at the base.

*Hessian or burlap is a woven fabric usually made from skin of the jute plant

CARPETS

Flat weave carpets and Hooked Rugs

- A **flatweave** carpet is created by interlocking warp (vertical) and weft (horizontal) threads. Types of oriental flatwoven carpet include kilim, soumak, plain weave, and tapestry weave.
- Types of European flatwoven carpets include Venetian, Dutch, damask, list, haircloth, and ingrain (aka double cloth, two-ply, triple cloth, or three-ply).



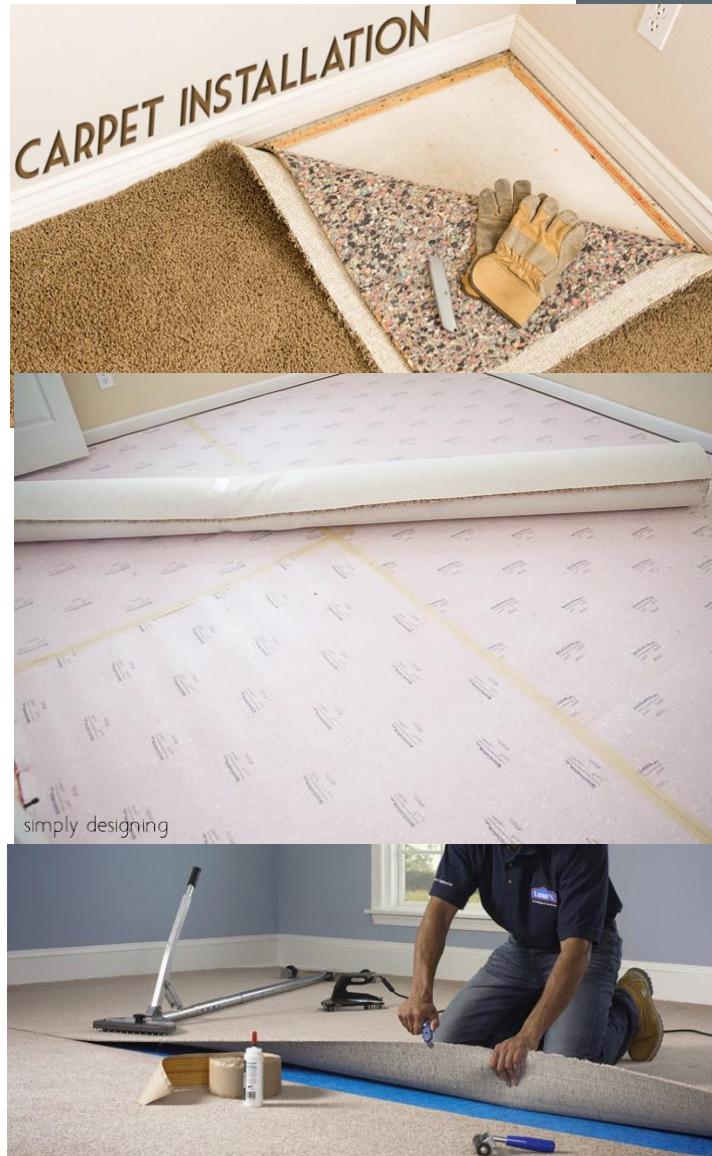
Hooked rug

- A **hooked rug** is a simple type of rug handmade by pulling strips of cloth such as wool or cotton through the meshes of a sturdy fabric such as burlap. This type of rug is now generally made as a handicraft.

FLOOR SYSTEMS

Installation of Carpet.

- Carpet is supplied usually in widths of 12 or 15 ft in rolls in long lengths. It may be cut to desired sizes and shapes with a carpet knife.
- Strips of carpet are laid side by side to extend the covering from wall to wall. Joints may be stitched or taped.
- Installation should conform to recommendations of the carpet manufacturer. In general, carpet may be laid on any firm, smooth floor.
- Carpets with jute or synthetic secondary backing generally should be stretched over a good-quality pad, to eliminate bulges, and anchored at the walls with tacks or tackless strips.
- With this type of installation, carpets may be removed easily when replacement is necessary. However, they must still be cleaned in place, may require restretching, and can be difficult to repair. (Power stretchers should be used for carpets with synthetic secondary backing.)



FLOOR SYSTEMS

Installation of Carpet.

- Alternatively, this type of carpet may be directly cemented to subfloors, eliminating an underlying pad and future restretching.
- But wearability may be lower and there may be a greater tendency to soil under heavy traffic.
- Carpets with high-density foam-rubber backing also may be cemented directly to subfloors. Such carpets, however, are not suitable for carrying heavy traffic and may be difficult to remove when replacement is necessary.
- In all cases, use of chair pads under castered chairs is desirable.

FLOOR SYSTEMS

- **TERRAZZO**
- A Venetian marble mosaic, with portland cement matrix, terrazzo is composed of two parts marble chips to one part portland cement. Color pigments may be added.
- Three methods of casting in place portland-cement terrazzo atop structural concrete floor slabs are commonly used:
 - sand cushion, bonded, and monolithic.
- **Sand-cushion (floating) terrazzo** is used where structural movement that might injure the topping is anticipated from settlement, expansion, contraction, or vibration.
- This topping is at least 3 in thick. First, the underlying concrete slab is covered with a 1/4- to 1/2-in bed of dry sand.
- Over this is laid a membrane, then wire-fabric reinforcing. The terrazzo underbed is installed to 5/8 in below the finished floor line. Next, divider strips are placed and finally, the terrazzo topping.

FLOOR SYSTEMS

TERRAZZO

Bonded terrazzo has a minimum thickness of 1 - 3/4 in.

- After the underlying concrete slab has been thoroughly cleaned and soaked with water, the surface is slushed with neat portland cement to ensure a good bond with the terrazzo.
- Then, the underbed is laid, divider strips are installed, and terrazzo is placed.

Monolithic terrazzo

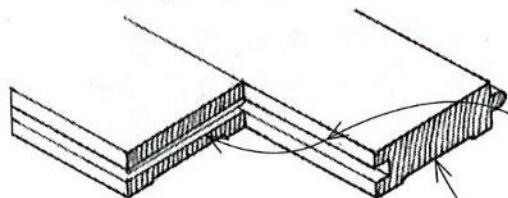
- It is constructed by placing a 5/8-in topping as an integral part of a green-concrete slab. Adhesive-bonded monolithic terrazzo with an epoxy resin adhesive also has been used successfully, with a topping thickness of only 3/8 in.
- Terrazzo may be precast. It generally is used in this form for treads, risers, platforms, and stringers on stairs.
- Portland-cement terrazzo, should not be used in areas subject to spillage, such as might be encountered in kitchens.
- Other matrix materials used with marble chips include rubber latex, epoxy, and polyesters. Suppliers should be consulted for installation details.

FLOOR SYSTEMS

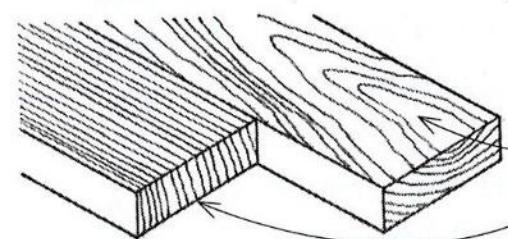
WOOD FLOORS

- Both hardwoods and softwoods are used for floors. Hardwoods most commonly used are maple, beech, birch, oak, and pecan. Softwoods are yellow pine, Douglas fir, and western hemlock.
- The hardwoods are more resistant to wear and indentation than softwoods.
- Hardwood strip floorings are available in thicknesses
- Softwood strip flooring
- Solid-unit wood blocks for floors are made from two or more units of stripwood flooring fastened together with metal splines or other suitable devices.
- A block usually is square. Tongued and grooved, either on opposite or adjacent sides, it is held in place with nails or an asphalt
- A laminated block is formed with plywood comprising three or more plies of wood glued together. The core or cross bonds are laid perpendicular to the face and back of the block. Usually square, the block is tongued and grooved on either opposite or adjacent sides.
- The most common thickness is 1/2 in, but other thicknesses used are 3/8, 7/16, 5/8, and 13/16 in.
- Laminated blocks are installed with adhesives

WOODEN FLOORING

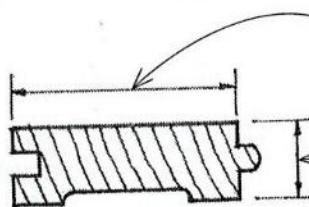


Strips are matched to form tongue-and-groove joints along sides and ends.



Flat grain, plain sawn

Edge or vertical grain, quarter sawn



Face widths:

1-1/2", 2", 2-1/4", 3-1/4" (38, 51, 57, 85)

Thicknesses:

Light duty: 3/8", 1/2", 5/8" (10, 13, 16)

Normal service: 25/32" (20)

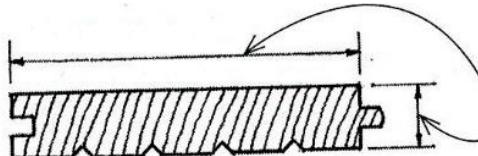
Wood flooring combines durability and wear resistance with comfort and warmth. Durable, hard, close-grained species of both hardwood and softwood are used for flooring. Common species of hardwood flooring species include oak, maple, birch, pecan, and cherry. Common species of softwood flooring include southern pine, Douglas fir, and hemlock. Whenever possible, woods used for flooring should be from certified sustainable sources. While technically not a wood, bamboo is a relatively fast-growing grass product that qualifies as a renewable resource.

(LEED® MR Credit 6: Rapidly Renewable Materials)

Strip Flooring

Strip flooring is composed of long wood strips 3-1/4" (85) or less in face width.

WOODEN FLOORING



3-1/4" to 8" (85 to 205) wide
Thicknesses similar to those of
strip flooring

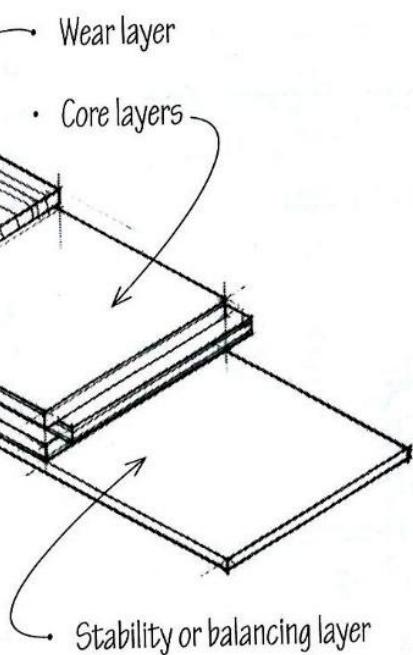
Plank Flooring

Plank flooring refers to flooring boards that are wider than 3-1/4" (85). End- and side-matched boards are blind-nailed. The boards may also be face-nailed or screwed and then plugged. Some new plank flooring systems can be laid with mastic or adhesive. To minimize the effect of variations in humidity on the wide planks, 3-ply laminated planks are available.

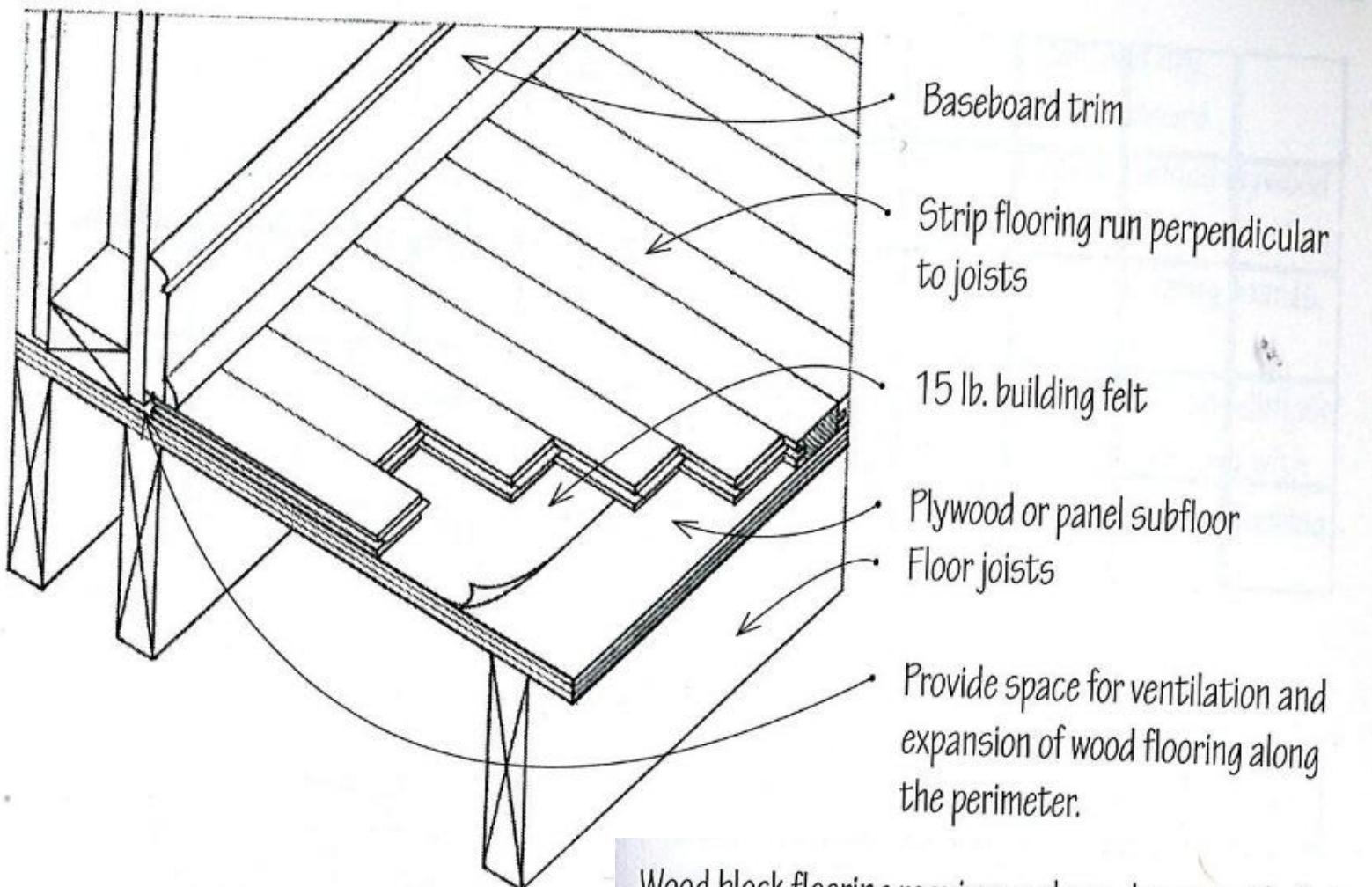
Wood flooring is most often finished with clear polyurethane, varnish, or a penetrating sealer. Finishes can range from high gloss to satin. Ideally, the finish should enhance the durability of the wood and its resistance to water, dirt, and staining, without concealing the wood's natural beauty. Stains are used to add color to the natural color of the wood without obscuring the wood grain. Wood flooring can also be waxed, painted, or stenciled, but painted surfaces require more maintenance.

Engineered Flooring

Engineered flooring is impregnated with acrylic or sealed with urethane or vinyl. Laminated flooring assembles high-pressure laminates, including wood veneers, into durable, acrylic-urethane sealed panels. Bamboo is also laminated under high pressure, milled into planks, immersed in polyurethane, and coated with acrylic polyurethane.



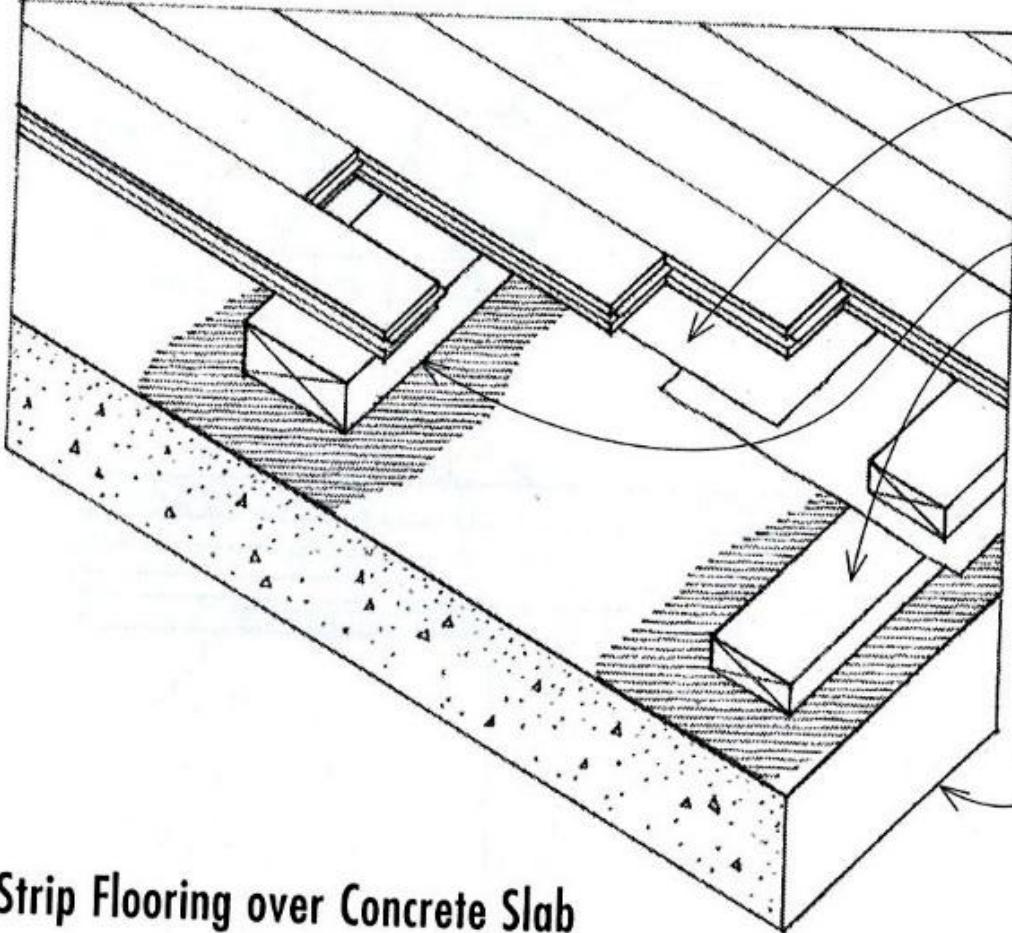
WOODEN FLOORING - installation



Strip Flooring over Wood Subflooring

Wood block flooring requires a clean, dry, smooth, flat surface such as a plywood subfloor or underlayment. While block tiles can be applied to the surface of a dry concrete slab, it is best, especially in basements, to lay the flooring over a plywood subfloor and a vapor barrier set on treated wood sleepers.

WOODEN FLOORING - installation



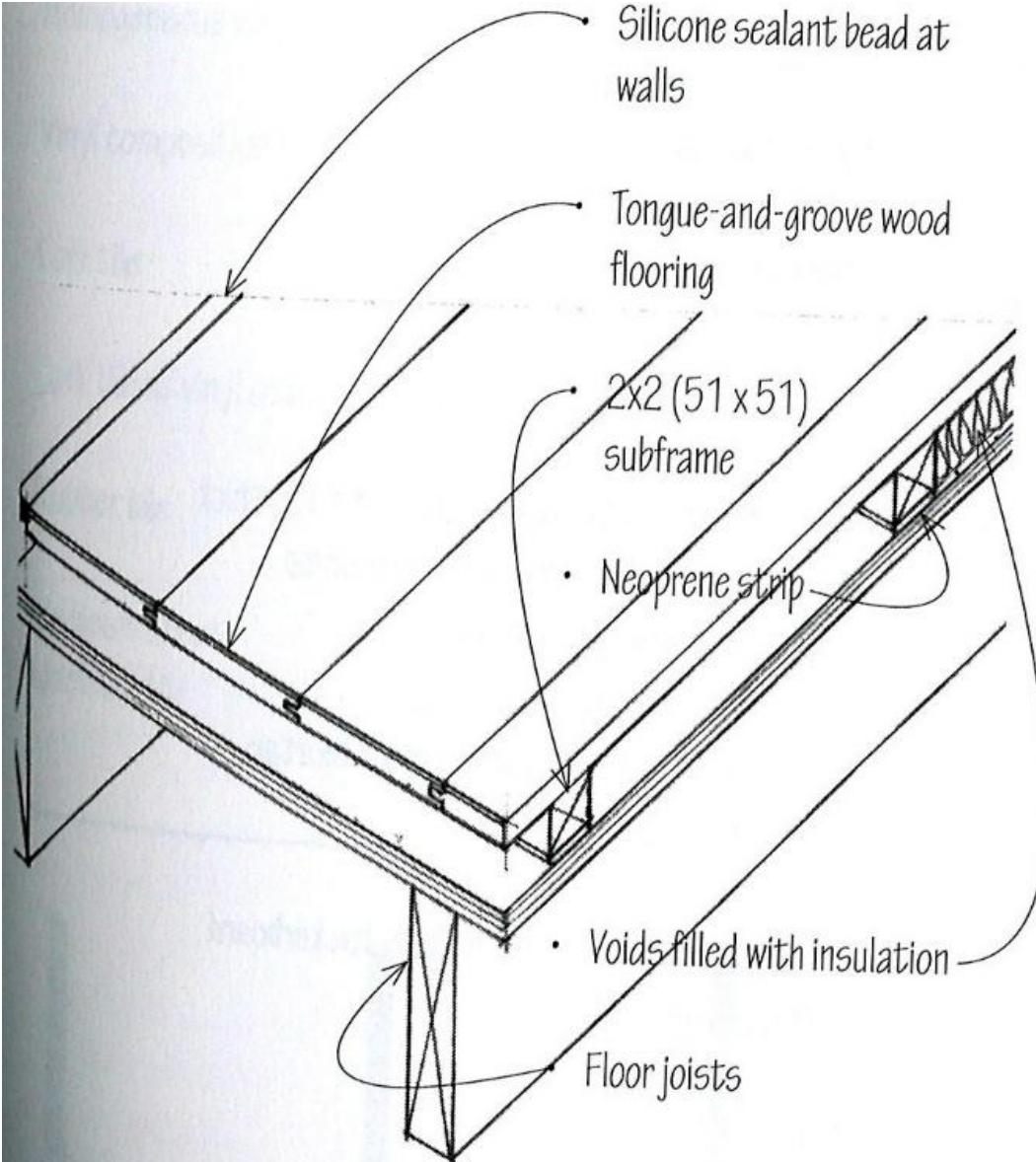
- Polyethylene film
 - 2x4 or two 1x3s
 - Treated wood sleepers set in mastic @ 16" (405) o.c.
 - Sleepers may be set on spring-steel chairs or other resilient cushion.
- Vapor barrier for concrete slabs on grade

Strip Flooring over Concrete Slab

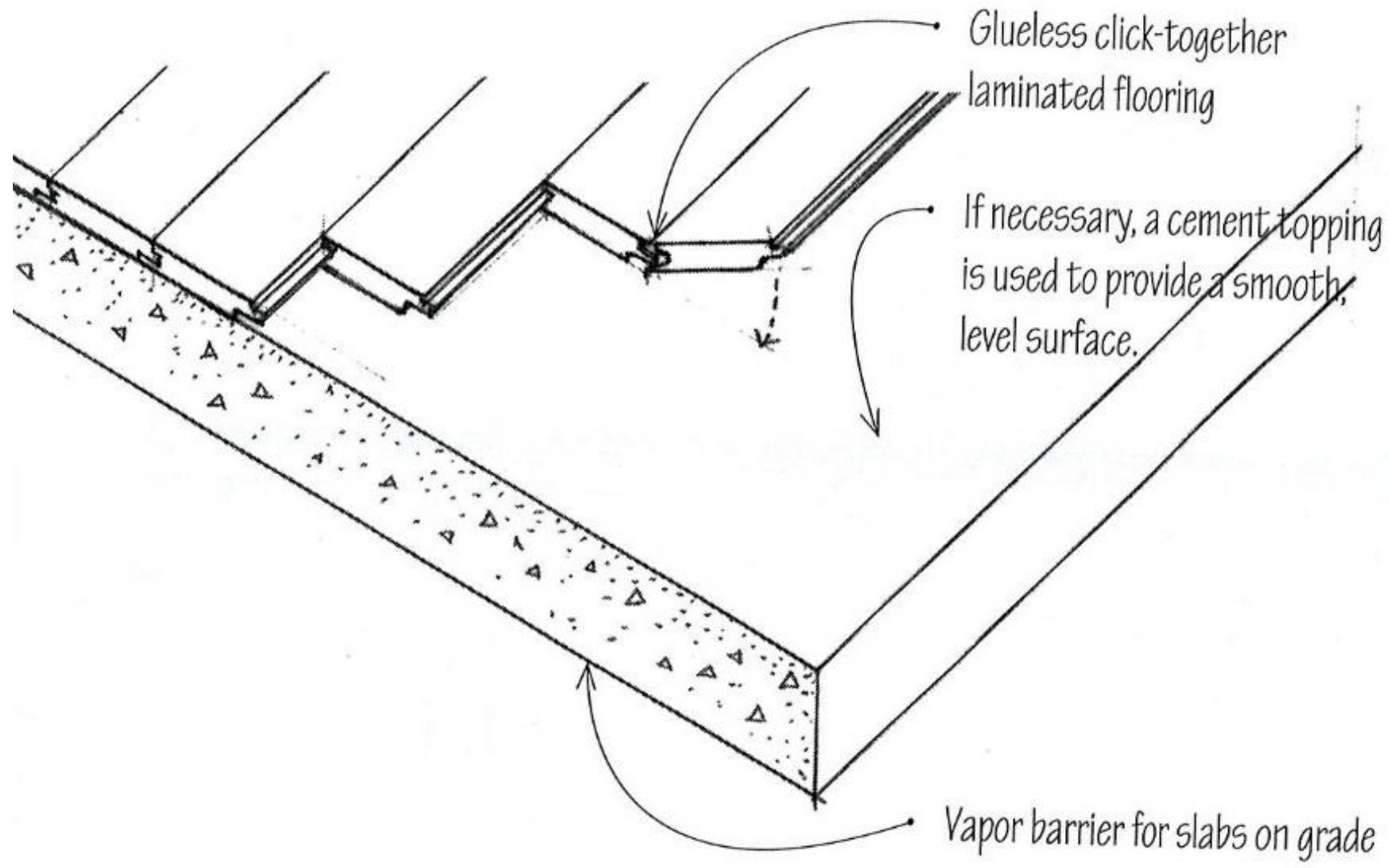
Wood strip and plank flooring requires a wood sub floor or base of spaced wooden **sleepers**.

Wood block flooring requires a clean, dry, smooth, flat surface such as a plywood subfloor or underlayment. While block tiles can be applied to the surface of a dry concrete slab, it is best, especially in basements, to lay the flooring over a plywood subfloor and a vapor barrier set on treated wood sleepers.

WOODEN FLOORING - installation



WOODEN FLOORING – glue less laminated floor installation



FLOOR SYSTEMS

5. WOODEN BLOCK/ PARQUET FLOORING

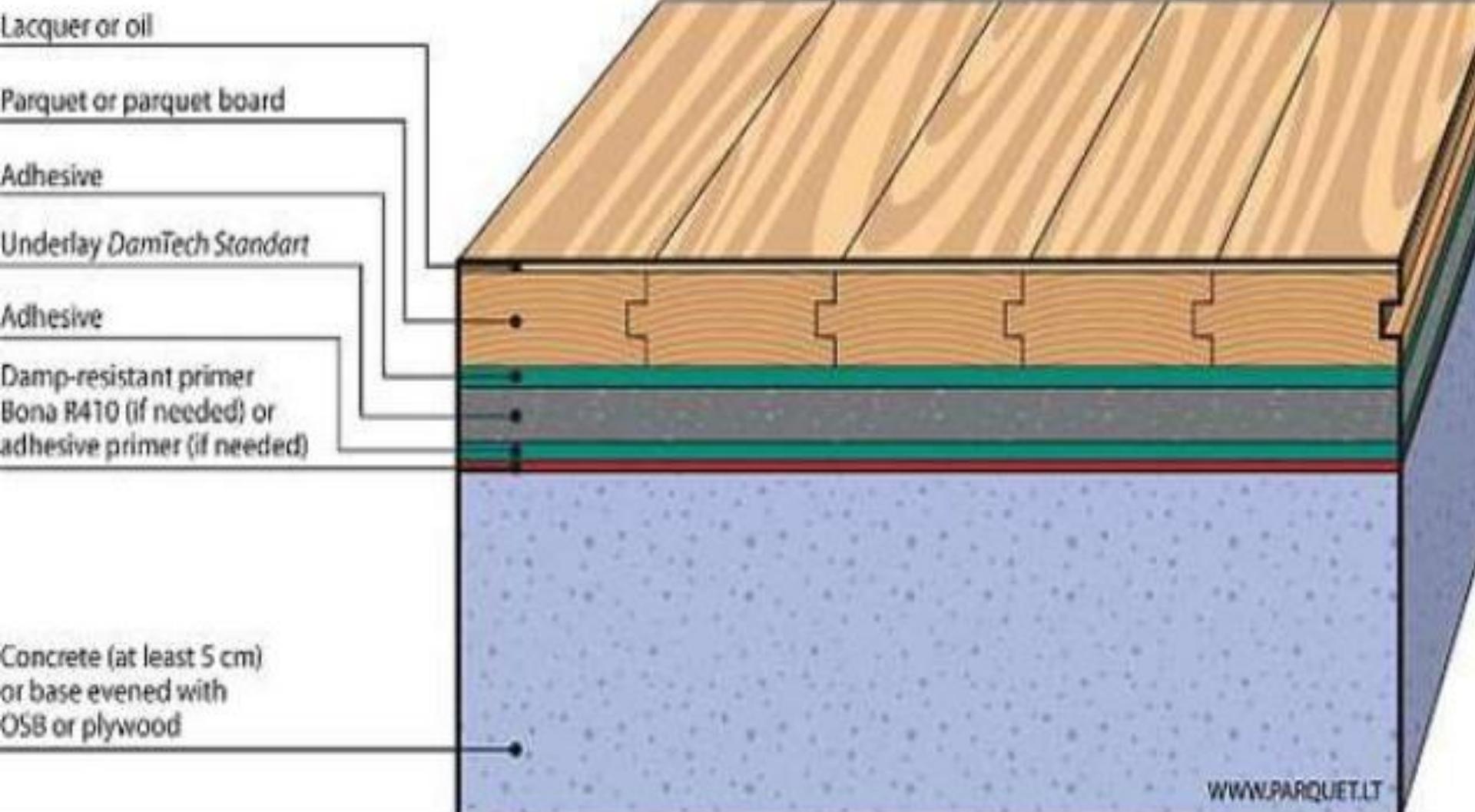
Wood floors can be divided into three groups- the traditional wooden floors, the woodblock floors and parquet floors.

Wood block and parquet floors can be used for light traffic and are used only in special places. The work should be carried out by experience workmen. The work using thick pieces of wood is called woodblock flooring and that using thin pieces of wood of maximum thickness of 10mm is called parquet flooring.

Traditional wooden floors are laid by wooden boards fixed on main beams and joists. As good timber is very costly and difficult to get, such floors are not common nowadays. Wood flooring on top of concrete flooring is quite often used in high class buildings for drawing rooms, reception halls, dancing halls etc.

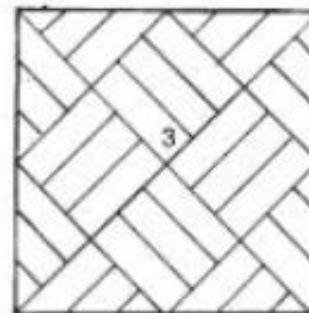
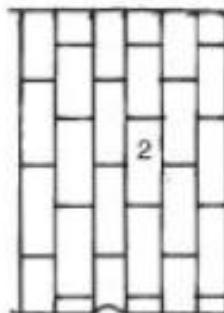
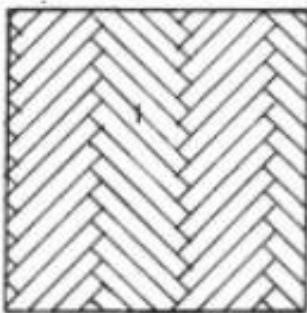
INSTALLATION OF WOODEN FLOORING

Construction of Wooden Floors Layed on *DamTec Standart* Underlay

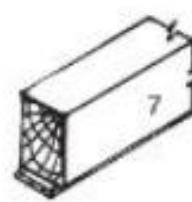
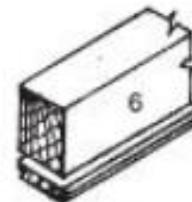
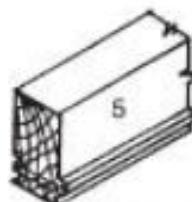
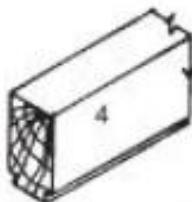


FLOOR SYSTEMS

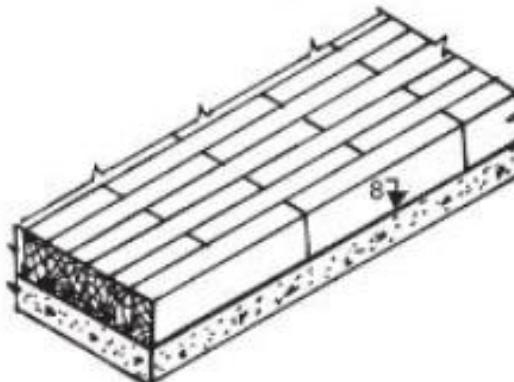
WOOD FLOORS



(a) Some patterns of laying wood floors



(b) Details of interlocking of blocks at base



(c) Method of fixing woodblock to concrete floor showing penetration of bitumen into dovetail grooves

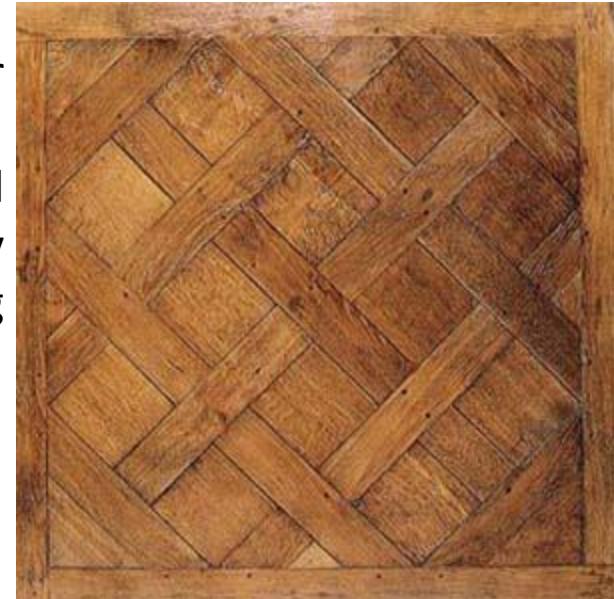
Fig. 19.1 Woodblock floors: 1. Herring bone pattern, 2. Brick pattern, 3. Square basket weave pattern, 4. Dovetailed grooves at base, 5. Tongue and grooved above base, 6. Dovetail groove above base, 7. Tongue at the ends, (8) Hot bitumen @ 2.45 kg/m^2 .

FLOOR SYSTEMS

WOOD FLOORS

Parquet is a geometric mosaic of wood pieces used for decorative effect in flooring.

Parquet patterns are often entirely geometrical and angular—squares, triangles, lozenges—but may contain curves. The most popular parquet flooring pattern is herringbone.



Parquet flooring

- Wooden block/ Parquet flooring is used for auditoriums, dance halls, gymnasium floors etc.
- In this flooring wooden blocks are supported on sub-floor and their thickness does not exceed 10mm.
- There are various types of parquet floors including very thin veneers of treated wood and plastics with wood like appearance. These are usually stuck to a concrete or any other dry surfaces by means of special glues in various patterns.
- One of the prime requirements for sticking these thin pieces to the flooring material is that the surface on which it is to be stuck should be dead level with no level differences.

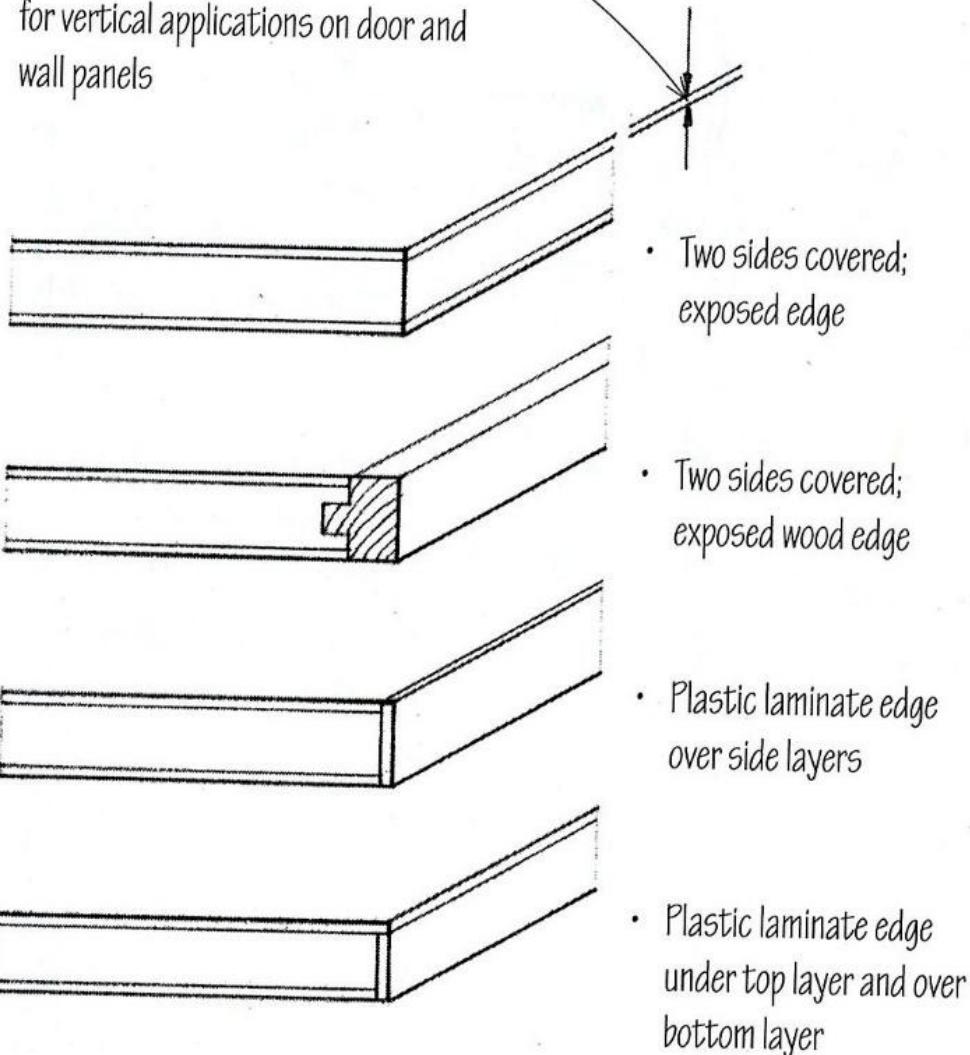
LAMINATES

Plastic laminate is a hard surfacing material consisting of superposed layers of kraft paper, foil, printed paper, wood veneer, or fabric impregnated with melamine and phenolic resins, fused together under heat and pressure. Plastic laminates provide a durable, heat- and water-resistant surface covering for countertops, furniture, doors, and wall panels. They may be applied to smooth plywood, hardboard, particleboard, and other common core materials. They may be bonded with contact adhesive in the field or with thermosetting adhesive, under pressure, in the shop.

- Formica is a trademark for a brand of plastic laminate.
- Plastic laminate surfaces with tight rolls and bends should be postformed during manufacture and bonded with thermosetting adhesive. Postformed plastic laminate $\frac{1}{20}$ " (1.2 mm) thick may be bent to a radius as small as $\frac{3}{4}$ " (19). Plastic laminate edge banding may be bent to a radius of 3" (75) or smaller if heated.

LAMINATES

- $\frac{1}{16}$ " (2) thick high-pressure laminate for horizontal applications on countertops and tabletops
- $\frac{1}{32}$ " (1) thick low-pressure laminate for vertical applications on door and wall panels



Edge Treatments for Plastic-Laminate-Faced Panels