

*PU PAINTING
OF
LHB COACHES*

SURFACE PREPARATION

What is Surface preparation?

- ❖ **Surface preparation is preparing the object to be painted suitably.**
- ❖ **Removal of unwanted materials.**
- ❖ **Creation of surface roughness.**
- ❖ **50% of the total painting time and effort.**

Why Surface preparation?

- ❖ **Fundamental to good painting.**
- ❖ **Acceptable appearance.**
- ❖ **Proper adhesion gives max. Performance.**
- ❖ **If neglected, Premature failure of the coating.**
- ❖ **Surface preparation method depends on**
 - (i) Type of material**
 - (ii) Type of paint**

DEGREE OF SURFACE PREPARATION

- ❖ **Removal of mild deposit.(dust, old paint, rust)**
- ❖ **Removal of heavy deposit(tightly adhering mud, old paint, rust and oil)**
- ❖ **Creation of surface roughness**
- ❖ **Introducing a coat over the material to be painted.**

The foreign matter that are normally present on the surface:-

- 1. Oil/grease**
- 2. Rust**
- 3. Dust**
- 4. Moisture**
- 5. Old paint**
- 6. Mud/clay**
- 7. Spatters**

SURFACE PREPARATION METHODS

- 1. Hand cleaning**
- 2. Solvent wiping**
- 3. Abrasive cleaning**
- 4. Chemical treatment**

HAND CLEANING

- ❖ **Removing loosely adhering dirt, grease, oil, rust.**
- ❖ **Tools used are wire brush, dust brush, scrappers, emery paper.**

SOLVENT WIPING

- ❖ **Removing light oil and grease on the metal surface.**
- ❖ **Cotton waste must be used and change frequently.**
- ❖ **Solvent used are Acetone and Neptha.**
- ❖ **This process is adequate in many cases.**

ABRASIVE CLEANING

- ❖ Directing abrasive particles at high velocity.
- ❖ Life of coating is high.
- ❖ Good adhesion of paint.

CHEMICAL TREATMENT (Hot phosphating and Cold phosphating)

- ❖ Used to remove rust and grease films.
- ❖ Cold phosphating solution supplied by the firm.
- ❖ The solution is diluted with water in the ratio 1:1 or 1:2.
- ❖ Applied with the help of brush.
- ❖ Allowed to react for 5 to 10 minutes.
- ❖ The excess solution should be wiped using dry cloth.
- ❖ Phosphating coating is obtained.

EXTERIOR PAINTING SYSTEM OF ICF COACHES

EPOXY-PU SYSTEM

1. SHOT BLASTING:- to create the necessary roughness.
 - Cast steel shot to IS 4606/1983.
 - Ra value 6 to 9 microns.
 - Clean with compressed air.



BEFORE BLASTING



BLASTED SHELL CLEAN WITH COMPRESSED AIR

EXTERIOR PAINTING OF LHB COACHES

1. SURFACE PREPARATION

- Remove unnecessary metal projections on welded areas by grinding and buffing operations, in order to ensure smooth exterior of coaches.

- Acetone cleaning

- Application of Body Filler over welded joints wherever necessary.

EXTERIOR PAINTING OF LHB COACHES

- Body Filler flattening by using orbital sanders.
- Application of Eco-friendly Water based Etch Primer to ICF/MD/Spec-231, Issue status : 01 ; Rev: 00 (Single Pack)
- It improves adhesion for further painting.

2. TWO COMPONENT EPOXY ZINC PHOSPHATE PRIMER:-

- **RDSO/M&C/PCN/100/2009 Chapter-II.**
- **This is the protective coating, prevents corrosion.**
- **Immediately after surface preparation.**
- **Mode of application – By Airless spray.**
- **Drying time – Oven dry at 70⁰C– 30 min..**
- **DFT – 60 microns.**
- **Viscosity – Spray - 20 to 25 sec.
Brush - 40 to 50 sec.**
- **Inspection – Smooth, Matt and uniform surface.**



PRIMERED SHELL

3. PUTTY APPLICATION (Polyster putty) :-

- **RDSO/M&C/PCN/100/2009 Chapter-III.**
- **Purpose:- To fill cavities undulations, dents and at the welded joints.**
- **No. Of coats :- Spot putty, 1st coat putty, 2nd coat putty is applied.**
- **Putty thickness:- (i) Alkyd putty-145 microns max.
(ii) Polyster putty-300 microns max.**
- **Re-coatable Time (Drying time) :- 8 hours for each coat.**
- **DFT of each coat of putty exceeds Specified thickness cracks may be developed.**
- **Normally putty is applied with putty knife.**





1st coat Putty



Spot putty



Second coat putty

4. WET FLATTENING :-

- **Purpose:- (i)To remove the excess putty.
(ii)To make the surface smooth and even.**
- **Water emery sheet no. 150 is used if it done manual.**
- **80 grade emery is used if it is done with wet flattening machine.**
- **The success of painting depends on putty application and wet flattening process.**
- **Water is used to ensure smooth and dust free putty removal.**





Putty grinding

5. PU SURFACER :-

- **RDSO/M&C/PCN/100/2009 Chapter-IV.**
- **It fills the small pores/holes on the putty flattened surface.**
- **It forms the base for the final coat.**
- **It enable to get smooth and even surface.**
- **Mode of application – By Airless spray.**
- **Drying time – Oven dry at 70⁰C– 30 min..**
- **DFT – 40 - 50 microns.**
- **Viscosity – Spray - 20 to 25 sec.
Brush - 40 to 50 sec.**
- **Inspection – Smooth, Matt and uniform surface.**

6. SURFACER FLATTENING :-

- **Gently wet rub the surface using 220 grade emery.**
- **Clean the surface with soft cotton cloth.**
- **Smooth and uniform surface.**

7. PU FINISH:-

- **RDSO/M&C/PCN/100/2009 Chapter-V**
- **This is the final coat of chosen colour.**
- **Mode of application – By Airless spray.**
- **Drying time – Oven dry at 70°C– 30 min..**
- **DFT – 40 - 45 microns.**
- **Viscosity – Spray - 20 to 25 sec.
Brush - 40 to 50 sec.**
- **Inspection – Smooth, full Glossy and uniform finish.**

INTERIOR PAINTING

- Acetone cleaning
- Application of Eco-friendly Water based Etch Primer to ICF/MD/Spec-231, Issue status: 01 ; Rev: 00(Single Pack)
- It improve adhesion for further painting.
- **APPLICATION OF TWO COMPONENT EPOXY ZINC PHOSPHATE PRIMER:-**
- RDSO/M&C/PCN/100/2009 Chapter-II.
- This is the protective coating, prevents corrosion.



FINISHED COACH

SEQUENCE OF PAINTING IN ALKYD SYSTEM AND PU SYSTEM

ALKYD SYSTEM

1. ROZ primer. DFT 15-20 microns.
viscosity:- 25-35 sec.
2. Filler
3. Spot putty
4. 1st coat putty:-145 microns.(max.)
5. 2nd coat putty.
6. Wet flattening.
7. Filler.
8. Filler flattening and under coat.
9. Under coat flattening
10. Final coat

PU SYSTEM

- Epoxy primer. DFT 60 microns.
viscosity:- 20-25 sec.
- Spot putty.
- 1st coat putty (pop putty-300 microns)
- 2nd coat putty.
- Putty cutting.
- Surfacer (PU):- 40-45 microns.
- Surfacer flattening
- Final coat. 40-45 microns.

COMPARISON OF PU SYSTEM AND ALKYD SYSTEM

PU SYSTEM

1. Two pack system.
2. Outstanding abrasive resistance.
3. Longer paint life, 5 years
4. Epoxy primer has good corrosion resistance. Can withstand salt spray test up to 400 hrs.
5. Good gloss retention.
6. Good chemical resistance.
7. Hardness without sacrificing of flexibility.
8. Possible to achieve high DFT. up to 50 microns.
9. Less cycle time.
10. Better uv resistance.
11. Good water resistance.
12. Faster rate of drying.

ALKYD SYSTEM

- Single pack system.
- Poor abrasive resistance.
Only 2 years.
- Poor corrosion resistance.
Can withstand up to 72 hrs.
- Poor gloss retention..
- Poor chemical resistance.
Poor hardness.
- DFT not than 20 microns.
- More cycle time.
No such property.
- Poor water resistance.
Slow rate of drying.

LIMITATIONS OF PU SYSTEM

- ❖ High initial cost.
- ❖ Low pot life(2- 3 hrs.)
- ❖ High consumption of costly thinner.
- ❖ Hazardous in nature.
- ❖ PPE's such as respirator, gloves must be used.

PAINING DEFECTS AND REMEDIES

<u>DEFECTS</u>	<u>CAUSE</u>	<u>REMEDIES</u>
1. <u>SAGGING</u> Downward movement of Paint film during spraying.	(a) Too much of paint applied. (b) Spraying too close . (c) Viscosity of paint of very low.	(a) Use correct viscosity of Paint (b) Maintain specified distance .

SAGGING



PAINING DEFECTS AND REMEDIES

<u>DEFECTS</u>	<u>CAUSE</u>	<u>REMEDIES</u>
2. <u>BRUSH MARKS</u> Bristle mark in dried paint Film left by the paint.	(a) While using new/coarse brush for finishing coat. (b) Usage of high viscosity paint.	(a) Suitable choice of brush. (b) Using correct viscosity of paints.

BRUSH MARK



PAINING DEFECTS AND REMEDIES

<u>DEFECTS</u>	<u>CAUSE</u>	<u>REMEDIES</u>
3. <u>FLAKING</u> It is the lifting of paint film (right from the primer) from the underlying surface in the form of flakes.	(a) Poor surface preparation. (b) Paint film is not having elasticity. (c) Due to sudden expansion and contraction of the job.	(a) Ensure proper preparation. (b) Use of paint with good elasticity.

FLAKING



PAINING DEFECTS AND REMEDIES

<u>DEFECTS</u>	<u>CAUSE</u>	<u>REMEDIES</u>
4. <u>ORANGE PEEL</u> Painted surface looks like An orange peel.	(a) Poor atomization of paint while spraying. (b) Spraying too close to the object.	(a) Spraying done in spray booth. (b) Maintain specified distance between spray gun and job.

ORANGE PEEL



PAINING DEFECTS AND REMEDIES

<u>DEFECTS</u>	<u>CAUSE</u>	<u>REMEDIES</u>
5. <u>PEELING</u> Rupture of paint film Usually the top layer being Removed as a skin, but the underlying paint is unattached	(a) There must be a layer of oil/grease between two coats of paint. (b) Poor adhesive quality of paint.	(a) Ensure moisture free and oil free surface before Painting. (b) Use approved quality of paint

PEELING



PAINING DEFECTS AND REMEDIES

<u>DEFECTS</u>	<u>CAUSE</u>	<u>REMEDIES</u>
6. <u>DRY SPRAY</u> After spraying in painted Surface forms as coarse Or rough surface as same As orange peel.	(a) More air mixed with paint. (b) Spray gun too far from the object.	(a) Set correct pressure. (b) Maintain the correct distance.

DRY SPRAY



INSPECTION OF PAINTED SURFACE

GLOSS METER



GLOSS VALUE:-

1. In ICF, gloss value is measured by gloss meter of 60 degree angle.
2. It is used to measured the gloss value of paint by reflection of 60 degree angle of incidence.
3. It depends on the amount of light reflected when a known quantity of light fall on it.
4. The gloss value is indicated by a number. The more the reflection of light, the higher gloss value.
5. In ICF coaches a gloss value of 85 is to be maintained.

DRY FILM THICKNESS

ELCOMETER



1. Dry film thickness is measured by Elcometer.
2. DFT measured in microns. (1microns=1/1000MM)
3. These instrument operated either by magnetic inductive or eddy current principle.
4. Place the probe at right angle of the painted surface to be measured.
5. Push ON button.
6. Direct reading of DFT shown in the Elecometer.
7. Calibrate the instrument before taking the reading.
 - ❖ In epoxy PU system :- 135-745 microns.
 - ❖ In Alkyd system:- 65-360 microns.

SALT SPRAY TEST

- ❖ Painted samples are hanged inside the cabinet.
- ❖ Salt solution is sprayed.
- ❖ ROZ Primer up to 72 hrs.
- ❖ EPOXY Primer up to 400-500 hrs.

PAINT DRYING

- ❖ The Paint should dry within a specified period after application.
- ❖ Drying of paint may be classified as :-
 - (i) Surface dry
 - (ii) Tack free dry
 - (iii) Hard dry
- ❖ Hard drying of paint film means that next coat of paint film can be satisfactorily applied after slightly rubbing the paint film.



THANK YOU...

SEQUENCE OF PAINTING OPERATION IN ALKYD SYSTEM

1. ROZ PRIMER TO IS:2074/92 :-

- This is the protective coating, prevents corrosion.
- Immediately after surface preparation.
- DFT – 15 to 20 microns, Viscosity :- Spray – 25 to 35 sec.
Brush – 40 to 50 sec.
- Drying time – 8 hrs.
- Smooth, Matt uniform or free from any defect(sagging, rough surface.)

2. FILLER TO IS:110/83 :-

- Protect the primer.
- Gives grip to further coating.
- DFT – 15 to 25 microns.
- Viscosity :- Spray – 25 to 35 sec.
Brush – 40 to 50 sec.
- Drying time – 8 hrs.
- Smooth, Matt uniform and free from any defect.

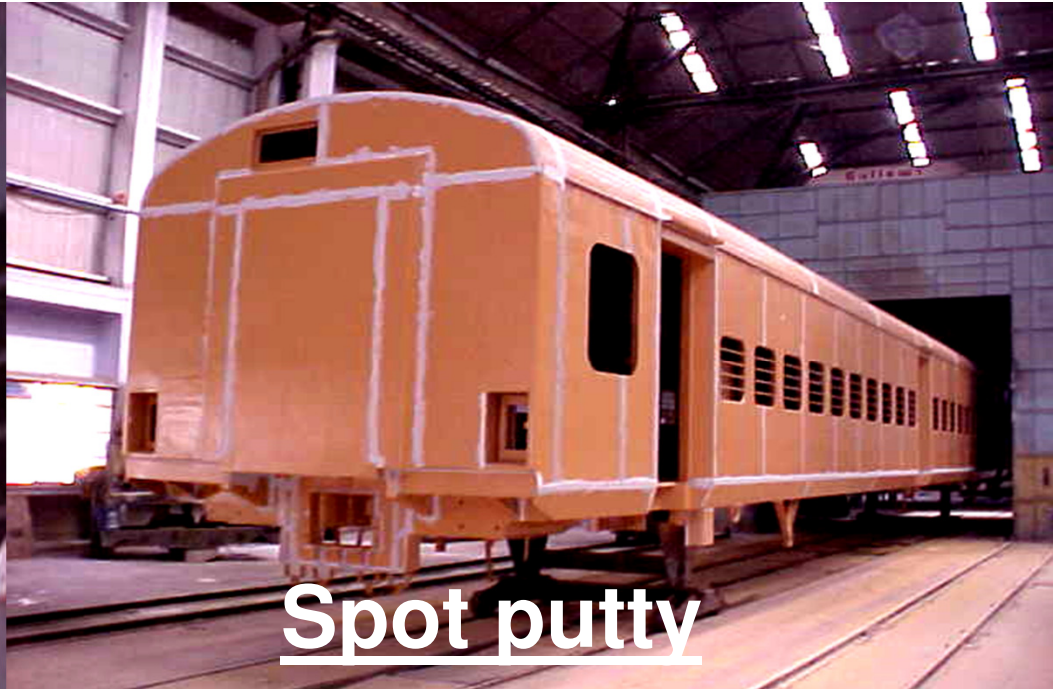
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- **The success of painting depends on putty application and wet flattening process.**
- **Water is used to ensure smooth and dust free putty removal.**





Putty grinding

5. 2nd FILLER:-

- It fills the small pores/holes on the putty flattened surface.
- It enable to get smooth and even surface.
- Mode of application – By Airless spray.
- Drying time – 8 hrs.
- DFT – 15 - 20 microns.
- Viscosity – Spray - 25 to 35 sec.
Brush - 40 to 50 sec.
- Inspection – Smooth, Matt and uniform surface.

6. FILLER FLATTENING :-

- Gently wet rub the surface using 220 grade emery.
- Clean the surface with soft cotton cloth.
- Smooth and uniform surface.

7. APPLICATION OF UNDER COAT :-

- It gives the back ground colour to the final finishing coat.
- It forms the base for the final coat.
- DFT – 15 to 25 microns.
- Viscosity :- Spray – 25 to 35 sec.
Brush – 40 to 50 sec.
- Drying time – 8 hrs.
- Smooth, Matt uniform and free from any defect.

8. UNDER COAT FLATTENING:-

- Gently wet rub the surface using 280 grade emery.
- Smooth and uniform surface.

9. 1st COAT OF FINISHING COAT to IS:8662/2004 :-

- **This is the final coat of chosen colour.**
- **DFT – 15 to 25 microns.**
- **Viscosity :- Spray – 25 to 35 sec.
Brush – 40 to 50 sec.**
- **Drying time – 8 hrs.**
- **Smooth, Glossy uniform and free from any defect.**

10. FLATTENING :-

- **Gently wet rub the surface using 280 grade emery.**
- **Smooth and uniform surface.**

11. 2nd COAT OF FINISH COAT to IS:8662/2004 :-

- **This is the final coat of chosen colour.**
- **DFT – 15 to 25 microns.**
- **Viscosity :- Spray – 25 to 35 sec.
Brush – 40 to 50 sec.**
- **Drying time – 8 hrs.**
- **Smooth, Glossy uniform and free from any defect.**