

## SCOPE OF WORK

PU painting of electric locomotives at Loco Shed Gonda for 1 year.

1. The scope of work includes painting and stickering of locomotives.
2. The locomotives which are to be painted with PU paint, the cost of stickering for the loco number and horizontal band on both sides of the loco Retro- reflective Radium sticker is also included in the PU painting cost itself.
3. **GOVERNING SPECIFICATIONS:**  
RDSO specification No.
  - 3.1 M&C/PCN/100/2018 or latest.
  - 3.2 M&C/PCN/120/2020 with RDSO Amdt No. 1B w.e.f. Sept. 2020 or latest for fire retardant paints.
  - 3.3 DLW Specification No. MISC:378 dated 17/10/20217, for procurement of decals used in vehicle project for locomotives.
4. **THE REQUIREMENT OF PAINTING:**  
Following metallic surface of Electric locomotive are to be painted.
  - (i) Exterior surface
  - (ii) Interior surface
  - (iii) Driver's cabs
  - (iv) Roofs
  - (v) Cleaning and painting of loco pneumatic pipe lines, equipment and under frame.
  - (vi) Lettering work in both cabs, exterior of body, face & rear side of loco.
5. Decals with the high adhesive sticker of suitable colour of make 3M or equivalent. The drawing or required diagram shall be done using enamel paint or sticker transfer.
6. Non-metallic parts are excluded from the scope of painting unless specifically mentioned / asked by railway representative. Suitable masking of all such parts e.g. cab instruments, cables, equipments, head lights, glasses etc. is necessary to avoid damage due to unintended ingress of paint/primer/putty to these parts. The necessary material for suitable masking is to be arranged by contractor at their own cost.
7. **EXTERIOR SURFACE PAINTING (with PU paint):**  
**REPAINTING OF LOCOs as per M&C/PCN/100/2018 or latest.**
  - 7.1 **Surface preparation-** These locomotives will have a fine layer of previous paint. The previously applied paint is to be sanded off with orbital sander machine and paper of 180 grit. However, in the rusted area stripping should be done so as to expose the bare metal such that no traces of paint or rust are left. In other areas a DFT (dry film thickness) of 30 microns of previous primer/paint should remain on the surface after stripping. In the areas rebuilt by welding, the weld beads must be levelled by rotary grinders. Sheet repair work for rusted portions shall be done by the contractor duly welded with the new metal sheets which will be arranged by Railways.
  - 7.2 **Application of degreaser and tack cloth prior to application of Epoxy based ZINC PHOSPHATE Primer-** A degreaser should be applied manually immediately after the de-painting exercise. The degreaser must evaporate leaving no residue. A tack cloth, made of non-woven material ensuring lint free surface, should be used to remove any remaining dirt/dust on the surface. Blow of compressed air should not be used to remove the remaining dirt and dust as it can deposit oil on the surface.

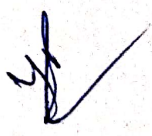
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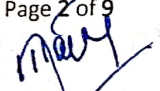




- 7.3 **Application of Epoxy based ZINC PHOSPHATE PRIMER-** The entire surface is already having a thin layer of paint as a result only the bare metal surface, if any, should be covered with this primer and to be smoothened also (i.e. the new welded part only). The total thickness of the primer including the previous paint should be 60-80 micron.
- 7.4 **Application of two pack fine polyester putty followed by sanding-** Wherever required the surface shall be applied with fine polyester putty with knife. The objective of applying putty is to achieve a thoroughly even surface free from scratches. Two -three coats of putty can be applied depending upon the conditions. One coat of putty should be applied in movements in the vertical direction. The edges of the knife should be levelled manually after putty has dried, before application of second coat of putty, in horizontal hand movements. Thereafter sanding shall be done in the above mentioned method by grit paper to further reduce unevenness of the surface and achieve finish. At this stage wet sanding may be done manually with the help of spongy blocks and sand paper of 320 grit or with random orbital sander using 320 grit discs.
- 7.5 **Application of polyurethane base surface-** The full surface is now to be coated with the P.U. based two pack surface (premium PU primer) by cup gun method or by airless spray, followed by the wet sanding procedure with a water paper of 600 grit, in such a way that the coating layer should not be less than 50 microns at any place.
- 7.6 **Application of Final Premium P.U. based paint-** It should be noted that paint has to be dried in normal atmosphere or in stoving oven if available. The drying period as specified by the manufacturer of paint for given atmospheric condition should be followed. As also the manufacturer's recommendation should be followed for using activator and thinner. The final painting is to be carried out by base coat/clear coat method by cup gun method or by airless spray according to the pattern and scheme of the locomotive. The clear coating material should be dual pack. The thickness of PU finish paint should be of 40 microns and that of clear coat should be minimum 40 microns. The specifications of this paint should match RDSO specification No. M&C/PCN/100/2018 or latest.
8. **INTERIOR SURFACE PAINTING:**
- 8.1 **Surface preparation:** Remove old paint from the corroded area and wherever loose paint flakes are available. Care should be taken to avoid any undesirable effect on the body sheet or any other parts. Clean the surface duly removing the accumulated dirt, oil and grease etc.
- 8.2 **Application of anti-corrosive primer-** After cleaning the surface area to the extent of repaired/completed descaled portion, shall be coated with red oxide zinc chromate primer to IS: 2074. It can be sprayed by cup gun/ by airless spray method or applied with the help of brush depending upon the location.
- 8.3 **Application of Enamel putty and sanding-** All the weld beads should be leveled using rotary grinders. All the joints and other visual scratches as well as welded beads should be filled with the two pack enamel putty as required levelling the surface. Thereafter, sufficient drying time should be allowed in accordance with the manufacturer's recommendation. Preferably drying may be done overnight. This dried putty should be sanded off with a paper of 180 grit to level the surface. Thereafter the surface should be cleaned with tack cloth.
- 8.4 **Application of fire retardant paint-** The surface is to be painted with fire retardant paint as per the instructions in the color scheme. The paint can be sprayed or applied with brush, depending upon the location making sure that the DFT of paint should not be less than 80 microns at any place. It will be necessary to apply minimum 2 coats to achieve this thickness. The specifications of this paint should match RDSO specification No. M&C/PCN/120-2011 or latest.



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9. **DRIVER'S CAB:**

- 9.1 **Surface preparation-** Remove old paint from the corroded area and wherever loose paint flakes are available. Care should be taken to avoid any undesirable effect on the body sheet or any other parts. Clean the surface duly removing the accumulated dirt, oil and grease etc.
- 9.2 **Application of anti-corrosive primer-**After cleaning the surface area to the extent of repaired/completed descaled portion, it should be coated with red oxide zinc chromate primer to IS: 2074. It can be sprayed by cup gun/ by airless spray method or applied with the help of brush depending upon the location
- 9.3 **Application of Enamel putty and sanding-** All the weld beads should be levelled using rotary grinders. All the joints and other visual scratches as well as welded beads should be filled with the two pack enamel putty as required to level the surface. Thereafter, sufficient drying time should be allowed in accordance with the manufacturer's recommendation. Preferably drying may be done overnight. This dried putty should be sanded off with a paper of 180 grit to level the surface. Thereafter the surface should be cleaned with tack cloth.
- 9.4 **Application of spray enamel synthetic paint to IS: 8662-** The cabs (inside) shall be painted with according to the previously painted scheme i.e. enamel to the existing colour scheme. The DFT of the final paint should not be less than 40 microns at any place and this thickness is to be achieved in two coats minimum.

Note:- It is clarified that the even though driver desk is to be subjected to painting but the equipments of the driver's desk, i.e. gauges, master controller etc, shall not be-subjected to putty work. Suitable masking may be done for protection.

10. **ROOF PAINTING:**

10.1 **Exterior surface-**

- 10.1.1 **Surface preparation-**Remove old paint from the damaged/corroded/rusted section of areas of roof and wherever loose paint flakes are available. Care should be taken to avoid any undesirable effect on the body sheet or any other parts. Clean the surface duly removing the accumulated dirt, oil and grease etc.
- 10.1.2 **Application of anti-corrosive primer-**The surface should be cleaned thoroughly with the help of wire brushes and tack cloth. All the welded beads should be levelled with the help of rotary grinders. Subsequently, it is to be coated with red oxide zinc chromate primer to IS:2074 making sure that the DFT is not less than 40-50 microns at any place.
- 10.1.3 **Application of two pack putty-**After a drying period of at least 24 hours, all the major dents and scratches as well as well beads are to be filled with this two pack putty by knife to achieve levelling of surface and thereafter we sanded with 80 grit paper. The purpose is to obtain maximum smoothness, maintain perfect/symmetrical level. At this stage, the roof equipments should be refitted.
- 10.1.4 **Application of Aluminum paint-**The whole surface area is to be cleaned with help of tack cloth and then to be painted with the help of spray gun using cup gun method. The DFT of the paint should not be less than 60-80 microns at any place and this thickness is to be achieved in minimum three coats.

- 10.2 **Interior Surface-**The procedure for painting the roofs from inside is same as mentioned above from Para 8.1 to 8.4. The roofs should be kept on raised stand for interior painting.

11. **CLEANING AND PAINTING OF LOCO PNEUMATIC PIPE LINES, EQUIPMENT AND UNDER FRAME:**

- 11.1 After the locomotive is placed on Jacks, the under-frame surface, pneumatic pipe lines, Main reservoirs MR-1,2,3,4&5, Centrifugal dust collectors 1&2 , After cooler, Control reservoir, Air dryer, cocks, all pneumatic valve bases should be cleaned thoroughly with the help of scrapers

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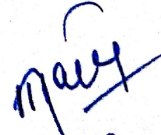


and wire brushes to remove the bulk of muck and mud that may be stuck to it. Thereafter the method of cleaning can be adopted, depending upon the facility available at site.

- 11.2 After scrapping & iron brushing of under frame equipments, Pneumatic pipe lines and other accessories are to be cleaned with kerosene oil & cotton waste.
- 11.3 Pneumatic Pipe lines are applied with a suitable rust converter that should be applied evenly on the entire surface prior to application of Anti corrosive primer. Care should be taken to ensure that rust converter does not affect adhesion of Anti corrosive, red oxide zinc chromate primer to IS:2074.
- 11.4 All the above equipments are to be painted thoroughly with silver paint.
- 11.5 After applying silver paint, pneumatic equipments, pipes and cocks to be painted with colour code (as instructed by Consignee) at under frame.
- 11.6 After applying silver paint, CDC -1&2, Control reservoir, MR reservoir 1,2,3,4&5, After cooler, Air dryer Safety guards are to be painted with black paint.
12. **STICKERING WORK:** The details of locomotive shall be done with sticker (radium tape – self-adhesive reflective film acrylic type as per the proposed colour scheme recorded during initial joint inspection for respective locomotive. Any additional writing work as received on incoming loco or as intimated by Sr.DEE/TRS/GD or his authorized representative, shall be done on exterior body free of cost. Prior approval shall be obtained from Sr.DEE/TRS/GD for radium tape as specified above before use by the contractor.
13. To obtain the high performance of protective painting (PU) system the surface should be prepared thoroughly and correctly and the nature of the paint coating should be followed as per paint manufacturer's instructions.
14. The dry film thickness (DFT) will be as follows after completion of painting-
- 14.1 **Exterior surface-**
- (i) Primer application - 160 microns.
- (ii) Finish coat - 60-70 microns.
- (iii) Total - 220-230 microns.
- 14.2 **Interior surface-**
- (i) Primer application - 40-45 microns.
- (ii) Finish coat - 80-85 microns.
- (iii) Total - 120-130 microns.
- Note: The Contractor shall arrange all the testing/measuring instruments those are required to ensure the parameters of PU painting as per specification/agreement condition.
15. **LETTERING:** Lettering work should be with the high adhesive sticker of suitable colour of make 3M or equivalent. The drawing or required diagram shall be done using enamel paint or sticker transfer. The colour and dimensions of sticker for lettering shall be same as suggested by the authorized Railway representative during the inspection.
- If any further stenciling of loco equipment is required (beyond those covered under scope of stickering), stenciling should be done by the contractor at free of cost with paint as per requirement of Railways, after painting of locomotive.
16. Colour scheme of locomotive shall be as jointly recorded on incoming loco with the Railway's representative before starting the work. Same scheme shall be replicated through "PU" painting. Contractor's representative and Railway's representative will prepare an initial joint inspection report.



17. **PROVISION OF HORIZONTAL BAND AND LOCO NUMBER WITH RETRO-REFLECTIVE STICKER (RADIUM) ON LOCOMOTIVES:** The locomotive exterior body to be provided with horizontal band of Red colour Retro-reflective Radium sticker on either side of loco with dimensions of (42 feet length x 1 foot width ) on both sides and loco number to be provided with Red colour Retro-reflective Radium sticker of size (05 feet length x 1.5 feet width) on either side of loco.
18. **FACILITIES THAT WILL BE PROVIDED BY RAILWAY AT FREE OF COST:**
- 18.1 Electricity and water required for execution of the work. In case of any breakdown in water and power supply, the contractor should make alternative arrangement and Railway is not liable to pay towards any loss incurred by the contractor on this account.
- 18.2 Welding plant without electrodes.
- 18.3 Provision will be made for keeping the materials, tools etc. of contractor.
- 18.4 EOT cranes for handling the roof hoods.
- 18.5 Compressed air will be arranged free of cost & Contractor has to make his arrangements for using the compressor air arranged by Railways.
- 18.6 Ladder trolley required for painting work of loco.
- 18.7 Necessary material handling facility shall be provided by Railways (i.e. EOT crane, Forklift, battery operated truck etc.) as per their availability in the shed.
19. **INSPECTION:**
- 19.1 **Initial inspection:** The locomotive shall be jointly checked and recorded as per Annexure-A, with the Railway's representative before starting the work. Initial joint inspection report shall be jointly signed by contractor's representative and Railway's representative.  
Before commencement of work on each loco, the PU paints/putty/primers being used shall be shown to the Railway representative.
- 19.2 **Final inspection:** The joint inspection of painted locomotive as per Annexure – D shall be carried out by the authorized representatives of Railway & contractor. The final inspection report shall be jointly signed by Railway representative and contractor's representative after completion of work on that locomotive. The contractor has to arrange all the facilities required during stage and final inspection at free of cost and to bear all the incidental charges required, if any, towards the chemical testing etc.
20. Any dispute regarding scope of work involved to carry out the work between contractor & Railway representative at the time of joint checking, the same shall be referred to Sr.DEE/TRS/GD, whose decision shall be final & binding.

  
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**INITIAL JOINT INSPECTION**

LOA No. &amp; date™

Sr. No.	Loco No.	Date of loco handover to Firm	Remarks (if any)	Sign of SSE/LD-GD	Sign of Firm representative
1					
2					
3					
4					
5					
6					
7					
8					
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10					
11					
12					
13					

Countersigned by Officer  
Loco Shed Gonda

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### Format for Inspection Register (during work)

The Locomotive(s) was inspected on the date of measurement regarding Painting work. During Inspection of loco, observations noted are as below-

[illegible]

Countersigned by Officer  
Loco Shed Gonda

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Format for Material Register

LOA No. &amp; date

Sr. No.	Item Description	Quantity	Challan / PO / Receipt No.	Sign of Firm representative	Date of inspection	Remarks of SSE	Sign of SSE

Countersigned by Officer  
Loco Shed Gonda

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## FINAL INSPECTION REPORT

LOA No. &amp; date

Sr. No.	Loco No.	Date handover of Firm	to	Date of completion	work	Penalty (if any)	Remarks (if any)
1							
2							
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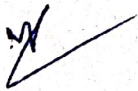
- A. The final inspection of above P.U/Enamel painted locomotives carried out jointly.  
 B. All the stage booking / defect / deficiencies have been attended by the contractor.  
 C. Final painting of exterior surface interior surface and Roofs as per scope of work is carried out by the contractor.  
 D. Any other penalty (apart from above) is :


Date:

Firm's Representative

- SSE/LS GD

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