PAINTING, VARNISHING AND DISTEMPERING

- Final finishing of all surfaces such as walls, ceilings, woodwork, metalwork, etc,
- According to the nature of the surface and the finishing required, the surface should be coated with paint or varnish or distemper etc.

PAINTING

The paints are coatings of fluid materials and they are applied over the surfaces of timber and metals**.**

Objects of painting a surface:

- It protects the surface firm weathering effects of the atmosphere and actions by other liquids, fumes and gases.
- It prevents decay of wood and corrosion in metal.
- It is used to give good appearance to the surface
- The decorative effects may created by painting and the surface becomes hygienically good, clean, colourful, and attractive.

Characteristics of an ideal paint:

Possess a good spreading power i.e. maximum area of the surface should be covered by minimum quantity of the paint.

- Fairly cheap and economical.
- Easily and freely applied on the surface.
- Dries in reasonable time and not too rapidly. Colour is maintained for a long time.
- Should form a hard and durable surface.
- Should not affect health of workers during its application.
- Should not be affected by weathering actions of the atmosphere. Possess attractive and pleasing appearance.

- Should not show cracks when the paint dries.

When applied on the surface, the paint should form a thin film of uniform nature.

Types of paints:

- Aluminium paints
- Anticorrosive paint
- Asbestos paint
- Bituminous paint
- Cellulose paint
- Cement paint
- Colloidal paint
- Emulsion paint
- Enamel paint
- Graphite paint
- Oil paint
- Plastic paint
- Silicate paints
- Synthetic rubber paint

ALUMINIUM PAINTS

- The very finely ground aluminium is suspended in either quick-drying spirit varnish or sow-drying oil varnish as per requirement.
- The spirit or oil evaporates and a thin metallic film of aluminium is formed on the surface.
- Widely used for painting gas tanks, hot water pipes, marine piers, oil storage tanks etc.,

Advantages:

- Visible in darkness.
- Resists heat to a certain degree.
- Surfaces of iron and steel are better protected from corrosion by this paint than any other paint.
- Possesses a high covering capacity. A litre of paint can cover an area of about 200 m^2
- Gives good appearance to the surface.
- Impervious to the moisture.
- Possesses high electrical resistance.

ANTICORROSIVE PAINT

Anti-corrosion refers to the protection of metal surfaces from corroding in high-risk (corrosive) environments.[1]

When metallic materials are put into corrosive environments, they tend to have chemical reactions with the air and/or water. The effects of corrosion become evident on the surfaces of these materials. For example, after putting the iron into a corrosive atmosphere for an extended period, the iron starts rusting due to oxygen interaction with water on the iron's surface.[2]

Metal equipment lacking any preventive (anti-corrosive) measures, may become rusted both inside and out, depending upon atmospheric conditions and how much of that equipment is exposed to the air. There are a number of methods for preventing corrosion, especially in marine applications. Anti-corrosion measures are of particular importance in environments where high humidity, mist, and salt are factors

Essentially consists of oil and a strong drier. A pigment such as chromium oxide or lead or red lead or zinc chrome is taken and after mixing it with some quantity of very fine sand, it is added to the paint.

Advantage:

- Cheap
- Lasts for a long duration
- Appearance of the paint is black.

ASBESTOS PAINT

Peculiar type of paint and it is applied on the surfaces which are exposed to the acidic gases and steam.

BITUMINOUS PAINT

Prepared by dissolving asphalt or mineral pitched or vegetable bitumen in any type of oil or petroleum

Variety of bituminous paints is available.

Paint presents a black appearance and it is used for painting ironwork under water.

VARNISHING

Varnish is a transparent, hard, protective finish or film that is primarily used in wood finishing but also for other materials. **Varnish** is traditionally a combination of a drying oil, a resin, and a thinner or solvent.

- Varnishes are transparent or nearly transparent solutions of resinous materials and they are applied over the painted surfaces.
- Varnish is used to indicate the solution of resins or resinous substances prepared either in alcohol, oil or turpentine.

Main objects of applying varnish on a wooden surface

- Brightens the appearance of the grain in wood
- Renders brilliancy to the painted surface
- Protects the painted surface from atmospheric actions.
- Protects the unpainted wooden surfaces of doors, windows, roof trusses, floors, etc.. , from the actions of atmospheric agencies.

Characteristics of an ideal varnish

- Should render the surface glossy.
- Should dry rapidly and present a finished surface which is uniform in nature and pleasing in appearance.
- Colour of varnish should not fade away when the surface is exposed to the atmospheric actions.
- Protecting film developed by varnish should be tough, hard and durable. Should not shrink or show cracks after drying.

Types of Varnishes

- Oil varnishes
- Spirit varnishes
- Turpentine varnishes
- Water varnishes

Fig. Varnish on wood

OIL VARNISHES

- Linseed oil is used as solvent in this type of varnish.
- Hard resins such as amber and copal are dissolved in linseed oil and if the varnish is not workable, a small quantity of turpentine is added.
- Oil varnishes dry slowly, but they form hard and durable surface. In fact, these are the hardest and the most suitable varnishes.
- Specially adopted for exposed works which required frequent cleaning
- Used on caches and fittings in houses.
- Methylated spirits of wine are used as solvent in this type of varnish.
- The resins are of soft variety such as lac or shellac.
- The spirit varnishes dry quickly.
- But they are not durable and are easily affected by weathering actions.
- They are generally used for furniture.
- The French polish is a variety of this class of varnish and the desired colouring tinge can be obtained by addition of suitable colouring pigment.
- The French polish is one of the finest finishes for ornamental furniture prepared from superior quality of wood.

TURPENTINE VARNISHES

Used as solvent in this type of varnish.

The reins adopted are of soft variety such as gum dammar, mastic and rosin.

These varnished dry quickly and possess light colour.

Not durable and tough as oil varnishes.

WATER VARNISHES

Shellac is dissolved in hot water and enough quantity of either ammonia or borax or potash or soda is added such that shellac is dissolved.

Theses varnishes are used for varnishing g maps, pictures etc.

They are also used for delicate internal work and as covering for wall paper.

DISTEMPERING

Distemper is a term with a variety of meanings for paints used in decorating and as a historical medium for painting pictures, and contrasted with tempera. The binder may be glues of vegetable or animal origin (excluding egg). Soft distemper is not abrasion resistant and may include binders such as chalk, ground pigments, and animal glue. Hard distemper is stronger and wear-resistant and can include case in or linseed oil as binders

- Applied over the plastered surfaces.
- Object of applying distemper to the plastered surfaces to create a smooth surface
- Available in market under different trade names.
- Cheaper than paints and varnishes.
- They present a neat appearance.
- Available in a variety of colours.

Properties of distempers

- On drying, the film of distemper shrinks, hence it leads to cracking and flaking if the surface to receive distemper is weak.
- Coatings of distemper are usually thick and they are more brittle than other types of water paints.
- The film developed by distemper is porous in character and it allows water vapour to pass through it. Hence it permits new walls to dry out without damaging the distemper film.
- They generally light in colour and they provide a good reflective coating.
- They are less durable than oil paints.
- They are treated as water paints and they are easy to apply.
- They can be applied on brickwork, cement plastered surface, lime plastered surface, insulating boards, etc.
- Exhibit poor workability
- They prove to be unsatisfactory in damp locations such as kitchen, bathroom, etc.

PROOFING OF DAMPNESS

Damp proofing is defined by the American Society for Testing and Materials (ASTM) as a material that resists the passage of water with no hydro-static pressure and *waterproof* as a treatment that resists the passage of water under pressure.[1] Generally damp proofing keeps moisture out of a building where vapor barriers keep interior moisture from getting into walls. Moisture resistance is not necessarily absolute: it is usually defined by a specific test method, limits, and engineering tolerances.

Damp proofing is accomplished several ways including:

- A **damp-proof course** (DPC) is a barrier through the structure by capillary action such as through a phenomenon known as rising damp. Rising damp is the effect of water rising from the ground into your property.[2] The damp proof course may be horizontal or vertical.[3] A DPC layer is usually laid below all masonry walls, regardless if the wall is a load bearing wall or a partition wall.
- A **damp-proof membrane** (DPM) is a membrane material applied to prevent moisture transmission. A common example is polyethylene sheeting laid under a concrete slab to prevent the concrete from gaining moisture through capillary action.[4] A DPM may be used for the DPC.
- **Integral damp proofing** in concrete involves adding materials to the concrete mix to make the concrete itself impermeable.[3]
- **Surface coating** with thin water proof materials for resistance to non-pressurized moisture such as rain water or a coating of cement sprayed on such as shotcrete which can resist water under pressure.[3]
- **Cavity wall construction**, such as rainscreen construction, is where the interior walls are separated from the exterior walls by a cavity.[3]

- Damp proofing is the method adopted to prevent the entry of dampness into a building, so as to keep them dry, habitable and safe.
- Provision of damp proofing courses prevents the entry of moisture form walls, floors and basement of a building.

Causes of dampness

- Entry of moisture from the ground
- Entry of rain water
- Exposed tops of walls
- Deposition of atmospheric moisture on walls, floors, and ceilings
- Location
- Orientation
- Workmanship

Effects of dampness

- Creates unhealthy conditions for those who occupy it. Corrosion of the metals used in building construction is evident.
- Formation of unsightly patches on the wall surfaces and ceilings. Formation of dry-rot leading to the decay of timber in a damp atmosphere. Deterioration of electrical fittings.
- Floor covering materials are seriously damaged.
- Acceleration of the growth of termites. Softening and crumbling of the plaster.

Requirement of an ideal material for damp-proofing

1. Damp-proof course should remain effective during the life of the building. Hence the material should be durable.
2. Should remain steady and should not allow any movement in itself.
3. Should be impervious
4. Material should safely resist the load coming on it.
5. Should be strong enough to undergo some structural movement without fracture.

Materials used for damp-proofing

(a) **Hot bitumen-** it is flexible and should be applied with a minimum thickness of 3mm

(b) **Mastic asphalt –** it is a semi-rigid material and it forms an excellent impervious layer. It is very durable but can withstand only slight distortion.

(c) **Bituminous felts –** it is also flexible and it is available in rolls of normal width. This can accommodate slight movements. It is liable to squeeze out under pressure.

(d) **Metal sheets of lead, copper, and aluminium.**

- Metal sheets can also be used as damp proofing material.
- These metal sheets are flexible and do not squeeze out under pressure.
- The surface of lead coming in contact with lime and cement will be corroded and hence it should be protected with bitumen.
- Aluminium sheets should also be protected with bitumen but copper does not required any protective coatings.

Methods of Damp Proofing

1. If the level of the ground floor is in level with the ground surface or just above it, the damp proofing course is provided as shown in Figure A.

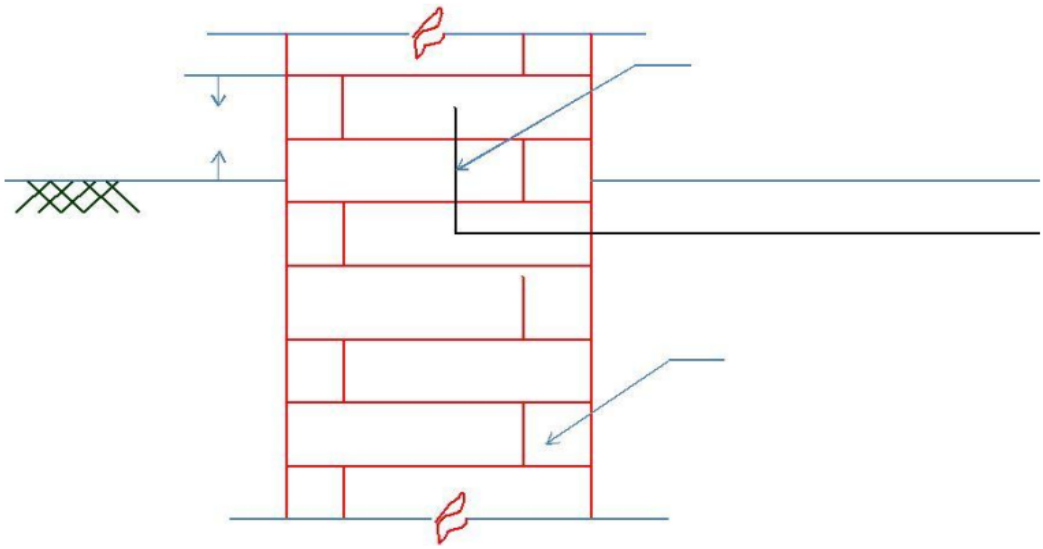


Fig: A. Damp proofing for ground floor in level with ground surface

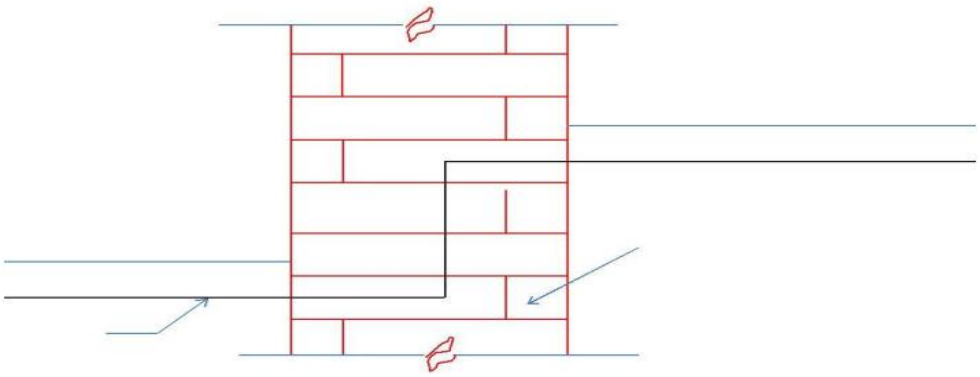


Fig: B Damp proofing for floors at different levels

If two ground floors are at different levels, D.P.C. is provided as shown in Figure B.

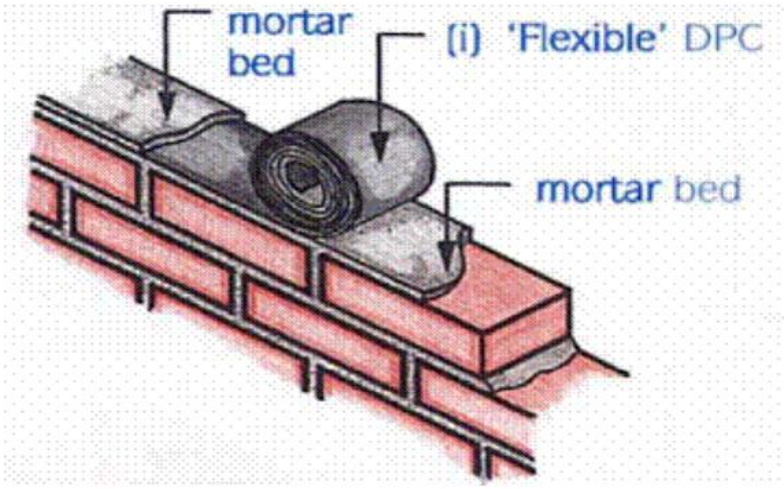


Fig. Flexible Damp proofing

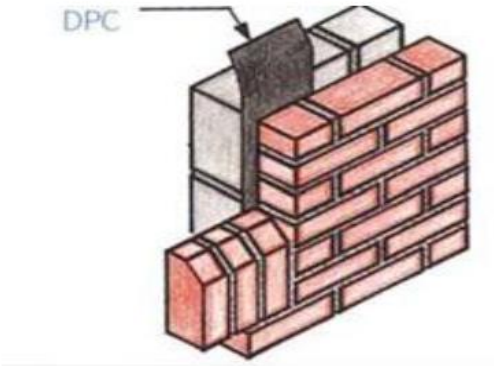


Fig. DPC in walls

For sunk slabs and terrace floor to make surface water proof use Bostik Boscocrete and Brushbond

For leak arrest use Renderoc plug

In water tank, septic tank and roof concrete use Conplast WP 90

Fro rebonding of concrete with old concrete work use Nitobond EP

To fix new lintel rod on old wall or concrete use Lokfix

For crake on wall surface use Renderoc CS and Dachflex

PROOFING FOR FIRE

Introduction

- Buildings are made up of different components.
- Some of them are designed to resist fire so as to prevent spread of fire and protect people and their properties from the effect of fire.
- Unauthorized alterations to these building components may reduce their fire resisting property and thus the fire safety of the building.
- This leaflet introduces the common types and functions of fire resisting construction in a building which should not be altered without proper professional advice and the approval of the Building Authority.

Fireproofing is rendering something (structures, materials, etc.) proof against fire, or incombustible; or material for use in making anything fire-proof.[1] It is a passive fire protection measure. "Fireproof" or "fireproofing" can be used as a noun, verb or adjective; it may be hyphenated ("fire-proof")

Preventive maintenance

- Building owners should keep the fire resisting components under proper maintenance.
- If unauthorized alteration or defective fire resisting construction is found, the owner, the occupant, the owner's corporation or the management company should enlist the service of an Authorized Person to advise on the conditions, propose remedial work, and apply for permission from the Building Authority as necessary.

- A list of Authorized Persons can be viewed at the Buildings Department and any District Offices. Authorized Persons include architects, engineers and surveyors registered under the Buildings Ordinance.

Among the conventional materials, purpose-designed spray fireproofing plasters have become abundantly available the world over. The inorganic methods include:

- Gypsum plasters
- Cementitious plasters
- Fibrous plasters

Common Fire Resisting Construction and Deficiencies

Removal of fireman's lift lobby:

Fireman's Lift Lobby- It protects the firemen using the lift. No alteration should be made in the lobby wall and door

Services within staircase enclosure without proper protection

Cable and Duct Protection - Other than firefighting equipment and installations, staircases should not accommodate electrical cables, air ducts or similar services.

Unprotected electric meter room

Special Hazard Rooms - Fire resisting enclosure protects fire spread from such rooms. No unprotected opening should be made in the enclosure.

Damaged / missing fire doors

Fig. importance of firepoofing

Fire doors- they protected the staircase from fire and smoke, and should have adequate fire resisting property and self-closing device to keep them in a closed position.

Unauthorized opening in fire resisting wall and the installation of exhaust fan Staircases, Walls and Floors - They prevent the spread of fire and smoke from one part of a building to another. No opening should be made in these walls and floors. No opening or alteration should also be made in the fire resisting walls and doors for protected lobby.

Door of inadequate fire resistance opens onto common corridors

Common Corridors - Walls and doors enclosing internal corridors are required to have a specified fire resisting property and no holes are allowed, otherwise, fire and smoke may pass through these holes blocking the access to the exits staircase.

Fire resisting building materials

- Brick
- Gypsum
- Stucco
- Concrete
- Fire resisting glass for windows

Bricks:

As bricks are made in a fire kiln, they're already highly resistant to fire. However, it's true that individual bricks are much more fire-resistant than a brick wall. Brick is commonly cited as among the best building materials for fire protection. Depending on the construction and thickness of the wall, a brick wall can achieve a 1-hour to 4-hour fire-resistance rating.

So, although some materials are more fire-resistant than others, several factors might influence a builder's decision, including cost effectiveness, ease of installation and climate.

Gypsum:

Gypsum board is the most commonly used fire-resistant interior finish. Gypsum board, also known as dry wall consists of a layer of gypsum sandwiched between two sheets of paper. Type X gypsum board is specially treated with additives to further improve its fire-resistive qualities.

The paper on the exterior of the type X gypsum board burns slowly and doesn't contribute to fire spread. In addition, gypsum board has a noncombustible core that contains chemically combined water (in calcium sulfate). When affected by fire, the first thing that happens is that this water comes out as steam. This effectively impedes the transfer of heat through the gypsum board. And even after the water is gone, the gypsum core continues to resist fire penetration for a time. Builders often use multiple layers of gypsum board to increase the fire-resistance rating.

Stucco:

Stucco is a plaster that has been used for centuries for both artistic and structural purposes. Modern stucco is made of Portland cement, sand and lime, and it serves as an excellent and durable fire-resistant finish material for buildings. It can cover any structural material, such as brick or wood. It usually consists of two or three coats over metal reinforcing mesh. A one-inch (2.54-centimeter) layer of stucco can easily lend a 1-hour fire rating to a wall.

Roof eaves (overhangs) are a fire hazard, but they can be protected with an encasement of fire-resistant material. Stucco is often recommended as one of the best materials for boxing in hazardous eaves.

Concrete:

Concrete, one of the most common building materials, is also an excellent fire resistant material. It is noncombustible and has low thermal conductivity, meaning that it takes a long time for fire to affect its structural, load-bearing ability, and it protects from the spread of fire. It's actually significantly more fire-resistant than steel, and often used to reinforce and protect steel from fire.

Aggregate can make up 60 to 80 percent of the concrete's volume. The exact fire-resistance properties change depending on the type and amount of aggregate used. Natural aggregates tend not to perform as well. Moisture in the aggregate can expand when heated, causing concrete to sinter after long exposure.

Fire resisting glass for windows:

Windows, important for visibility and light, can nonetheless be a fire hazard. Even before a window is in direct contact with flames, the intense heat of a nearby fire can cause the glass to break. And a broken window allows flames to enter a building easily. In addition, the heat from a fire outside might be enough to simply ignite flammable items inside a home without direct contact.

To protect your house, consider installing fire-resistant windows. One example is dual-paned glass windows. which, in addition to providing energy efficiency, also double the time it would take for fire to break the windows. The outer layer will break first before the inner layer. Tempered glass, which is heat-treated to make it about four times stronger than regular glass, is also effective.

Though they don't provide visibility, glass blocks are extremely fire-resistant while still providing light. Perhaps the best is wired glass, which is tempered glass with metal wire reinforcement. Doors that require fire resistance but also visibility often incorporate wired glass windows.

It's also wise to note the importance of window framing. Steel framing offers the best fire protection, followed by wood and aluminum. Vinyl is the least effective.

ANTI TERMITE PROTECTION

Termite resistant materials

- Steel, aluminium or other metals
- Concrete
- Masonry
- Fibre-reinforced cement
- Naturally termite resistant timbers
- Treated termite resistant timbers.

The use of termite resistant materials must be backed up by regular inspections and a maintenance program.

Therefore provision must be made during construction to allow space for inspection under the floor of the house.

This will include the use of ant caps which aid in the detection of termites.

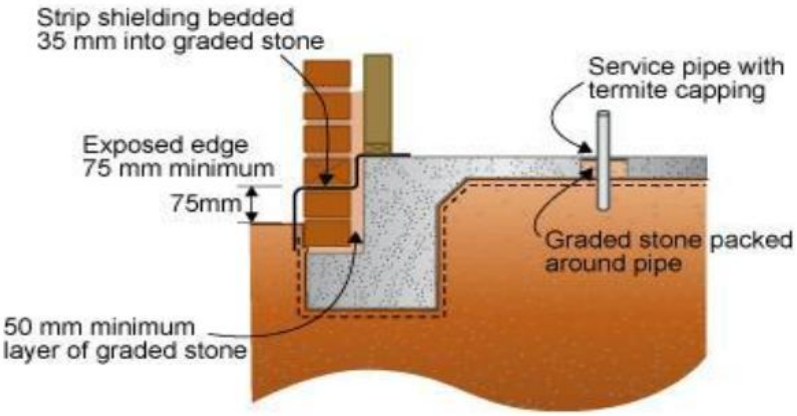
Concrete slabs - A termite barrier

Concrete slabs form part of the termite barrier. However, termites may be able to access timber framing at the edges of the slab, around service pipes and box-outs for plumbing fixtures or through naturally occurring cracks in the concrete.

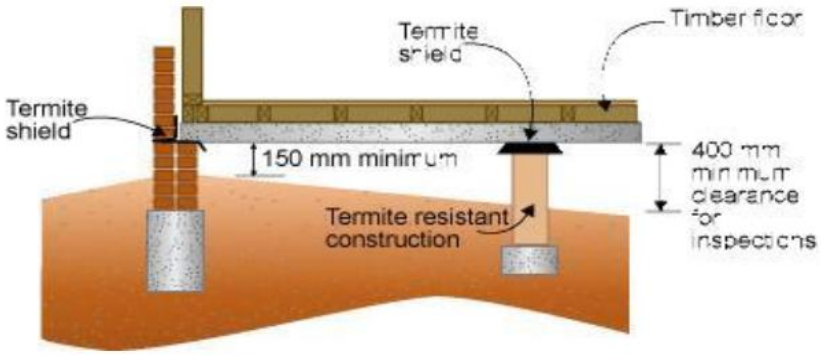
The majority of termite infestations occur at the perimeter of the building. Leaving an exposed edge to the perimeter of a concrete slab allows easy detection of the presence of termites.

Concrete slabs - Preventing termite entry with graded stone

Graded stone may be used to prevent termite entry. The stone is finely crushed granite of a size difficult for termites to tunnel through. The graded stone is placed at likely entry points for termites, such as service penetrations and the perimeter



Suspended timber floors - Protection from termites



Timber floors can be protected from termites by providing metal shields that force the termites out into the open for easy detection. Adequate space must be provided under the floor to allow for inspection.

Fig. Wall Cement mortar plastering

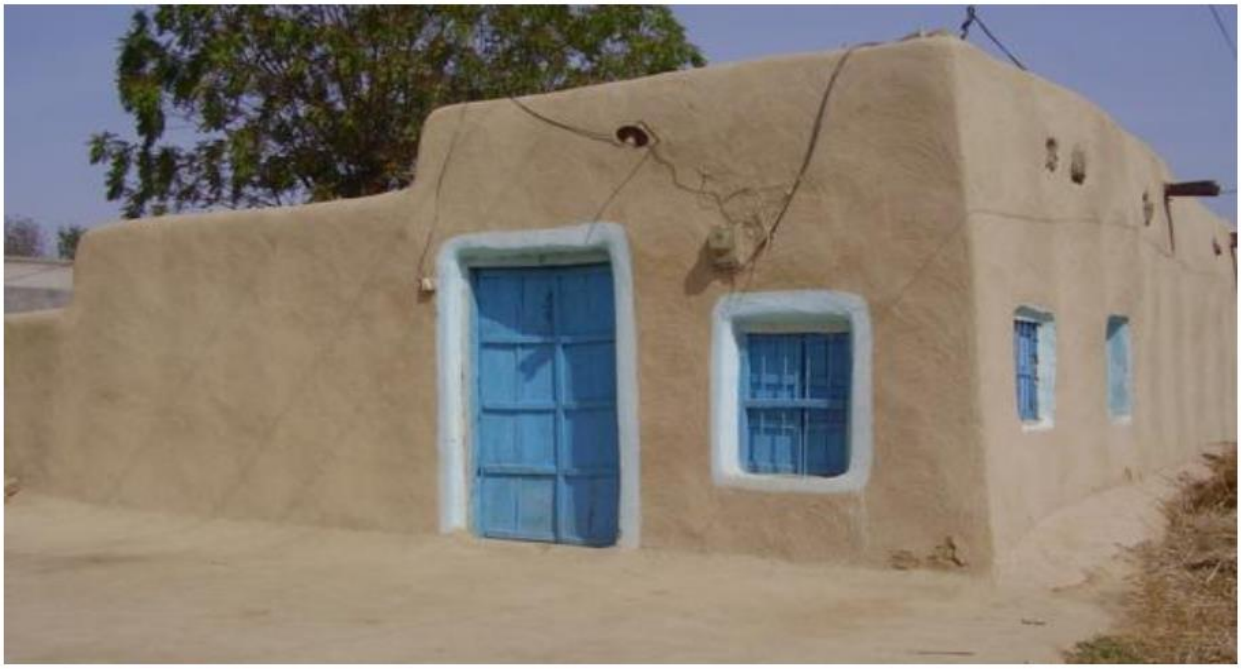


Fig. Mud plastered surface

Fig. Water proofing plastering

Fig. Distemper colour shades