

AR 17-53 BUILDING MATERIALS AND CONSTRUCTION - IV

MODULE I - WALL FINISHES (12 hrs)

MODULE -I

- **Plaster**: Lime plaster and gypsum plaster. Fire resistant plaster, X-Ray shielding plaster and acoustic plaster. Plaster over masonry and ceiling.
- **Paints and varnish**: Characteristics of an ideal paint and varnish. Classification – various types of paints. Painting process. Defects in painting works. Process of varnish.
- **Wall cladding** : stone cladding, tile cladding, Wooden cladding and metal cladding. Stucco finish and other finishes.
- **Sketches** : Stone cladding, Metal cladding

PAINTING



PAINTING AND DECORATION

Paints are coatings of fluid materials which are applied as a final finish to surfaces like walls, ceiling, wood and metal works.

OBJECTIVES OF PAINTING

- To protect the surfaces from weathering effects of the atmosphere
- To **protect** the decay of wood and corrosion of metals
- To provide a **decoartive finish** to obtain a clean, colorful, and pleasing surface.
- To provide a decorative finish and to obtain a clean, hygienic and healthy living atmosphere.

Characteristics of a good paint

- A good paint should possess high spreading power and should be durable, tough and resistant to wear on drying. It should work smoothly and freely and should not crack, fade or change colour.
- Its surface should become dry in 9 hours and hard enough to take another coat in 24 hours.
- We should be able to spread it into a very thin layer and it should provide a smooth and pleasing appearance.

CONSTITUENTS OF A PAINT

- A Paint is generally made up of following constituents:
- 1.BASE- A base is a solid substance in a form of fine powder, forming the bulk of a paint.
- It is generally a metallic oxide. A base in a paint provides opaque coating to hide the surface to be painted.
- Commonly used Bases are White Lead, Red Lead, Oxides of Iron and Zinc.
- 2.BINDER– These are liquid substances which hold the different in gradients of a paint in liquid suspension.
- It makes the paint to spread evenly on the surface. Commonly used Binders are Tug oil, Linseed oil, poppy oil.
- 3.DRIER– Driers are used to accelerate the process of drying and hardening by extracting oxygen from atmosphere and transferring it to the Binder.

CLASSIFICATION & TYPES OF PAINTS

CLASSIFICATION BASED ON BINDERS:

- Oil Paints
- Paints based on non-oil resins
- Cellulose paints
- Water based Paints
- Miscellaneous paints

CLASSIFICATION BASED ON ULTIMATE USE:

- General purpose paints, including primers, under-coat paint and finishing coat paints.
- Acid and alkali resistant paints
- Fire-resistant paints
- Fungicidal paints
- Miscellaneous paints

PAINTING - WALL

- One is that you can use distemper paint or you can go for emulsions.
- Both have their advantages and disadvantages when it comes to painting the house.
- Distemper is also known as cement paint. This is called so because such kind of paint can be applied directly on cement walls without any other coating on them.
- They are a cheaper option and they stay good for more than 5 years. Distempers are used for both interior and exterior walls. They usually need two coatings.
- On the other hand, if you settle for emulsions, then you can have smoother finish for your walls. This is oil based and it gives a shine to the walls.
- Being better in quality, emulsions are a little costlier as compared to distemper paints.
- They also last for about 10 years which is very beneficial. These work well in a single coat and are somewhat washable too.

MATERIALS FOR FINISHES

- A painting system for a given material usually consists of:- primer, undercoat & finish coat
- **Paint Primer** Priming ensures better adhesion of paint to the surface, increases paint durability, and provides additional protection for the material being painted.
- Adheres well to the background and evens out the surface porosity. With ferrous metals, controls rust. Care must be taken to choose suitable primer for the material to be covered.
- **Undercoat** Adheres to the primer, builds up the paint thickness and obliterates surface irregularities. The undercoat should bring the surface to a suitable colour for receiving the finishing coat. Two coats of undercoat are usually required.
- **Finish** Adheres to the undercoat and provides a protective layer, colour and surface texture.

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- The primer must be applied before painting either in outside building's components or inside partitions and walls.
- It is really important to prepare the surface by sanding it before applying any coat of primer paint.
- The most important function of the primer is that it will assure that the surface being painted will last longer and the final product can be more eye-appealing.

MATERIALS FOR FINISHES

Distempers :

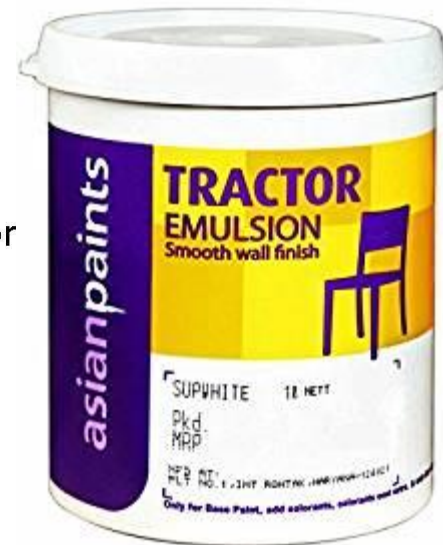
- Distempers are durable and economical water based paints. The major constituents of distemper include colouring agents, as well as chalk and lime.
- They have been the main painting substance for decades and still are excellent budget painting solutions. Even the distempers now used are more varied and have special properties.

Emulsion Paint :

- These are the superior quality of paint formed by mixing oil/water and an emulsifying agent to prevent the combination separating.
- They have much better ease of application, are washable and have a greater overall decorative appeal. Not only do they have higher coverage than enamel and distempers, they are mostly washable and can be easily applied on concrete and stucco surfaces.
- As per the interior and exterior painting requirements both interior and exterior emulsion paints exist.

Enamel Paints :

- Enamels are hard, washable and usually glossy paints. They can be oil based or alkyd based and come in several sheens, from eggshell or low-luster to satin, semi-gloss and high-gloss.
- They find application not only on metal surfaces but also on interior walls and wooden surfaces.



DISTEMPERING

- Both Emulsions & Distempers have a few similarities as both are durable, and offer a wide range of shades to choose from.
- But some clear differences are that Emulsion paints give a silky and smooth finish to your walls, are more durable and long lasting, in addition to offering a wider range of shades to choose from.
- They are cheaper than paints and varnishes and they present a neat appearance. They are available in a variety of colors.

PROPERTIES OF DISTEMPERS

- On drying, the film of distemper shrinks. Hence, it leads to cracking and flaking, if the surface to distemper is weak.
- The coating of distemper is 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 are generally light in colour and they provide a good reflective coating.
- They are less durable than oil paints.
- They are treated as the water paints and they are easy to apply.
- They can be applied on brickwork, cement plastered surface, insulating board, etc.
- They exhibit poor workability.
- They prove to be unsatisfactory in damp locations such as kitchens and bathrooms.

DISTEMPER

- The basic constituent of distemper is **chalk, lime** and **water**. Distemper is also known as cement paint.
- This is called so because such kind of paint can be applied directly on cement walls without any other coating on them it's not required primer.
- They are a cheaper option and they stay good for more than 5 to 6 years.
- Distempers are used for both interior and exterior walls. They usually need two coatings. There are three types of distemper available in market Acrylic Distemper, Synthetic Distemper and UNO Acrylic Distemper.

PROS OF DISTEMPER PAINT

- Distempers doesn't need any primer quoting can be directly applied on cement surface without any preparations.
- They are less expensive compared to other alternatives.
- They stay long and up to three to five years.
- They have a distinctive smell.
- They don't dry or crack in sunlight.

CONS OF DISTEMPER PAINT

- Their quality will not be great when compared to other paints.
- Distemper paint peels off when wet.
- It's not fully washable.
- Distemper colour will fade time being quickly than emulsion.

EMULSION

- Emulsion Paint typically consists of pigment, resin, solvent and additives.
- Emulsion is water based paint. As compared to oil based paint, working with emulsion paint is far better. Many home owners find it efficient and suitable for their home.
- There are many benefits of applying emulsion on walls like it's easy to clean and maintain and it avoids the potent odors that comes from the oil based paints.

PROS OF EMULSION PAINT

- Emulsion stays longer then Distemper paint up to four to five years.
- Emulsion paint has attractive smell.
- They don't dry or crack in sunlight.
- The quality and finishing is better while compared to Distemper paints.
- Emulsion paint won't peels off when wet.
- It's washable and colour won't be fading in time being.

CONS OF EMULSION PAINT

- Emulsion paints are expensive compared to Distemper Paints.
- Emulsion need primer and putty quoting before applying on wall.

DIFFERENT TYPES OF FINISHES

- Basically, the emulsion paint comes in three different types of finish:
- Vinyl soft sheen
- Vinyl matte
- Vinyl silk
- Each and every type of emulsion finish has its own advantage. The matte emulsions helps in hiding the imperfection on the walls.
- Vinyl soft sheen emulsion helps in offering longer durability. It is among the list of highly durable material that is efficient in handling high moisture areas as compared to the other two.
- But when it comes to the glossiness, it tends to increase and grab the attention over the imperfection on the walls.

WHITE WASHING AND COLOUR WASHING OF NEW WALLS

- Traditionally, a lime wash is done to coat the walls after the cementing is complete, but with the arrival of an economic and affordable source of white cement, these traditions are changing. And this is with good reason as well, white cement offers the surfaces multiple benefits, the most important one being the durability.

PREPARATION OF THE SURFACE

- New surfaces shall be thoroughly cleaned of mortar or other splashes. Any damage to the plaster shall be made good to match the adjacent surfaces and the surface brushed clean of dust and dirt

PREPARATION

- Lime used for white or colour washing shall be fresh burnt shell like.
- When thoroughly mixed, it shall be strained through a clean coarse cloth.

WHITE WASHING

- White wash is prepared from fresh burnt shell lime or pure stone lime mixed with water
- White wash is applied to specified number of coats with a jute brush – usually 3 coats for new work

COLOUR WASHING

- A colour washing is usually prepared by adding the necessary coloring pigments in suitable quantities to the screened whitewash or liquid mixture of whitewash.
- The color wash is applied in exactly similar manner as white wash

FINISHING WORKS - PAINTING

1. Pre-painting work
2. Surface preparation
3. Painting

1.PRE-PAINTING WORKS

- Patching
- Sanding
- Cleaning
- Priming

2.SURFACE PREPARATION

- Allow newly plastered surface to mature for a period of at least 6 months before painting.
- Rectify existing surface problems such as dampness, cracks etc. before actual painting process.
- Check for hand prints, greasy fingerprints, algae as well as dirt and stained marks.
- Use a scraper, putty knife or scrub brush to remove any dirt, grease, rust, or flaking.
- Fill in the holes, cracks and joints with plaster.
- Clean and dry the surface.
- Make sure the area to be painted is well ventilated as well as free of dust.
- As far as possible, don't paint under much humid conditions.

3.PAINTING

- Objects to be Painted
 1. Interior walls
 2. Exterior Walls
 3. Metal Surfaces
 4. Wooden Surfaces

INTERIOR WALLS

- Apply a coat of Wall Primer (water thinnable) on new surfaces.
- Fill and level the minor undulations of wall by applying putty.
- In case of major undulations on the wall surface, POP (Plaster of Paris) work needs to be carried out.
- Ensure that the surface is uniformly smooth by sanding after POP or putty work.
- One liberal coat of Wall Primer (solvent thinned or water thinned) is recommended on puttied areas before the application of top coat.
- The primer should be allowed to dry for 10 - 12 hours.
- If the primer coat is not applied over the puttied areas, there can be a patchy appearance of the top coat.
- Avoid application of putty or filling compound while painting exterior surfaces.
- Fill up cracks with a 1:3 (by volume) cement and sand mixture.

DEFECTS IN PAINT WORK – REFER ASSIGNMENT

- The defects which are commonly found in paint work are as follow.
- **1. BLISTERING**
- Formation of bubbles like shapes on the painted surface is known as blistering. The primary cause of this defect is water vapor. When water vapor trapped under the paint layer, it creates bubbles under the film of paint.
- Blistering Defect of Paint
- **2. BLOOMING**
- Formation of dull patches on the painted surface is known as blooming. The primary cause of this defect is poor quality of paint and improper ventilation.
- Blooming Defect of Paint
- **3. FADING**
- When there is a gradual loss of colour from the painted surface, it is known as fading. The main cause of this defect is the reaction of sunlight on pigments of paint.
- Fading Defect of Paint
- **4. FLAKING**
- In this type of defect, some portion of the paint film is not stucked properly with the surface; resulting flaking off of the paint layer. This is cause due to poor adhesion between paint and the surface to be painted.
- Flaking Defect of Paint
- **5. FLASHING**
- Presence of glossy patches on the painted surface is known as flashing. The cause of this defect is mainly due to poor workmanship, cheap paint or weather actions.
- Flashing Defect of Paint

DEFECTS IN PAINT WORK – REFER ASSIGNMENT

- **. GRINNING**

- If the thickness of the final coat of paint becomes very thin, the background can be seen clearly. This is known as grinning. Poor workmanship is the main cause of this defect.

- **7. RUNNING**

- This type of defect is seen when the surface to be painted is very smooth. In case of smooth surface the paint runs back and leaves small areas of surface uncovered.

- Running Defect of Paint**8. SAGGING**

- This type of defect is more prominent when a thick layer of paint is applied on a vertical or inclined surface.

- Sagging Defect of Paint**9. SAPONIFICATION**

- Formation of soap patches on the painted surface is termed as saponification. Chemical action of alkalis is the cause of this defect.

- Saponification Defect of Paint**10. WRINKLING**

- This type of defect is more prominent when a thick layer of paint is applied on a horizontal surface

MATERIALS FOR FINISHES

Metal Surfaces

- Surface should be free from dirt, dust, grease, rust, moisture etc.
- The area which is not to be painted must be covered by a masking tape, paper and/or cloth.
- For best results, allow the primer coat to dry for 6 hours and dry sand paper before application of subsequent coat.
- Allow the surface to dry overnight after application of primer as above.
- Apply top coat using the recommended thinner. For best results, apply two coats allowing 8 hours of drying time between two coats.
- The first coat should be wet sanded with waterproof emery paper grade 400 before applying the second coat.

PAINTING SYSTEM FOR METAL SURFACE



PAINTING SYSTEM FOR METAL SURFACE

- Main Types of Paint Used With Steel
 - Standard primers
 - Specialty paints
 1. Zinc
 2. Epoxy
 3. Polyurethane
 - Standard grey primers are generally provided as alkyd paints.
 - Alkyd primers are usually grey but may also be available in red and white.
 - Contrary to universal alkyd finishes, standard alkyd primers cannot be top coated with high performance paints such as epoxy or polyurethane. However, they can be used in combination with additional coats of alkyd primer, enamel, water-based acrylic paints.

PAINTING SYSTEM FOR METAL SURFACE



Figure 1
Three-coat paint system

Specialty paints

- Finishes other than the standard grey alkyd primers described above are commonly referred to as specialty paints.
- Compared with standard primers, these paints, which require much more care during the application process, are more costly but provide enhanced protection against corrosion.

Zinc

- Zinc rich primers are divided into two categories: organic and inorganic. Both types offer cathodic protection against rust since the zinc, which serves as a "sacrificial metal", acts as an anode to protect the steel from corrosion.

Epoxy

- Epoxy coatings are two-component paints that offer much greater rust protection than standard primers, but less than zinc primers. Epoxy paints, which create a protective barrier that seal the metal surface, are very effective in humid environments such as arenas and pools.

Polyurethane

- Polyurethane paints are usually applied as a finish coat on the zinc primer or epoxy. Several types of polyurethane paints can also be applied directly to steel without the use of primers.

WOOD WORKS - VARNISHING

- Varnish is a solution of resins in alcohol, turpentine or oil.

It is applied on wood surfaces with the following objects

- To intensify the appearance of natural grains in wood.
- To render brilliancy to the painted surface.
- To protect the painted surface from atmospheric action.
- To protect unpainted wooden surfaces of doors, windows, floors, roof trusses etc. from atmospheric action

CHARACTERISTICS OF A GOOD VARNISH

- It should dry quickly.
- The protective film obtained on drying should be hard, tough, durable, and resistant to wear.
- The finished surface should be uniform in nature and pleasing in appearance.
- It should exhibit a glossy surface.
- It should not shrink or show cracks on drying.
- The colour should not fade with time.

TYPES OF VARNISHES

- Oil Varnishes – These varnishes use linseed oil as solvent in which hard resins such as amber and copal are dissolved by heating.

These varnishes dry slowly, but form hard and durable surface.

- Spirit Varnishes – These are methylated spirit of wine as solvent in which soft resins such as lac are dissolved. They dry quickly.
- Turpentine Varnishes – They use turpentine as solvent in which soft resins such as gum dammar are dissolved.
- Water Varnishes – These are formed by dissolving shellac in hot water.

NEW WOODWORK

- Normally, four coats of paint are required for new woodwork. The process of painting is as follows:
- The surface of the woodwork is prepared to receive the paint for satisfactory working.
- It is necessary that the woodwork is sufficiently seasoned and it does not contain more than 15 per cent moisture at the time of painting.
- The surface of the woodwork is thoroughly cleaned and the heads of nails are punched to a depth of 3 mm below the surface.
- The surface of the woodwork is then knotted.
- The process of cleaning the surface using sand paper is then carried out.
- The subsequent coats of paint, namely undercoat and finishing coats, are then applied on the surface.
- Extreme care should be taken to see that the finishing coat presents a smooth and even surface and that no brush marks are seen on the finished surface.

- **TURPENTINE**

- A colorless volatile liquid distilled from the products of certain pine trees and consists of a complex mixture Terpene hydrocarbon.

Turpentine was formerly extensively used in paints and varnishes but has now been largely replaced by white spirit