8 LHB COACH PAINTING

Version: **1.1**

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Amendment and Revisions

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8.1 Painting System in Indian Railways

i) Alkyd- Alkyd- Alkyd system (Followed in ICF).
ii) Epoxy-Epoxy- Alkyd system (Earlier in RCF for ICF type coaches)
iii) Epoxy- Epoxy- Polyurethane system (RCF for ICF type coaches).
iv) Epoxy-Polyester- Polyurethane system (RCF for LHB coaches).

8.1.1 Alkyd painting system is

i) Less durable.
ii) Low Gloss & Colour retention.
iii) Less resistance to salty atmosphere.
iv) Less resistance to ultra-violet rays.
v) Require frequent re-painting.
vi) Increases effective cost of painting

8.2 LHB Painting Procedure (Epoxy-Polyester- Polyurethane System)

1) Surface Preparation.
2) Primer Application.
3) Putty Application on joints.
4) First & Second Coat Putty application.
5) Putty Rub-down.
6) Fine Putty Application.
7) Fine Putty Rub-down.
8) PU Primer Application.
9) Spot Filling.
10) PU Under Coat Application.
11) First PU Top Coat Application.
12) Masking.
13) Second PU top Coat application.
14) De masking.

8.3 General

a. After the coach body is fully repaired and the flooring work completed, it should be swept and cleaned of all dust, shavings, etc., before the coach is placed in the Paint shop for painting and polishing.

b. The condition of the paint on the inside and outside surfaces should be examined to decide whether the old paint should be removed to the bare metal. Usually, extensive corrosion repair work necessitates removal of old paint to bare metal and complete repainting of the coach.

c. If the condition of the paint so warrant the paint should be completely removed to the bare metal and the coach repainted as per paint schedule `A'. If the general condition of the paint is good, follow paint schedule `C'. These paint schedules cover the exterior painting of coaches with Epoxy cum polyurethane painting system (two pack). RCF Drg. no. LW83100 (Ref. Doc. no. PLW0960) gives the exterior colour scheme of the coaches.

8.4 Paint Schedule `A' (Refer Annexure 8a)

a. The entire surface should be applied with a suitable paint remover and the old paint scraped off. Thereafter, the coach surface shall be swabbed with petroleum hydrocarbon solvent to IS:1745-78 to remove all traces of paint remover.

b. Level up the surface imperfections over welded joints with light weight body filler (MDTS 176 rev. 04) and after 2 hours of air dry time, dry flattening should be done with **sand paper of Grade P-80.** Now clean the surface properly and apply one coat of Eco-friendly water based Etch primer of **DFT 25 microns**.

- consumables required
- precaution to be taken during application of primer
- preparation of epoxy based zinc phosphate primer for exterior & interior
- procedure for epoxy based zinc phosphate primer application on exterior of side walls, end walls, under frame & roof
- procedure for epoxy based zinc phosphate primer application on interior of side walls, end walls, roof & under frame
- procedure for primer application on interior of sidewalls, end walls, roof, under frame and trough floor below & above between lower deck and upper deck. All these above point covers under RCF Doc. No. PLW0952

Note: *Where facilities exist, the entire coach body should be sand blasted and the primer coat of zinc phosphate primer should be applied by spray/brush immediately thereafter.*

c. Apply zinc phosphate primer (M&C/PCN/100/2018: Chapter-II, two pack system) to a cumulative DFT of 85 microns.



Fig1.1: Coach after primer application



Figure 1.2: putty application

d. Apply two coat of unsaturated polyester base knifing stopper putty (two pack : M&C/PCN/100/2018: Chapter-III) to a DFT of first coat 300 micron and total DFT of both coats will be 600 microns approximately. Allowable air dry time of individual coat should be minimum 8 hours.
   - tool and machinery
   - consumables required
   - precaution to be taken during application of putty
   - Procedure for Unsaturated polyester base knifing stopper putty application on shell All these above point covers under RCF Doc. No. PLW0954

e. Does dry flattening by pneumatic sander machine consist of 150 grade emery paper (in case of wet flattening emery paper of grade 280 should be used). Remove the dust accumulated over the surface by jet water and let it force dry.



Fig 1.3: Procedure of dry flattening by sander machine

f. Ensure that there is no trace of water on the coach body, now apply a coat of Polyurethane surface (M&C/PCN/100/2018: Chapter-IV) by trolley mounted airless painting equipment to a DFT of 60 microns minimum. Allow 8 hours of air dry time and then do wet flattening with emery paper of grade 280.
   - tool and machinery
   - consumables required
   - precaution to be taken during surface application
   - procedure for surfacer application on shell
   - All these above point covers under RCF Doc. No. PLW0958

g. Wipe the entire surface of coach body with soft cotton clothes and then apply Ist coat of full gloss Polyurethane Enamel (M&C/PCN/100/2018: Chapter-V) to DFT of 35 microns minimum.

h. After ensuring that1st coat of full gloss Polyurethane Enamel (two pack) has dried up completely, apply 2nd coat of full gloss Polyurethane Enamel (M&C/PCN/100/2018: Chapter-V) to a cumulative DFT of 70 microns minimum. Now Check DFT and glossiness value whether it is up to the mark else revise the operations. Air dry time of individual coat should be minimum 8 hours.
   - tool and machinery
   - applicable Drawings
   - consumables required

- precaution to be taken during full gloss Polyurethane Enamel (two pack) application
- procedure for full gloss Polyurethane Enamel (two pack) application on shell

All these above point covers under RCF Doc. No. PLW0960

i. Roof should be painted as per prescribed color scheme.

j. Standard lettering, as specified, should be done with golden yellow color No. 356 IS: 5-94 and cobalt blue RAL 5013. Similarly, all standard schedule charts, signs, etc., should be stenciled/ painted or screen printing as prescribed in drawing.

k. Window glasses should be cleaned well and all paint marks should be removed. Any damage to the painted surface should be touched up before the coach is turned out after POH.

8.5 Paint Schedule `C'

i. The portions where paint has flaked or is damaged should be scraped off of all the loose and damaged paint. The coach should then be washed thoroughly with soap and water and allowed to dry, make it slightly rough and a coat of Epoxy zinc phosphate primer to specification no. M&C/PCN/100/2018: Chapter-II to DFT of 60 Microns applied by brush at the places where metal surface is visible.

ii. After the primer dries up completely, it should be puttied and after ensuring that there is no trace of water on the surface, a coat of Polyurethane surfacer to M&C/PCN/100/2018: Chapter-IV should be applied at these portions.

iii. The complete coach shall thereafter be painted in the manner described in paragraphs 8.4g to 8.4k above.

8.6 Interior Painting

i. Newly built coaches are provided with aluminum mouldings. The mouldings should be cleaned in every POH. This maintenance manual deals with interior painting of LHB shells after epoxy base metal primer.

ii. Applicable specification and documents are Dy. CME/D's technical specification no MDTS094 RCF No. MD22151 dated 16.03.2011.

iii. If the condition of the paint on the mouldings has deteriorated or become thick, the complete paint should be removed by the paint remover. The moulding should then be washed thoroughly, allowed to dry and repainted with a coat of Epoxy zinc phosphate primer to specification no. M&C/PCN/100/2018: Chapter-II followed by two coat of full gloss Polyurethane Enamel(two pack) to M&C/PCN/100/2018: Chapter-V of appropriate color.

iv. In this coach only FRP windows are used, but should be thoroughly cleaned of all stains in position. If they are very dirty, they should be removed and cleaned with oxalic acid. FRP windows should be painted with polyurethane paints to RDSO specification no. M&C/ PCN/100/ 2013 Chapter-V.

v. Laminated panels should be polished with silicon paste or similar suitable polish to restore luster and also to provide a protective coating.

vi. Coaches other than those fitted with laminated plastic panels should be cleaned with soap solution or suitable detergent and thereafter cleaned thoroughly with wet cloth so that all head stains, oily marks, etc., are completely removed. Then a single coat or, if required, a double coat of full

gloss Polyurethane Enamel(two pack) to M&C/PCN/100/2018: Chapter-V should be applied by brush/spray.

vii. In case where the old paint has become thick due to repeated painting or where the paint has deteriorated or cracked, the wooden panel should be removed and replaced or reused after completely removing the old paint and repainting it.

viii. tool and machinery

ix. consumables required

x. precautions

xi. procedure for two component high build elastified paint application on interior of shell

All these above point covers under RCF Doc. No. PLW0961

8.6.1 Painting of Parts

i) The laminated plastic seats or moulded seats of synthetic materials require no painting. These items should be cleaned thoroughly with soap solution or suitable detergent.

ii) In case of seats made of wooden battens, it should be sand papered smoothly and a coat of filler should be applied and then entire surface including old painted surface should be sand papered smoothly and seats should be repainted with a coat of full gloss Polyurethane Enamel (M&C/PCN/100/2018: Chapter-V) .

8.7 Marking of Coaches Together With Exterior

All lettering on coaches should be according to the sizes prescribed in the marking diagrams for the type of coach to which they pertain (refer RDSO drawing number CSC-1728). Anti telescopic coach end walls should be marked with yellow stripes as sketch no. 77356. Each should be marked with following details:

- Coach No., Owning Railway, and Mechanical code if any.
- Name of base station for primary maintenance
- No. of compartments and seating capacity as prescribed for the type of coach
- Notices for use of alarm signal, safety precautions etc. if separate notice plates for these are not placed.
- Transportation code applicable to the type of coach as per appendix ‘B’ of IRCA Conference Rule part IV.
- Carrying capacity of OCV’s to the nearest tones up to one decimal place above actual capacity.
- Tare weights as recorded at the time of initial building or subsequent major modifications.
- A woman’s figure head painted on illuminated panel of compartments permanently reserved for ladies.
- Return date showing the month and year in which the coach is required to be returned to the owning railway workshop for POH.
- A block as shown below to be stenciled on the left side of end panel

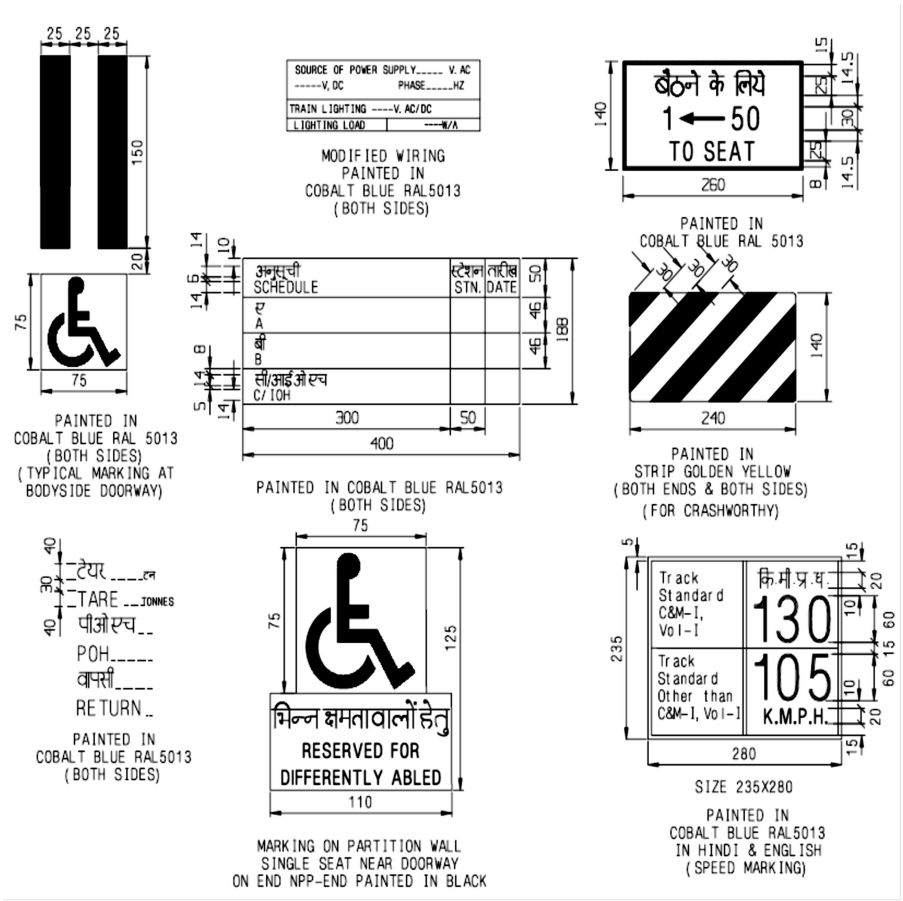
Note: Size of letters should be according to applicable drawing.

i) The capacity of the dynamo/power supply source and light/fan loads to be stenciled on the end panels.

ii) The following legends should be stenciled on battery box covers to enable stenciling of necessary particulars against each.

- Make
- Type
- Specific gravity (at full charge)
- Corrected to temperature
- Cell watered on
- Cell examined on

Some examples of lettering on coaches are given below:-



Picture 1.4 Lettering of coaches

8.8 Tools and Plants for Painting

Toll and Plant for painting should be as per RDSO CMI No. RDSO/2013/CG/CMI-01

8.8.1 Types of Brushes

i) Round brushes nos. 1/0, 2/0, 3/0 & 4/0.

ii) Flat brushes nos. 25 mm, 38 mm, 50 mm, 63 mm, 75 mm, 100 mm

iii) Lettering brushes:

iv) Flat brushes nos. 1 to 12

v) Round brushes nos. 1 to 12

vi) Stencil brushes

vii) Cleaning brushes for LP sheets with soda ash

8.8.2 Putty Knife

i) Pallet knife
ii) Falling knife
iii) Hacking knife

8.8.3 Scrapers

i) Shave tukes
ii) Triangular
iii) Semi circular
iv) Diagonal

8.8.4 Abrasive Papers

Silicon carbide water proof paper grade nos. 120, 220, 320 & 400.

8.8.5 Safety Apparels

i) Goggles
ii) Helmet
iii) Gum

Air compressor plant with spray gun for painting

Annexure 8A

A SCHEDULE

1st Step	Remove old paint through various methods suggested in above Para 14.1a and Level up the surface imperfections by body filler (MDTS 176 rev. 04) and do dry flattening with **sand paper of Grade P-80.**
2nd Step	Now clean the surface properly and apply one coat of Eco-friendly water based Etch primer. OR Where if facilities exist, the entire coach body should be sand blasted and just after it apply one coat of Epoxy zinc phosphate primer to specification no. M&C/PCN/100/2018: Chapter-II.
3rd Step	1st coat of unsaturated polyester base knifing stopper putty (two packs) to M&C/PCN/100/2018: Chapter-III.
4th Step	2nd coat of Unsaturated polyester base knifing stopper putty (two pack) to M&C/PCN/100/2018: Chapter-III to fill up holes/dents where required.
5thStep	Rub down the surface with sanding disc of Grade 150. In case of wet flattening emery paper of Grade 220 can be used.
6th Step	One coat of Polyurethane surfacer to M&C/PCN/100/2018: Chapter-IV should be sprayed by trolley mounted airless painting equipment
7th Step	The entire surface should again be rubbed down smooth with silicon carbide water proof paper grit 220 and after drying apply Ist coat of full gloss Polyurethane Enamel(two pack) to M&C/PCN/100/2018: Chapter-V.
8th Step	Check DFT and apply a 2nd coat of full gloss Polyurethane Enamel (two pack) to M&C/PCN/100/2018: Chapter-V to a cumulative DFT of 70 microns minimum.
9th Step	Check DFT & gloss, Standard lettering, as specified in drawing, should be done with golden yellow color No. 356 to IS:5-94/cobalt blue RAL 5013 (or as specified in drawing) and miscellaneous work like as cleaning window glasses etc.

Note: The Painting Schedule should be as per RDSO specification M&C/PCN/100/2018 and CMI No. RDSO/2013/CG/CMI-01

Annexure 8B

POH PAINTING PROCEDURE "C" SCHEDULE

1st Step	Cleaning with soap solution or any other cleaning solution and wash thoroughly with water touch up damaged portion with primer recommended under A schedule.
2nd Step	Spot putty if necessary and one coat of Polyurethane surfacer.
3rd Step	The putty should be rubbed down with sanding disc of 80 grade, and apply 1st coat of full gloss Polyurethane Enamel.
4th Step	Check DFT and apply a 2nd coat of full gloss Polyurethane Enamel (two pack) to M&C/PCN/100/2018: Chapter-V to a cumulative DFT of 70 microns minimum.
5thStep	Check DFT & gloss, Standard lettering, as specified in drawing, should be done with golden yellow color No. 356 to IS:5-94/cobalt blue RAL 5013 (or as specified in drawing) and miscellaneous work.

Annexure 8C

Paint schedule of LHB Coaches

Operation	Garnet Blasting /Application of Etch Primer	Application of Epoxy Primer(Exterior)	Light Weight Body Filler	1st coat Putty Application	2nd coat Putty Application	Putty Rub Down & NC Application	NC Rub Down & Application of Surfacer	Surfacer Rub Down & 1st Top coat	Masking & Rub Down &2nd Top coat	REMARKS
Related Documents/ Specification	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter I	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter II	MDTS 176	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter III	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter III	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter III	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter IV	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter V	RDSO Spec. No. M&C/PCN/ 100/ 2018 Chapter V	
Application area	Full Exterior &Full Interior (Including UF)	Side Walls, End walls, UF & Roof	End Wall Side Walls Joint, Sole Bar Joint, Roof Bearer Joints, Door Corners Etc	Side Walls, End walls	Side Walls, End walls,	Side Walls, End walls	Whole Exterior Side walls & Roof surface of shell,Turn Under & Door corner,End walls	Side walls, End walls, Roof	Side walls, End walls, Roof	