2. SHELL

Version: **1.1**



All rights reserved. This book or any portion thereof may not be reproduced or used in any manner whatsoever without authorization from Indian Railways.

Content in this document is compiled with the inputs provided by ICF, MCF, RCF, RDSO, OEMs and Railway Board instruction.

Amendment and Revisions

Version	Date	Corrections	Remarks
1.1	JULY 2022	REVISED MANUAL	

Table of Content

2. SHELL 1
2.1 General 5
2.2 Heat and Sound Insulation 6
2.3 Details of Heat Insulation 6
2.4 Details of Sound Insulation 6
2.5 Side Wall 7
2.6 End Wall 7
2.7 Roof 7
2.8 Under Frame 8
2.9 Codal Life Of Coaches 9
2.10 Periodicity of Maintenance Schedules 9
2.11 Periodical Overhaul 9
2.12 Method of Repairing 9
2.13 Maintenance During Shop Schedule-I 10
2.14 Lowering the Coach Body 11
2.15 Height of Centre Buffer Coupler 13
2.16 Coupler Height Adjustment 13
2.17 Body Repairs 13
2.18 Roof 16
2.19 Repairs to Door Handles 16
2.20 Repairs to Door Pivots 16
2.21 Repairs to CBC Support Structure 16
2.22 Water Tank Support Structure 16
2.23 Repairs to Floor Channel 16
2.24 PU. Surfacer Application 17
2.25 General Practice for Welding 17
2.26 Repair Procedure by Welding for Cracks on Sole Bar of LHB Coach 17
2.27 List of Tools and Plant Required for Shops 19
2.28 Examination and Repair Practice 19
2.29 Guideline for Corrosion Repair in LHB Design Coaches 20
2.30 Examination of Trains 20
2.30.1 Examination Of Originating Trains 20
2.30.2 En-route/Terminating Examination Of Passenger Trains 20
2.31 Washing and Cleaning of Coaches 24
2.32 Platform Cleaning and Washing 24
2.33 External Cleaning / Washing 24
2.34 Cleaning of Toilet 25
2.35 Internal Cleaning of Coaches 25
2.36 Internal Cleaning of GS, Generator Car/SLR 26
2.37 Maintenance Practices in Open Line Depots 27

2.37.1 Nomination Of A Depot 27
2.37.2 Special Repairs 27
2.37.3 Formation Of Block Rakes 27
2.37.4 Destination Boards 27
2.37.5 Fire Extinguishers 28
2.37.6 Brake Van Equipment 28
2.37.7 Watering And Cleaning Of Rakes 28
2.37.8 Deficiency Rolling Stock (DRS) For Coaching Stock 28
2.38 Reporting of Thefts 30
2.39 Coach Maintenance History Card 30
2.40 Warranty Claim for Defective/Failed Items 31
2.41 Maintenance Schedules to Be Followed in Coaching Depots 31
2.42 Schedule Examination 32
2.43 Detachment A Coach 32
2.44 Air Brake Rake Testing Procedure 33
2.45 Special Schedule 33
2.46 Procedure for Sending the Coaches to Shops for Shop Schedule 33
Annexure 2.1 35
Annexure 2.2 41
Annexure 2.3 43
Annexure 2.4 44
Annexure 2.5 45
Annexure 2.6 46
Annexure 2.7 47

2.1 General

The LHB Coach is of integral light weight construction, consisting of separate assembly group for under frame, side walls, roof and end walls. The individual assemblies are joined to each other by welding.

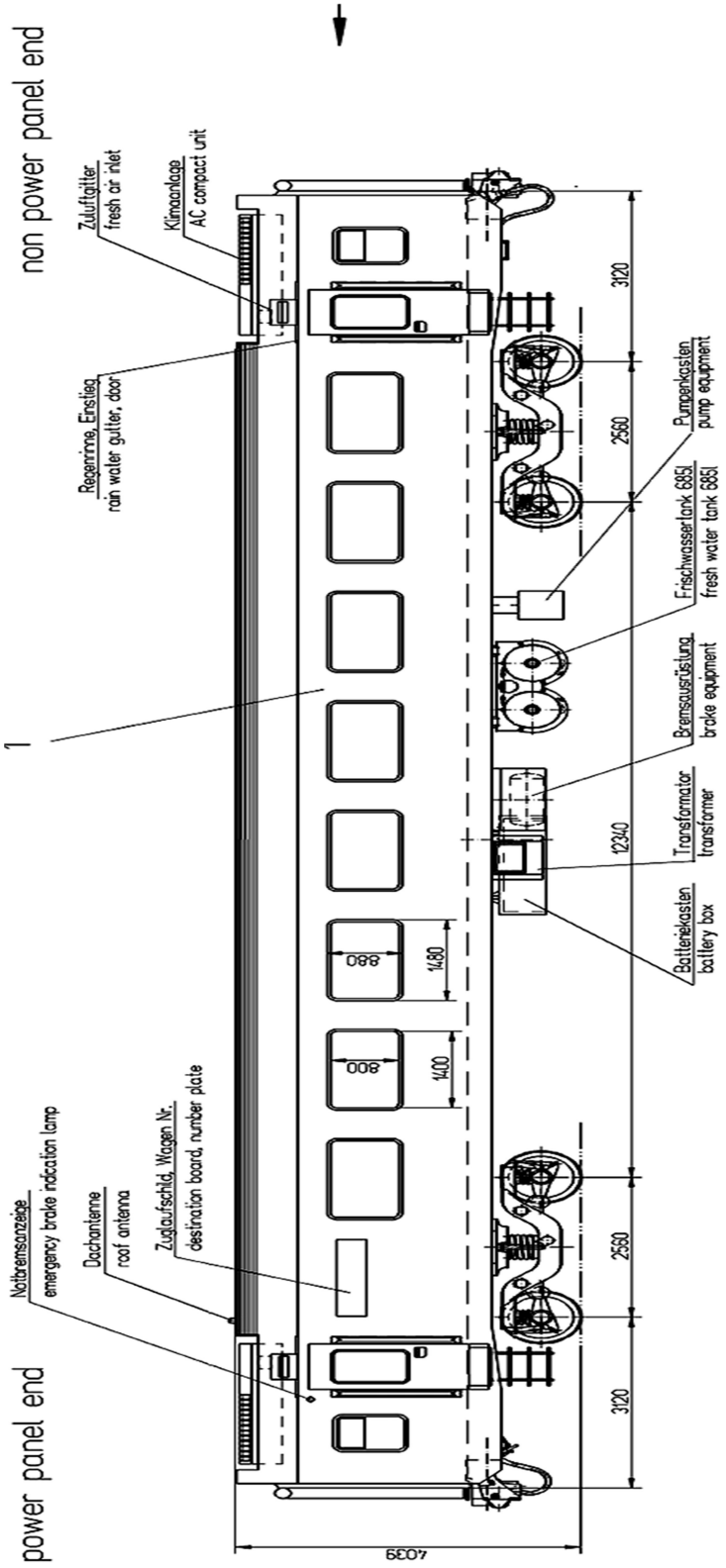


Figure: 2.1 View of LHB Coach

Three types of steel are used for manufacture of body shell.

Shell Assemblies	Steels used and their %age compositions	UTS N/mm^2	Yield Stress N/mm^2
Side wall, End wall and Roof structure	• X2CrNi12 Ferritic steel (Ref: Corrigendum No.1 of October, 2015 to RDSO Specification No. C-K 201, Amendment -1) • Chemical composition shall also be corrected as per RDSO Specification No. C-K 201, Amendment No. -1, Corr.-1.	450-600	320
Roof sheet and Trough floor	Chemical composition shall also be corrected as per RDSO Specification No. C-K 201, Amendment No. -1, Corr.-1.	550-750	235
Under frame	IRS M-41 / Corten Steel (C 0.01% max, Cr 0.35 -0.6%, Ni 0.2 - 0.47% Cu 0.3 - 0.6% Si 0.28 -0 .72%, Mn0.25 to 0.45%)	440-480	320

The important features of body shell which make it superior to conventional ICF shell are described below.

2.2 Heat and Sound Insulation

With regards to heat and sound insulation, LHB shell is far superior to ICF shell. PU based spray insulation is provided on the interior surface of the car body shell for corrosion protection and sound insulation. Heat insulation of the floor side wall lower area and end wall is done with Resonaflex insulation mat. Use of Resonaflex ALU and Bary skin V 60 DB in the shell, decoupling element in the flooring and elastomeric rubber metal components in bogie results in superior noise insulation. The noise level inside the coach is limited to 60 DB.

2.3 Details of Heat Insulation

Type/Location		Thickness
1.	Glass Wool insulation for Roof, Side wall, End wall	60 mm
2.	Glass Wool insulation for flooring	30 mm
Technical details of Resonaflex Alu are:		
1	Size of sheet	1000x1000 $^{+10}/_{-20}$ mm
2	Thickness	20 mm to 100 mm with 5 mm steps
3	Cubic weight	28.0 kg/m^3
4	Fire response	Conforms to B-1 of DIN 4102/5510

2.4 Details of Sound Insulation

Location	Thickness
Roof, side wall and end wall	2-3 mm
Floor near bogie(inside)	6-8 mm
Floor residual region	2-3 mm
Floor outside (thick coat)	100 microns

All items of end wall are manufactured from 2, 2.5, 3 and 4 mm ferritic stainless steel except console which is manufactured from 6 mm carton steel plate.

2.5 Side Wall

The side walls are manufactured by TIG Welding of sheets to achieve low heat inputs, less distortion and negligible shrinkage. The thickness of side wall sheets is 2 mm. The other important features are:

- Door frames are part of sub-assembly of side wall but fabricated separately to take up compensation of tolerances in whole side wall.
- Positive interlocking between all horizontal and vertical members
- Reduced side wall thickness of 60 mm from 90 mm.
- Better geometric integrity and strength.

Side wall is welded with under frame by V grooving of sole bar. Meta cot silver grey weld able primer is applied to avoid bimetallic corrosion. The welding is done by magnetic track welding and grinding of welded joint is done to ensure smoothness. The design of side wall has eliminated turn under to avoid accumulation of water; muck and resultant corrosion.

2.6 End Wall

End wall is made of ferritic steel. To reduce its weight holes provided in all stiffeners. The projection of side walls towards end is more. This results into more availability of space for passengers and reduction in the gap between two coaches, thereby reduced wind gap resistance and turbulence. The gap between two end walls is 300 mm only.



Figure: 2.2 Shell Structure

2.7 Roof

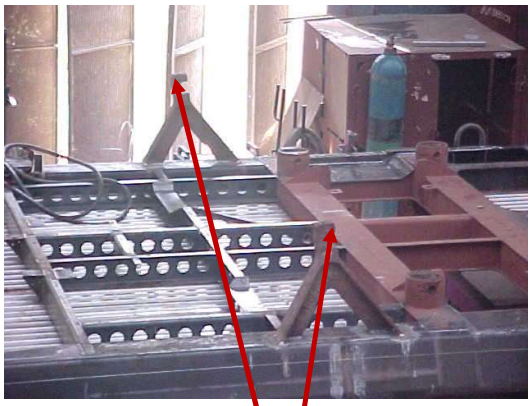
Roof sheets are manufactured from 1.25 & 1.7 mm Austenitic stainless steel. Roof arches are manufactured from 2mm Ferritic steel. End plate and angles are manufactured from 4 mm Ferritic steel. The middle portion of roof sheet is plain and manufactured from 1.7 mm Austenitic steel. The roof is light weight as compared to ICF coaches.

2.8 Under Frame

Main Components of Under Frame are:



- Front part made by joining head stock and body bolster.
- Two side sills of sole bar of AC Chair car are made of section 238x65x6.
- Two side sills of sole bar of AC Power car are made of section 238x65x8.
- Two side sills of sole bar of both above coaches are made of section 238x65x4
- Two main cross members - 6 mm thick
- Frame – cross members made of folded channel sections 140x50x4
- Floor is made of corrugated sheets of 1.25 mm thickness
- Corrugated trough floor is plug welded from top with the cross members.



YAW DAMPER (connected between under frame and bogie frame) brackets are welded on the under frame



Water tank mounting brackets are welded on the under frame

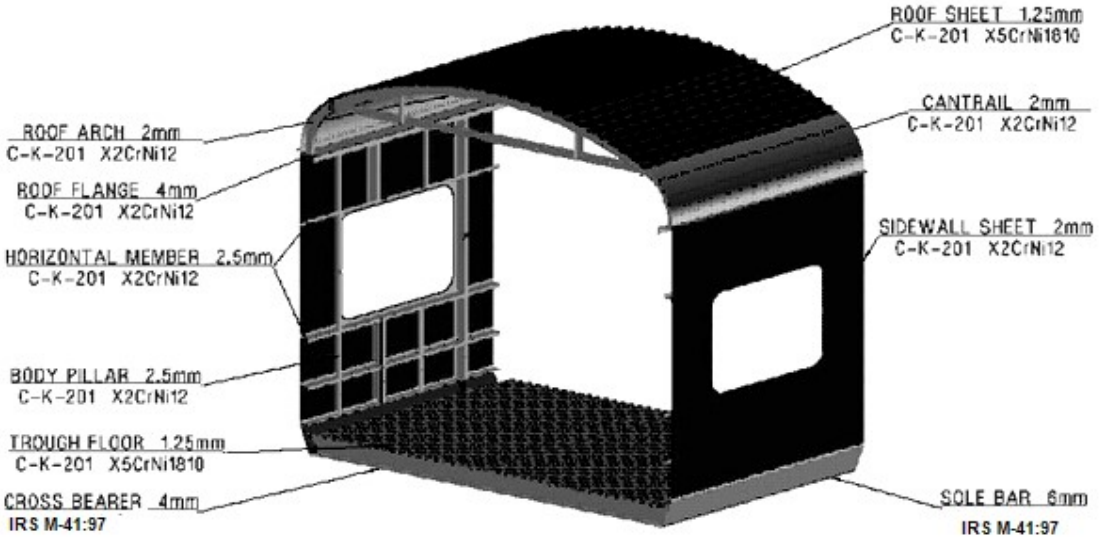


Figure: 2.3 Diagrams Showing Various Sections of Shell

2.9 Codal Life Of Coaches

The service life of LHB Coach has been fixed as per Railway Board letter RBA No 25/2006 dated 25.05.2006

Steel body coaches including Restaurant Cars etc DMUs/EMUs	25 years
Full Stainless Steel body coaches including Restaurant Cars etc DMUs/EMUs	30 years

2.10 Periodicity of Maintenance Schedules

TABLE-1

Schedule	Periodicity
Trip Schedule D1	Every Trip/Weekly
Monthly Schedule/D2	30 days ± 3 days
Six Monthly Schedule/D3	180 days ± 15 days
(Shop Schedule I) /SS-I	18 Months + 30 days/6 Lakhs Kms earned whichever is earlier.
Shop Schedule II / SS-II	3 Years/12 Lakhs Kms earned whichever is earlier.
Shop Schedule III /SS-III	6 Years/24 Lakhs Kms earned whichever is earlier.

2.11 Periodical Overhaul

- The general sequence of work during Shop Schedules of a coach is given in a typical PERT chart as shown in Annexure 2.1
- Modifications in LHB type BG coaching stock is given in CAIs issued by RCF/KXH. The list of these CAIs is in Appendix-A.

2.12 Method of Repairing

Lifting the coach body

a. On receipt of a coach for Shop Schedule, it must be taken on Lifting line/ Stripping line where electrical fittings should be disengaged /disconnected and

batteries removed. Furnishings, especially seats and backrests should be inspected thoroughly and only those that require repairs or attention should be removed.

b. Before lifting a coach, the following components should be removed, disengaged or disconnected:-

(i) Wheel sets earthing equipment.
(ii) Speed sensor cover.
(iii) Yaw Dampers.
(iv) Secondary Lateral Damper.
(v) Roll Link from Bolster.
(vi) Wire rope pin from Bolster.
(vii) Hose connection from Bogie to coach.
(viii) Centre pivot security plate.
(ix) Bolster from coach body by means of removing nut & swing nut.
(x) All air brake fittings
(xi) Control arm bottom cover
(xii) Centre Buffer Couplers etc.
(xiii) Under slung water tanks & Water Raising Apparatuses (WRA), where provided.
(xiv) Battery box and electrical fittings.
(xv) AC equipment in AC coaches.

c. Coach body should be lifted off the bogies either by two overhead electric cranes of 25 tonnes capacity each with suitably designed lifting tackles or by four powered lifting jacks of 15 tonnes capacity each operated simultaneously by one control switch. The coach body should be lifted uniformly without jerks and should remain horizontal during the lifting/ lowering operation. Coach should not be lifted from any point other than at the lifting pads.

d. The coach should never be lifted from one end only. If lifted from one end, the Centre pivots security plate is likely to suffer damages, body panels are likely to get dented near the body bolster. The sealed windows of AC coaches are also likely to break.

e. After the coach body is lifted, it should be kept on trestles. The steel trestles of the design shown in Figure 2.4 would prove useful for this purpose Lines should be protected by scotch blocks with locking arrangement and key should be kept with Engineer till the time maintenance work is carried out.

f. The entire under frame should be cleaned of dust, rust etc. from underneath by pneumatic/water jet followed by wire brushing at critical locations and check for cracks/damage, corrosion etc. on the under frame members.

g. After carrying out all repairs, the under frame should be painted with Anti Corrosive paint.

2.13 Maintenance During Shop Schedule-I

i. All bogies of LHB coaches shall be given SS-I after **18 months + 30 days** from the date of last Shop Schedule as per table 1.

ii. During this schedule, bogies/under frame members and body including trough

floors should be thoroughly examined and all parts of running gears are repaired/ replaced as necessary.

iii. The detailed of maintenance activities to be carried out during SS-I schedule, please refer Chapter 10 of this manual.

iv. The date of this schedule should then be stenciled at the appropriate place in schedule chart on the end panel.

2.14 Lowering the Coach Body

a) After all the repairs are carried out refit all repaired sub-assemblies which are removed for maintenance and lower the coach body on the overhauled and tested bogies.

b) The securing arrangement of Centre plate should be fitted into position and secured by means of necessary fittings.

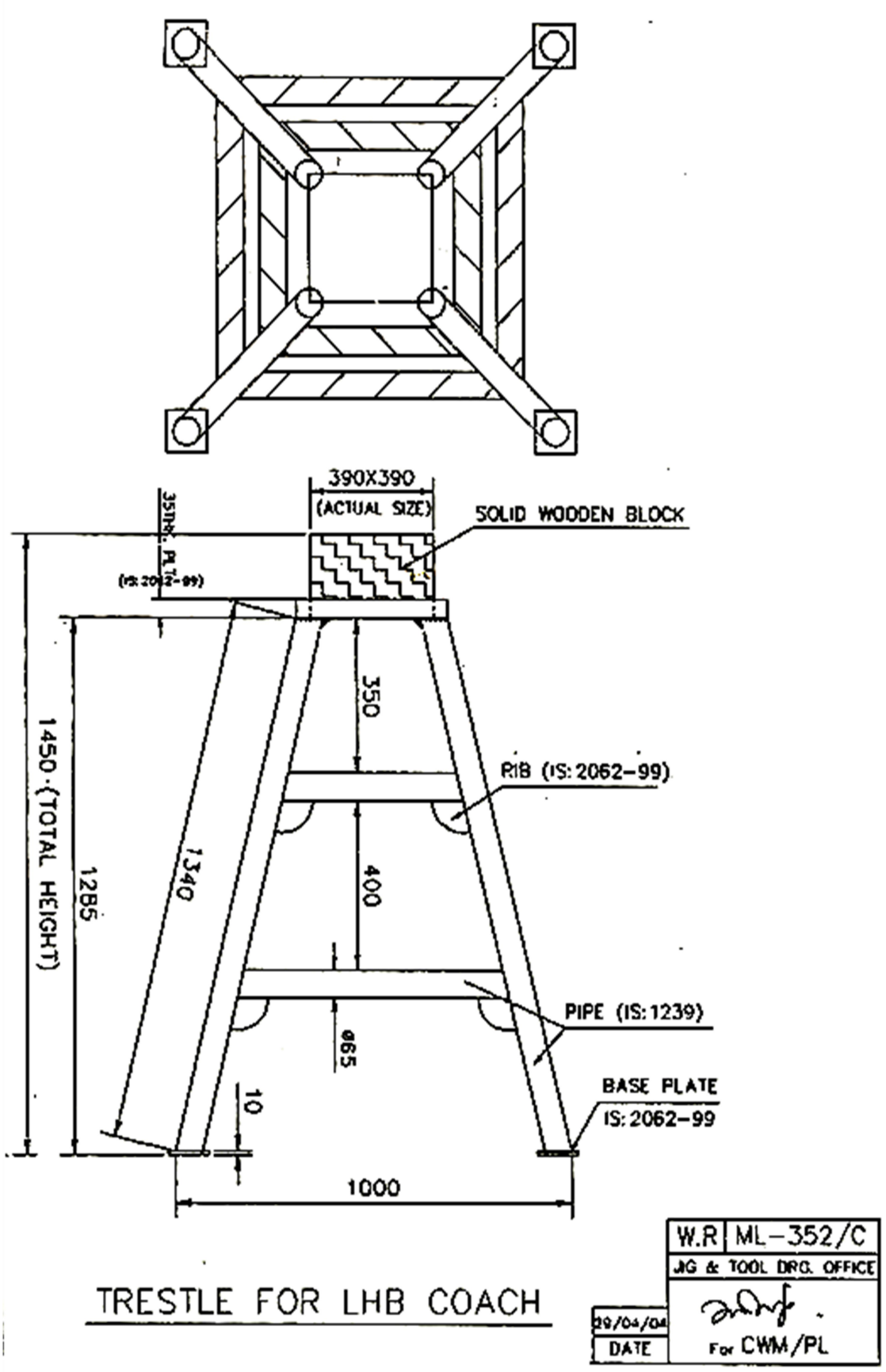


Figure: 2.4 Trestle for LHB Coach

2.15 Height of Centre Buffer Coupler

i. Height of CBC of a coach under its tare condition should be as under:-

Table 2

	Maximum height from rail level	Minimum height from rail level
Production units	1105 mm	1095 mm
Workshops	1105 mm	1090 mm

i. CBC height of a coach should be measured under its tare condition from the top of the rail on a level and straight track. For this purpose, a specific portion of the track should be earmarked in each carriage repair workshop. Engineer (Permanent Way) should get track attended and leveled once every month and then give a certificate that nominated portion of the track has been fully attended to and is in perfect level and straight condition.

ii. The height should be measured from the rail level to center of shank.

iii. Before the height adjustment of CBCs of the coach is taken up, it should be ensured that both the couplers have been fitted properly.

iv. The diameters of all the wheels measured before the assembly of the bogies must be available with the staff carrying out the height adjustment of CBCs.

2.16 Coupler Height Adjustment

Coupler height shall be adjusted by adding or removing shims from the bottom of the coupler carrier assembly when the vehicle is empty and at rest on a level track as per procedure described in chapter 5

2.17 Body Repairs

a. Inspection and repair of body members are done after the coach body is lifted off the bogies and placed on trestles.

b. All furnishing and other components from coach shell, which are stripped, are to be sent to the respective sections for maintenance.

c. Inspection of under frame

i) The under frame members should be thoroughly inspected for locating cracked/bent/corroded members. Corrosion is indicated by flaking of paint, flaking of metal, pitting and scale formation. Components like sole bar and trough floor which are not visible from both sides should be examined by tapping with a spiked hammer. Proper illumination will be required to carry out the check. A component will require repair/ replacement, if it has lost more than 20% of it's thickness.

ii) Particular attention should be paid to the more vulnerable members and locations listed below:-

- Sole bar, side wall pillar, and trough floor below lavatories in all types of

coaches and the luggage compartments of all SLRs and parcel vans.

- Sole bars, side wall pillars, and pillars above lifting pads
- Sole bars and pillars behind the sliding door pockets of SLRs and parcel vans.
- Sole bars and pillars and at the door corners.
- Head stock.
- Sole bars and pillars near coach body bolster.

1)Top flange (PartNo:5&6,4mm–IRSM41-97)under lavatory modules 2)Plate (Part No:33,4mm–IRSM41-97) above CBC coupler carrier and between Lavatories duly after removal of draft gear.3)Web (PartNo:22,6mm–IRSM41-97).4) Lower Flange (PartNo:7&16,8mm–IRSM41-97).5) Member(PartNo:20&21,4mm–IRSM41-97).6) Longitudinal member top flanges (Itemnos:14&15asperdrgno: LP11105,more prone to corrosion in LWLRRM luggage compartment). 7) Flange Plates (Itemnos:11&12 as Per drg no:LP11105,moreproneto corrosion in LWLRRM luggage compartment) 8) Main Door pivot holding bracket &Foot board holding bracket.

d. Procedure for inspection of under frame members for corrosion attention in case of vulnerable and not so-vulnerable locations should be (followed as given in RDSO /2019/CG/CMI-01, May-2021-Para 2.0 & 3.0 may be considered or latest). for details procedure please refer Appendix -E

i. Sole bar, body pillar at lavatory area

- Examine visually supplemented by tapping with a spiked hammer sole bars and pillars in the bays under and adjoining lavatories from below
- the coach after removing the accumulated dirt and cleaning the surface.
- If incidence of corrosion is noticed in the bottom half of the sole bar, the trough floor should be cut to a width of 300 mm and requisite length for examination of inside top half.
- If heavy corrosion is noticed, the side wall should be cut to a height of 500 mm. from the bottom covering sufficient length and all the exposed parts, after scraping and cleaning, should be examined to determine the extent of corrosion.

ii. Sole bar and pillars above the lifting pads

- Examine the above members in the same manner as described
- If signs of corrosion are noticed, the side wall sheet above the lifting pads should be cut to a height of 500 mm. and to a length of half meter, on either side of lifting pads. Scrape the structural members, clean and examine minutely to ascertain the extent of corrosion.

iii. Sole bar and pillars at door corners

- Examine the above locations visually. If corrosion is noticed, cut the side wall to a width of half meter from the door corner. Remove accumulated dust. Structural members should be thoroughly scraped, cleaned and examined to assess the extent of corrosion.

iv. Sole bar and body pillars at locations other than those described above

- Examine visible portion of sole from bottom of the under frame.

- Remove the accumulated dust and scrape structural members to the extent possible. If corrosion is noticed, side wall sheet in the area of corrosion should be cut to a height of 450 mm. from the bottom sufficient length for thorough examination.

v. Head stock

- Examine visually head stock, stiffening immediately behind the CBC and the junction of the sole bar at the head stock for incidence of corrosion.

- Examine visually inner head stock, outer head stock, stiffening immediately behind the CBC and the junction of the sole bar at the head stock for incidence of corrosion.

vi. Trough floor

- Examine the trough floor in the bays adjoining the lavatories and under the luggage compartments of SLRs and parcel vans from below for signs of corrosion, supplemented by tapping with a spiked hammer.

- If signs of corrosion are noticed in the above examination, the part should be thoroughly cleaned by scraping and an intensive inspection should be carried out to detect the extent of corrosion in the trough floor.

e. Corrosion repairs to under frame Members

i) Corrosion repairs should be carried out as per instructions.

It is essential to use corrosion resistant steel sheets of prescribed quality for corrosion repairs of coaches. Welding electrodes and paints should be of the prescribed quality conforming to the relevant IS/ IRS specifications.

ii) Where the corrosion noticed is of a very minor nature and has just started, there is no need to renew the parts. In those areas, the paint and the rust should be thoroughly cleaned to reach the bare metal and the surface treated with two coats of red oxide zinc chromate primer followed by the four coat system of anti-corrosive bituminous paint.

Note- SN, c to e (Guidelines for Corrosion Repairs in LHB Coaches to RDSO-CMI No. RDSO/2019/CG/CMI-01 of May-2021" may be referred Appendix -E)

2.18 Roof

a. Roof repairs

i) In LHB coaches, roof should be checked for corrosion. Special attention should be paid at location where gutter moldings are welded and ventilators bolted. Corroded roof should be repaired according to the instructions.

b. Roof Ventilators repairs

i) Examine the roof ventilator for damage or corrosion or leakage. If no corrosion is observed then seal the joints and crevices with water proof sealing agent. The securing bolts should be replaced whenever a ventilator is removed. Otherwise, they should be checked for tightness. Loose and corroded bolts should be replaced.

ii) After repairs and refitting, ventilators should be tested for water leakage at their base joints at the time of roof testing.

c. Roof testing

All coaches after Shop Schedule should be tested under water spray for roof leakage before they are finally turned out from the workshop. For this purpose, a fixture designed to simulate monsoon conditions should be provided in the workshop.

2.19 Repairs to Door Handles

Examine the door handle for breakage, damages. If the fixing bolts are loose or missing, tighten the bolts. Replace the door handles which are found beyond repairs.

2.20 Repairs to Door Pivots

Examine the door pivots for corrosion, breakage or wear by cutting the bottom portion of outer panel. Cut the corroded portion of the door pillar (Z molding) and weld new piece joining the door pivot pin. If the female socket is worn or damaged beyond repairs then replace it. Replace the bush provided in the socket.

2.21 Repairs to CBC Support Structure

Examine the CBC support structure for corrosion, breakage, etc. If the corrosion is light, scrap off the rust to bare metal, clean well and re-paint. If the corrosion is heavy, replace the corroded angle or gusset plate with new support angle.

Similarly examine the CBC support structure for corrosion, breakage, etc. If the corrosion is light, scrap off the rust to bare metal, clean well and re-paint. If the corrosion is heavy, replace the corroded angle or stiffeners.

2.22 Water Tank Support Structure

Examine the water tank support structure for corrosion, breakage, wear, etc. If the corrosion is light, scrap off the rust to bare metal, clean well and re-paint. If the corrosion, breakages are beyond repair, replace the corroded angle with new angle of suitable size as per the requirement. Replace the rubber/wooden packing if perished or damaged.

2.23 Repairs to Floor Channel

Examine the floor channel for corrosion, breakage, wear, etc. by cutting opening the PVC and plywood flooring where the corrosion suspected. If the corrosion is light, scrap off the rust to bare metal, clean well and re-paint. If the corrosion, breakages are beyond repair, replace the corroded channels with new channel of suitable size as per the requirement.

2.24 PU. Surfacer Application

P.U. surfacer/touch up on shell to be carried out as per instruction issued by RCF/Kapurthala vide document No. PLW 905 dated 09.06.2004 and M&C/PCN-100/2006.

2.25 General Practice for Welding

- All repairs of cracks should be carried out by gouging and welding by suitable electrodes.

- **CAUTION**: No electric welding on the coach should be carried out without proper earthing from near the portion being welded such that the return current has a distinct path (earth) which should not be allowed through the bogies and rails. In the absence of such earthing, the return current passes through axle roller bearings causing pitting of rollers and bearing failure in service.

- Distorted and bent parts should be heated and straightened.

- The parts used for repairs should be given proper surface treatment and applied with protective paint. Relatively thick sections such as sole bars, cross bearers, etc. should preferably be grit blasted and immediately thereafter given a protective coat of red oxide zinc chromate primer paint.

  Welders' Qualification: Welders deputed to carry out welding work on coaches and coach components should be only those tested and certified as adequately skilled for welding work on coaches and coach components.

2.26 Repair Procedure by Welding for Cracks on Sole Bar of LHB Coach

The repair should be carried out as per ED/STD (Carriage)/RDSO: letter No. MC/LHB/Coach, dated 10.10.2007

Reason: To prevent crack developed on sole bar near yaw damper bracket. Coach types proposed for inspection & repair are: ALL LHB type coach

Action: Weld procedure shall be adopted as advised under.

Material of:

(a) Yaw damper = Cast Steel **(b)** Sole bar = Corten Steel to IRS: M-41

Welding Electrodes used for repairs: Manual metal Arc welding electrodes should be used as per IRS: M-28-2020.version 1.0 dt 30.12.2020

These instructions shall be implemented during Shop Schedule and special repair of LHB coaches.

Sr. No	Activity
1	To inspect condition of coach at incoming/stage inspection & final inspection
2	**Before welding:** **a)** Clean the cracked area properly to remove all dust, dirt, grease, paint etc. **b)** Use dye penetrant test (DPT) to get proper location of crack. **c)** Drill a hole of 7 -10 mm diameter at about 15 – 20 mm away from the extremities of crack. **d)** Ground/gouge the crack up to its root & the same should be confirmed by DPT test. The grinding shall be extended up to near drilled end hole. **e)** Before welding proper removal of crack must ensured. **f)** Preheat the crack location (specially the yaw damper bracket, if the crack is at the joint of the bracket of the sole bar) to about 150° C, by oxy-acetylene flame; ensure temperature by using thermal chalk. **g)** After preheating the areas to be welded are thoroughly cleaned using wire brushes; to remove any oxide or carbon block etc. present.
3	**During welding:** **a)** Use AC or DC welding machine. **b)** If AC welding machine is used then, it must have OCV min 70 Volt. **c)** If DC welding machine is used then, electrode is to be connected with +ve terminal of the machine. **d)** Adjust the welding current within the recommended range of electrode manufacture. **e)** Preheat electrode: 250° C for 2 hours or 350° C for 1 hour or as recommended by electrode manufacture. **f)** Suitable anti-spatter compound be applied before welding. **g)** Root run by 3.15 mm diameter electrode with higher current for proper penetration, subsequent run by 4 mm diameter electrode. **h)** Fill up the contour properly. Proper slag removal before putting subsequent run.
	After welding:

	a) Remove all slag, spatter by using wire brush/chisel. **b)** Dress the final weld contour by little grinding. **c)** Finally check by DPT. **d)** If any crack is noticed, repeat the above procedure again and re-weld again. **Final inspection:** welding must be free from any crack or other harmful defect in visual & in DPT.
5	To keep records and co-ordination between shop & final inspection.
6	Procurement of suitable electrodes and other materials as above.

2.27 List of Tools and Plant Required for Shops

1. EOT cranes 2. Synchronized lifting jack 15/20Tcapacity 3. Trestles for coach body 4. Inspection torches 5. Spiked hammers 6. Ball peen hammers 7. Goggles for inspection staff 8. Measuring tape	9. Measuring scale 10. Gas cutting plants 11. Multi-operator welding plants 12. CO2 Welding plant 13. Electrical angle grinders 14. Pneumatic hand grinders 15. Component painting equipment 16. Phosphating plant

2.28 Examination and Repair Practice

Schedule D1, D2, D3 should be carried out in depots as per following periodicity

D-1 (D1 Schedule, Every Trip/Weekly)

D-2 (D2 Schedule, 30 days ± 3 days)

Check visually the following for any damages/defects/deficiencies, it is to be done in D1 or D2 or both:

- Destination board brackets.
- Body panels.
- End walls

- Windows walls
- Body side doors
- Condition of head stock, sole bar and other under frame members.

D-3 (D3 Schedule, 180 days± 15 days)

- In addition to Schedule D1 & D2 do the following.
- Examine trough floor and other under frames from underneath for corrosion.

The detailed items to be carried out have been covered in chapter 10 of this manual.

2.29 Guideline for Corrosion Repair in LHB Design Coaches

CMI No RDSO/2019/CG/CMI-01 version-2.0 issued on May 2021, The details instruction for corrosion repairs in LHB design coaches for the workshops is enclosed Appendix -E

2.30 Examination of Trains

The examination is to be carried out as per RPC-IV as amended from time to time.

2.30.1 Examination Of Originating Trains

i) All trains must be examined by the mechanical train examining staff before dispatch to ensure that all coaches on the train are in fit condition and without reject able defects. On formation of a rake and after its placement for examination, washing, cleaning and watering, the Station Master (SM) shall pass necessary memo to the Engineer (C&W). After carrying out all necessary work, the Engineer (C&W) shall communicate fitness of the train to Station Master. Normally, Railways have standard forms for the use of Station Masters and Engineers for this purpose. Railways, where such forms are not used, should also start using these forms as uniform practice for the guidance of both Engineer (C&W) and Station Master. The Station Master shall not dispatch the train unless the fitness certificate, in the prescribed form, is received from the Engineer (C&W).

ii) The level of the air pressure on the train engine and the brake van gauges and the percentage of operative cylinders should be recorded on a prescribed 'Brake Power Certificate' and signatures of the driver and the guard of the train should be obtained by the Engineer (C&W) as per the procedure laid down by each Railway. A suggested standard format for the certificate is placed at Annexure 'C'. No train should be allowed to leave with an inoperative/defective brake cylinder on any coach after pit attention. Trains which have been attended on pit line should have 100% brake power.

2.30.2 En-route/Terminating Examination Of Passenger Trains

i) Sr.DME/DME in charge shall nominate the site for carrying out rolling in/rolling out examination after personal inspection of site. While nominating the site following should be kept in view:

a. Site shall provide unobstructed view of under gear from both sides

b. Speed of the train shall not be more than 30 KMPH.

c. It should cover the entire length of train.

d. Should have adequate space for fixing the lighting arrangement and for staff.

ii) For rolling in examination of train it has to be ensured that proper lighting arrangement is provided on both the sides of the track at nominated spots for examination of under gear parts during night. Focusing of lights shall be done by keeping a coach on the line and adjusting the angle of light to illuminate under gear and bogie. Use of fixed lights as indicated in figure 2.6 is preferable.

iii) C&W staff should take position at nominated rolling in place on both the sides of the track before the arrival of train.

iv) As the train passes the nominated point, C&W staff should watch out vigilantly for loose/hanging/broken under gear parts of the coaches, any unusual sound coming from the coaches or any other abnormality in the coaches.

v) After train comes to halt, it should be ensured that the train is protected from both the sides (with the stop board/red flag during day time and red lamp during night time) before commencing the examination of the train. It should be ensured that a suitable indication board is placed at conspicuous location visible to the driver indicating that C&W staff is at work.

vi) Temperature of the axle boxes should be measured preferably with the help of the electronic temperature measuring device. for further Details see Para 4.5.4 of chapter –IV

vii) Brakes of coaches shall first be manually released through DV release valve and shall be visually checked. In case of any doubt of sticky/jam brakes, check it physically. Where, in any case, train locomotive has to be detached from the rake, to avoid rolling of rakes, it should be ensured that brakes are not released in at least 3 to 4 coaches from the locomotive end and 3 to 4 coaches from the rear end of rake. After attachment of locomotive, it shall be ensured that all such coaches are released manually through DV release valve.

viii) Under gear parts should be examined visually to ensure that the train is safe to run further. For examination during night, suitable inspection lamps/search light shall be used for adequate illumination.

ix) Repairs if required should be carried out promptly to avoid detention to train to the extent possible.

x) Lavatories of the coaches should be properly cleaned using High pressure water jet machine provided at nominated stations during halt of the train. Any complaint from passengers should be attended promptly to

the satisfaction of the passenger.

xi) After attending to any required repairs stop board/red flag should be removed.

xii) Carriage controller (CCR) should be informed about any out of course work done.

xiii) CCR shall repeat the out of course work done to the Primary Maintenance (PM) depot after corrective action.

xiv) At the train examination stations where locomotives are changed or dead locomotive/coach is detached /attached on through trains, the level of pressure created on the locomotive and brake van gauges should be recorded on the certificate to be issued to the guard and driver on prescribed form. The inoperative/blanked cylinders, if any, should also be written in the certificate for their information. This certification should be an endorsement on the original brake power certificate no fresh brake power certificate needs to be issued.

Approved Mandatory conditions to be fulfilled prior to introduction of Round Trip Primary Pattern of Maintenance on Coaching Trains

The following mandatory conditions should be fulfilled prior to introduction of round trip/kilometers base Primary maintenance pattern on any passenger carrying train on Indian Railways:

Primary end

1. The attention during primary maintenance should be made more intensive with special emphasis on the following aspects:

   The brake gearing should be properly adjusted to ensure **100% brake power.**

   The brake pad of the brake disc should be changed as and when required.

   All missing passenger amenity fittings must be replaced and the rake must be turned out as a ‘Zero-Missing-Fitting’ rake.

   Intensive cleaning of coach toilets and lavatory.

   No coach should run an overdue schedule.

2. Clear maintenance time of 6 hours on the pit as per the train schedule. Any exception is to be jointly decided by COM/CME of the Railways.

3. Provision of proper washing cum maintenance pit line facility with adequate testing equipment and high-pressure water cleaning arrangement.

4. Adequate gang strength with proper supervision.

The other end

1. Whenever the lie-over is more than 2 hours at the platform or the rake is stabled in the yard, the rake should be locked and positive security should be

provided.

2. Amenity and cleaning attention is carried out best on the washing lines where complete infrastructure by way of men, material and machines are available. Watering and drainage facilities are also available on these washing lines. Ideally, for cleaning and watering, the rakes should be taken to washing lines as far as possible. In the event of this being not feasible, such rakes can be returned from platform/yards. However, the minimum infrastructure to be provided at the platforms from where trains are returned without secondary maintenance should be as under.(Ref: IRCA part IV Para E:4.1.8.6.4) and elaborated in CAMTECH's report CAMTECH/2009/M/C/terminal Attention /1.0 of March 2009.

   i) One storage room for essential safety and passenger amenity item.

   ii) Road transportation facility for ferrying material from the main depot to the platform.

   iii) Adequate number of mobile high pressure jet cleaning machines or high pressure water pipe line running around the platform /yard line.

   iv) Washable apron on the platform lines with the covered drains to facilitate movement of maintenance staff.

   v) Walkie-Talkie/mobile telephones for quick and easy communication.

   vi) Standard watering hydrants.

   vii) Flood light at the platform ends for rolling-in examination at night and 110 V inspection lights along the side of the track for night examination of the under gear.

3. The decision, whether such trains may be shunted for working on pit line or attended at platform itself, has to be taken carefully after weighing these factors by the mechanical and Traffic HODs on the zonal Railway on case to case basis.

4. The status of implementation of revised pattern of coaching trains should be reviewed every year in the month of June by Mechanical and Operating branches at Divisional level and any discrepancy should be removed.

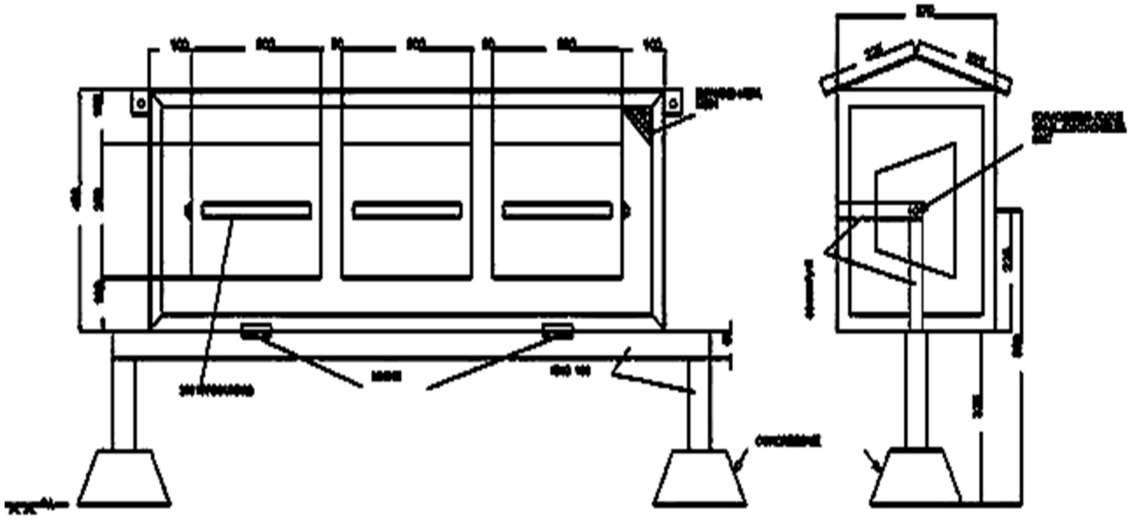


Figure: 2.6 Lighting Arrangement for Rolling in/out Examination

2.31 Washing and Cleaning of Coaches

Use recommended solutions for cleaning as per RDSO specification no. M&C/PCN/101/2020 or latest" i.e. Specification for liquid cleaning composition for exterior of Railway Coaches or use cleaning agents approved by CME of the Railway.

2.32 Platform Cleaning and Washing

i. Wherever washable aprons are available on the platforms, the time available before the terminating trains are pulled out into the yard, should be utilised for inside sweeping and toilet cleaning.

2.33 External Cleaning / Washing

For the coaches with vinyl wrap instructions of RCF/ RDSO should be follow.

Coach cleaning/washing should be done by 'Automatic Coach Washing Plant (ACWP).However, where these plants are not available, external cleaning/washing of coaches can be done in following manner;

i) Place the rake/coaches on the washing pit provided with equipments required for washing and cleaning. It should be ensured that the rake/coach is protected with proper board/signal for safety of the staff working on washing/cleaning job to prevent movement/disturbance in the activity. Scotch blocks with locking arrangement should protect lines and keys should be kept with Engineer (C&W) till the time rake is under maintenance. In electrified section, C&W supervisor shall in addition, obtain power block from OHE before commencing work.

ii) Remove old reservation charts/labels on the body panels. Splash water on old charts so that they are wet for easy separation. Care should be taken to avoid any damage to the paint.

iii) The cleaning solution should be spread /rubbed with nylon brush or sponge brushes and then rubbed thoroughly to clean the panels. Extra attention should be given to oily and badly stained surfaces.

iv) Destination boards may be removed and cleaned with brush/duster.

v) Clean the external surface by high pressure jet where facilities are available.

vi) All exterior panels including end panels should be hosed with water and brushed with diluted soft soap (detergent solution) the strength of the solution may be increased or decreased according to RDSO specification.

2.34 Cleaning of Toilet

i) Before starting cleaning of toilets ensure that all repairs in the toilets have been carried out and after cleaning no employee should enter in the toilet.

ii) Doors and walls should be cleaned with water sprayed by high pressure jet up to waist level. Apply specified solution and rub thoroughly with sponge brush/duster/nylon bristle brush.

iii) Indian style lavatory pans have to be cleaned by thorough rubbing with concentrated solution of recommended cleaning agent.

iv) Western style commode shall be cleaned as (iii) however due care should be taken that recommended solution should not fall on commode lid which may damage/spoil it.

v) The flooring should be rubbed with nylon bristles/sponge brush and cleaned with recommended cleaning agent. The drain holes should be cleaned thoroughly for easy discharge of water.

vi) The mirrors in toilet should be cleaned with light wet cloth. Recommended solution should be used for cleaning the dirty portion of glasses.

vii) After all the washing and cleaning in the toilets mentioned above, the toilets should be thoroughly cleaned with water jets and water should be flushed out. All fittings and floor should be wiped dry with a cloth.

viii) After cleaning, spray deodorant in the toilet to remove the bad odour.

ix) The facilities required should be as per CAMTECH's report no. CAMTECH.M.Coaching Infra/1.0/Dec 2009 and instructions given for Bio-Toilets.

2.35 Internal Cleaning of Coaches

i) Collect the news paper from magazine bag and waste from dust bin. Sweep the whole coach with broom in sleeper coaches. Clean the floor of AC coaches with vacuum cleaner.

ii) Remove dust from floor, berths/seat, magazine nylon wire mesh bag fitted on panels and fan guards with duster. Use of vacuum cleaner is excellent in such areas.

iii) Also remove dust/dirt from under the berths, window sill, sliding door, railing corner and all corner & crevices of coach interior with vacuum cleaner if provided.

iv) Ceiling panels, wall panels, cushion berths, fittings, table top, etc. should be

cleaned with duster and stain marks on these should be removed by use of recommended soft detergent.

v) Aluminum frames, strips, and other metal fittings, etc. should be cleaned with recommended cleaning agent.

vi) FRP window frames, louvers, etc. should be cleaned with recommended solution and rubbed out by nylon brush or sponge /duster to remove stain marks.

vii) Alarm chain handle and its holding bracket should be washed and cleaned.

viii) The coach flooring should be rubbed with hard coir brush and PVC flooring should be rubbed with nylon bristles/sponge brush and cleaned with recommended cleaning agent.

ix) The amenity fittings and toilet fittings such as coat hanger, stools, arm rest, foot rest, towel hanger, etc. should be cleaned with duster. Stains on these items should be removed with recommended detergent solution.

x) The compartment carpet should be cleaned with vacuum cleaner. Every month, the carpet should be cleaned thoroughly by taking it out from compartment and if necessary they should be dry cleaned in every three to four months. Before re-laying the carpet, the compartment floor should be thoroughly cleaned.

xi) Spray recommended air freshener in the coach. No employee should be allowed to enter the coach for any purpose/work after complete cleaning

xii) Curtains in the AC Coaches and Tourist Cars should be removed for periodical washing and cleaning. Faded and damaged curtains should be replaced on condition basis.

xiii) Precaution should be taken to prevent nuisance of cockroaches and rodents in AC coaches and pantry car

xiv) No repair works should generally be left to be carried out after washing and cleaning of the coach.

xv) Pest and rodent control should be done as per extant instructions issued by the Railway Board from time to time.

xvi) The facilities required should be as per CAMTECH's report no. CAMTECH.M.Coaching Infra/1.0/Dec 2009

2.36 Internal Cleaning of GS, Generator Car/SLR

i) Cleaning of GS, guard and passenger compartments of SLR should be done as mentioned under para 2.35 above wherever applicable.

ii) If necessary clean the wooden seat and their frames with recommended detergent solution and water.

iii) Interior surfaces of parcel and luggage vans should be cleaned with recommended detergent and water.

2.37 Maintenance Practices in Open Line Depots

2.37.1 Nomination Of A Depot

i) All passenger coaching vehicles (PCVs), other coaching vehicles (OCVs), owned by individual railways should be allotted a base depot for primary maintenance and a base workshops for periodical overhaul and special repairs by the Chief Mechanical Engineer/Chief Operation Manager of the Railway.

ii) The base depot to which the coaches are allotted will be responsible for their maintenance. This depot will also be responsible for the secondary maintenance of the coaches as prescribed by the Railway.

iii) If a coaching stock allotted to a particular depot, finds its way to another depot, it should be dispatched to the allotted depot for proper service.

iv) Due to exigencies of service a coach of another depot can be retained with the sanction of the Chief Mechanical Engineer (CME). It should, however, be subjected to necessary examination and repairs including maintenance schedules in the manner as it belonged to the depot.

v) No overdue periodical overhaul (POH) coaches of other railway should be allowed in service but should be booked to the owning railway for POH.

2.37.2 Special Repairs

i) The special repairs (Non-POH repairs) by workshops are those repairs, which cannot be done in the sick-line with their existing facilities or are specifically prohibited to be carried out on the divisions.

ii) Special repair coaches should be sent to the base workshops only after obtaining the permission of the Chief Mechanical Engineer and according to the calling in program of the workshop.

iii) For requesting permission for non-POH repairs, the supervisor in charge of the depot should prepare a complete list of damages and deficiencies and forward it to Divisional Mechanical Engineer for getting permission of the Chief Mechanical Engineer to book the coach to the shop for non-POH repairs. A copy of the list of damages and deficiencies should simultaneously be sent to the workshop concerned for planning it in their calling-in programme.

2.37.3 Formation Of Block Rakes

i) For the purpose of maintaining the coaches and the rakes in good condition and to avoid public complaints, the Chief Mechanical Engineer, in consultation with the Chief Operations Manager of the Railway, shall form Block Rakes for each of the long distance trains and the inter-railway trains; and also nominate spare block rake coaches of adequate number for these block rakes to replace sick block rake coaches.

ii) The station staff shall ensure that no non-block coach is attached in any Block Rake except with the express permission of the Divisional Mechanical Engineer, who will grant such permission only in emergency and that too for a specified trip only.

2.37.4 Destination Boards

Coaches on originating trains should be provided with approved destination boards. LED-based destination Boards should be provided as per extant instructions by

Railway Board and RDSO's specifications RDSO/2009/CG-01 Rev-01 of Feb'10 or latest.

2.37.5 Fire Extinguishers

Fire Extinguishers (DCP) should be provided on all originating trains according to the number prescribed by the Railways for air-conditioned coaches, brake vans, postal vans, dining cars, etc. These fire extinguishers should be checked every three months and completely refilled after one year. These extinguishers should not be overdue testing/refilling. In case they are used or damaged en route, the report of the same should be obtained from the guard, and replaced. Details are available in para 10.14.5 of chapter 10 of this manual.

2.37.6 Brake Van Equipment

Similarly, other brake van equipment, which mechanical train examining staff is responsible to supply, should be provided according to the instructions of each Railway. As per RDSO's letter, racks have to be provided in the SLRS/Generator Car for the provision of portable control telephones, portable train lighting equipment, portable fire extinguisher, wooden wedges/skids, and stretcher.

2.37.7 Watering And Cleaning Of Rakes

i) The mechanical department of each railway will nominate the watering and cleaning stations on the railway.

ii) All water tanks should be filled on a washing line so that no watering is necessary on a platform at the originating station. Arrangements should, however, be available at each of the platforms for filling the tanks in emergencies.

iii) Adequate staff and time should be provided at intermediate stations to enable complete replenishment of all the water tanks of the train at each of the nominated watering stations of the railway. The facilities required for en-route coach watering should be as per CAMTECH's design.

iv) In the case of ground-level side filling watering arrangements, it should be ensured that water hose pipes are not dragged or left over on the platform aprons, but are hung properly on the poles to prevent contamination of water.

v) Adequate staff and time should be provided to clean the compartment and the bathrooms/ lavatories as prescribed at nominated cleaning stations of the railway. Portable pressure jet cleaning equipment should be used for the efficient cleaning of toilets.

vi) Deployment of C&W staff on Rajdhani/Shatabdi Express/Rajdhani type nominated trains/Other super fast and Mail/Express trains should be as per Railway Board's letter no. 99/TG.V//12/2 dated 13.9.99. The `Safaiwalas' should wear identification armbands while on duty. A suitable cleaning kit consisting of requisite cleaning agents, brushes, mops, etc. should be standardized by the Railway and provided to them.

vii) OnBoard cleaning of trains should be done as per extant instructions of Railway Board for on 'Board House Keeping Services' (OBHS).

2.37.8 Deficiency Rolling Stock (DRS) For Coaching Stock

i) Railways should devise a system for detecting deficiencies. Reports of

deficiencies/defect in Rolling Stock (DRS) reports in the Performa given in Annexure 2.3 should be prepared for each mail/express/passenger originating train in duplicate by the Engineer (C&W)/ Engineer (Electrical) and should be signed jointly with the RPF representatives. Reports for mechanical deficiencies should be prepared on Performa 2.3 (the fittings mentioned in these Performa are selective and not exhaustive and may be altered by each Railway based on the items most prone to theft on their system). This should be done soon after the maintenance of the rake is complete in the sick/ washing lines. In case the train starts from the platform itself, these reports should be prepared by the train duty Engineer (C&W)/ Engineer (Electrical). The originating station must keep a copy of the report. It should be preferable if one booklet is maintained for each service so that the carbon copy is sent with the train guard, retaining the original for the record.

ii) After the coaches have been jointly checked, and DRS reports have been made, the coaches should be padlocked/ key locked and the key and report should be sent to the platform Engineer (C&W).

iii) Coaches with attendants

For the coaches, which have nominated attendants, the DRS card will be given to them. Deficiencies will be noted down by the attendant and advised to Engineer (C&W) and Engineer (Electrical) at the coaching depot after the end of the journey, will have to keep a register noting down the deficiencies and the date of advice and the date of recoupment.

iv) Trains are escorted by Engineer (C&W) & Engineer (Elect.)

For trains where an escorting C&W staff is provided on the train, he shall carry a DRS card for coaches other than para iii) above and get them filled up at the secondary maintenance depot by the Mechanical/Electrical staff and get the rake examined by RPF personnel in case of any deficiency.

v) Trains/Coaches not covered in para iii) & iv)

a. For other trains/coaches not covered in para iii) & iv), the DRS Reports should be handed over to the train guard and his signature obtained on the office copy. The guard will be responsible for the safe carriage of the Report up to the destination. At the destination station, the outgoing guard must ensure that the reports are handed over to the Mechanical/Electrical staff immediately on arrival of the train.

b. On arrival of the train at the destination station, the Engineer (C&W) staff and Engineer (Electrical) staff shall check the rakes jointly with a representative of RPF and a comparison may be made with the original report. If the original report is not received, the general inspection should be recorded on DRS Cards as done at originating stations. New DRS Cards showing deficiencies/ defects of each vehicle will be prepared and sent to originating station along with the rake. In case the vandalism is suspected, suitable remarks should also be given. The Engineer (C&W) staff, Engineer (Electrical) staff, and RPF staff should sign the report. On receipt of the report by the originating station, a comparison will be made and a statement prepared of deficiencies that occurred en route.

vi) The Supervisors at the destination station, viz., Engineer (C&W)/ Engineer (Electrical) shall report the thefts on the form already prescribed by RPF, to the RPF/GRP as quickly after the arrival of the train as possible and not later than 24 hours after the arrival of each rake. If the GRP refuses to accept such reports at the arrival station of the train from the Mech. /Elec. Supervisors, it shall be incumbent on the RPF in charge at the arrival station of the train to get cases registered with GRP and take further action as deemed fit to get the thefts traced/ reduced. If such reports are to be made to any other RPF post, this shall also be done by the RPF in charge of the train arriving station.

vii) The Supervisors of the originating station should compare these DRS Reports with the original DRS Reports and prepare a summary of the deficiencies/ thefts occurring in the up and down trips separately.

viii) A train-wise summary of the deficiencies/ defects shall be prepared and forwarded to the DME/DEE with a copy to the Security Commissioner, RPF, of the division. The cost of the fittings should also be shown in the summary, the price is taken from IRCA Rules Part IV. For items not covered in these, stores cost should be given.

ix) In the first week of every month, supervisors in charge of Mechanical, Electrical, and Officer- in charge of RPF Posts/Outposts should hold a joint meeting to identify the areas where the deficiencies/ thefts are occurring and analyses the items more prone to breakage/losses/thefts. The officials should take remedial measures as possible at their level. A monthly statement of thefts, giving their cost and analysis should be prepared by RPF but jointly signed by Engineer(C&W), and Engineer (TL) with the copy each sent to DME, DEE, and Security Commissioner, RPF.

x) The Divisional Officers, viz. Sr. DME, Sr. DEE & SC must meet every three months to carry out a similar analysis and decide upon preventive steps to be taken in each area. They should submit a similar joint report to their Headquarters Officers concerned, viz., CME, CEE, and CSC.

xi) The CME, CEE, and CSC should furnish every six months a report to the Director/ Mechanical Engineering (Coaching), the Director/ Electrical Engineering (Coaching), and DG/RPF in the Railway Board, indicating the extent of theft of C&W and electrical fittings on their system and the remedial measures taken by them bringing out any help in any area required from the Ministry of Railways.

2.38 Reporting of Thefts

i) All damages/deficiencies which may be due to mischief or theft during service should be reported to the RPF/GRP and the Divisional Mechanical Engineer according to the procedure laid down in Railway Board's letter No.73M(c) /165/4 dt.4.7.77

2.39 Coach Maintenance History Card

i) Every coaching depot shall have computers for maintaining the coach maintenance history in the software program which should be compatible with the program of the coaching workshop.

ii) The "Coach Maintenance History Card" (MHC) for each of its coaches. The

card will contain records of maintenance schedules including POH and special repairs in shops. It will also show the history of the coach from the time the coach is placed in service till its condemnation and will give details of all major repairs like wheel changing, bogie changing, etc.

iii) The complete history book of each coach, consisting of maintenance history cards, date cards, trial cards, etc. will, however, be maintained by the base workshops. When a coach is sent for Shop Schedule or special repairs, a copy of its maintenance history card should be sent by its base depot to the workshops for record in its complete history book.

iv) The workshops should send a new maintenance history card (MHC) giving the condition of the coach, the list of important fittings and furniture in case of Air Conditioned coaches, dining cars, etc., defects and deficiencies of the fittings, if any, to the base depot when a coach is turned out of workshops after POH or special repairs. Any special instructions regarding the coach for its base depot should also be maintained on the card. If modifications are carried out, they should be indicated in the card under its appropriate column. Similarly, if trial fittings/ components are fitted or materials are on trial on the coach, the details of the fittings/ components or the materials, the authority for conducting such a trial, the purpose of the trial, the nature and the frequency of the observations to be made, the type of interim/final reports required to be submitted, the name and the address of the authority to whom it is to be submitted and any other instruction in detail should be maintained in a "Trial Card" which should be sent by the workshops to the base depot for compliance of the instructions. The base depot, on receipt of the coach from the shop, will check the fittings/ articles in the coach with the list sent by the workshops and note all the instructions for compliance. It will also make examinations and observations as prescribed in respect of trial fittings, components, or materials and submit the trial reports to the appropriate authority as prescribed in the Trial Card received with the coach.

v) The base workshops will also carry out a detailed examination when a new coach is received, register the coach, open its history book, make a list of all defects and deficiencies, and then, in consultation with the CME's office, will allot a rake number and its base depot. The same should be stenciled on the coach's end. If it is fit in all respects, it will be sent to the base depot for service. Also, the workshop will prepare a warranty card as per Performa given in Annexure ‘2.4 ’ and will forward it to the base depot with detailed instructions for preferring claims from the manufacturers through Divisional Mechanical Engineer.

2.40 Warranty Claim for Defective/Failed Items

There are some items for which the manufacturers must give a warranty claim if the item fails or becomes defective during the warranty period as specified in the specification/drawings /purchase order.

Warranty on quality of POH during POH of rolling stock at the workshop as per RB letter no. 2022/M(W) I/814/4 dated 13.06.2022.

2.41 Maintenance Schedules to Be Followed in Coaching Depots

a. To maintain coaching stock in good condition, the following maintenance schedules are prescribed to be carried out in carriage depots on divisions

where the rake has been based for primary maintenance.

(i) Trip Maintenance Schedule i.e. **D1 Schedule- Every Trip/Weekly**

(ii) Monthly Maintenance Schedule i.e. **D2 Schedule- 30 days ± 3 days**

(iii) Six Monthly Maintenance Schedule i.e. **D3 Schedule 180 days ± 15 days**

A detailed table of maintenance activities to be carried out during schedules is enclosed as Appendix.

b. Maintenance schedules are required to be carried out by the base depots to which coaches are allotted. In an emergency, when due for any reason coaches cannot reach their base depots and maintenance schedules become due, D1 & D2 schedules can be undertaken by the carriage depots where the coaches are available. The 'D3' schedule should be done at the base depot only.

c. Each coach should be stenciled at a suitable place on its end panel, with the code name of the base depot and a schedule chart. The date and station code of the depot where a particular schedule is carried out should be stenciled at the appropriate place in the schedule chart immediately when the schedule is completed.

2.42 Schedule Examination

Schedule `D1' is required to be given every trip/weekly at the nominated primary maintenance depot within the normal primary maintenance time on a washing/pit line in a rake. A coach need not be detached from the rake for Schedule `D1' examination unless it requires such repairs which cannot be attended in the pit line or within the prescribed maintenance time on the pit line.

2.43 Detachment A Coach

A coach is detached from the rake due to several reasons such as:

i) For shop schedules.

ii) For maintenance of major break–down/malfunctioning of any sub-assembly, etc. the decision whether the coach is to be detached from the formation, for attending to maintenance/replacement of major subassembly is dependent on maintenance requirements, operational convenience, time availability, etc. The decision is taken by the Engineer (C&W). Coach failure report as per Annexure 'F' should be made. For failure components/assemblies during warranty, action is to be taken for warranty claims.

Procedure

The activities performed to detach a coach with an Air Brake system are as follows:

i) Safety precautions shall be taken to prevent injury while detaching/attaching a coach.

ii) Remove the clamps on the cut-off angle cocks. Close the cut-off angle cock of both feed pipe and brake pipe on both sides of the coach that has to be detached.

iii) Close the cut-off angle cocks of the feed and brake pipe of adjacent coaches. This is to ensure that the air pressure locked up in the air hose coupling gets vented to the atmosphere through the vent hole of the cut-off angle cock.

iv) Observe the above-mentioned safety measures to close all four cut-off angle cocks on either side of the coach to be detached so that while opening the air hose coupling, it may not cause injury due to air pressure inside.

v) Release the brake of the coach to be detached by pulling the manual release lever of the distributor valve.

vi) Open the Feed Pipe and Brake Pipe hose coupling from both sides of the coach.

vii) Uncouple the coach by operating an uncoupling handle.

Observe all other safety measures as prescribed.

2.44 Air Brake Rake Testing Procedure

For the Air Brake testing procedure please refer to chapter 3 of 'Air Brake System' of this manual.

2.45 Special Schedule

For high-speed trains and some special coaches like Power Vans, etc., special maintenance schedules by the individual railways may be followed.

2.46 Procedure for Sending the Coaches to Shops for Shop Schedule

The following procedure may be followed concerning the movement of coaching stock for repair to shops: –

a. Security Department shall arrange to escort all coaches booked to shops when booked by coaching specials or in lots of 3 coaches or more on receipt of memo.

b. All coaches booked to shops for Shop Schedule will be booked by passenger/parcel/Coaching special.

c. Before any carriage is allowed to proceed to workshops a joint check should be carried out by the representatives of the Mechanical, Electrical, and Security Branches based on which a deficiency list should be prepared at the rake/coach maintaining station under the joint signature of the three representatives in five legible copies with proper reference, number, and date out of which one copy should be pasted in side the compartment on one of the end wall. Two copies of the deficiency list will remain in the personal custody of the RPF Sainik accompanying the rolling stock to the workshop (In the case of the unescorted coach, the deficiency list will be sent by post to the CWM concerned and one copy will be sent to OC/RPF). the remaining two copies will be retained by the Engineer (C&W) / Engineer (Elect.) supervisor of the base station. Upper-class coaches must be pad locked/locked with a carriage key and also sealed after the joint check at the starting station by the booking Engineer (C&W).

d. Once a Joint check has been carried out and the deficiency list was drawn out

no removal of fitting from the stock at the starting depot should be entertained.

e. Coaches escorted by the RPF staff will continue to be under the watch of the Security Force (RPF) until coaches are taken over by the shops. On arrival of carriage at the Workshops, a careful check is made out jointly by the representatives of the Mechanical & Electrical Departments in presence of RPF staff in four copies. In case of any additional deficiency being noticed, a list of such additional deficiencies is made out in four copies jointly by all three staff.

f. One copy of each of the deficiency lists prepared by the representatives of the workshop duly signed by RPF be sent to the Engineer (C&W) /Elec. Supervisor of the base station and one copy be given to RPF for submission of the same to the OC/RPF of the base station and one copy is to be kept on shop record. Upon receipt of the additional deficiency list, the OC/RPF of the base station will arrange to fix responsibility for the additional deficiencies and take suitable action including sending a copy of his report to the Engineer (C&W) / Engineer (Elect.) The supervisor is concerned. On receipt of the report from OC/RPF, Engineer (C&W) /Elec. The supervisor will submit a report to the controlling Divisional Officer enclosing copies of the original as well as the additional deficiencies to enable the Divisional Officer to initiate action for the write-off of the cost of such materials. While granting write-off or forwarding the case to Headquarters for arranging the write off due remarks should be given for the reasons of the deficiencies and the action taken. A certified true copy of the joint check mentioned above should accompany the losses due to theft and pilferage.

   A copy of the write-off memo should be submitted to the Budget section of the divisional Headquarters office for exhibition in Appropriation Accounts.

g. Generally, coaches should be sent in lots of three duly escorted. In exceptional cases coaching stock coming to the Workshop by passenger/parcel trains unescorted by RPF Sainik, the deficiency list prepared jointly at the originating station should again be checked at the workshop in presence of an RPF representative and the difference between the two checkings should be taken as theft. On receipt of an unescorted coach in the Shop, the deficiency list in five copies in presence of representatives of RPF, Mechanical and Electrical Dept. will be prepared jointly. One copy of the deficiency list will be retained as an office copy, 2 copies will be given to OC/RPF of the shop station and one copy each will be sent to Engineer (C&W) / Engineer (Elect.) Supervisor of the base station. Out of two copies of the deficiency list received by the RPF representative at the workshop, one copy is sent to OC/RPF base station for necessary action by the security Department.

h. The workshop should have a proper organization to check these coaches immediately on arrival.

Annexure 2.1

POH cycle time for AC LHB coaches along with activities

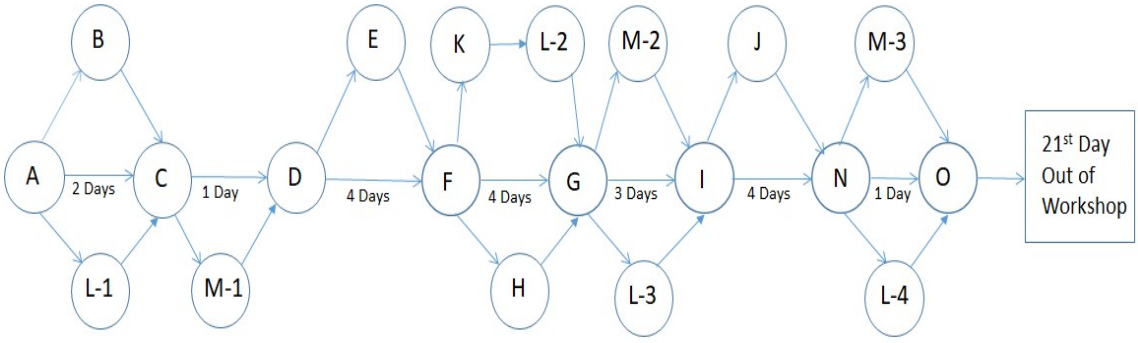
The detailed break up of each activity carried out (for POH of AC LHB) for the workshop, along with parallel activities that can be carried out simultaneously.

Activity Code	Brief of Activity	Details of Activity	Shop	No. of Days	Type of Activity (Direct or Parallel)
A	Pre inspection and stripping	Stripping of partition and ceiling, doors, battery unloading etc.	Outside CR shed	2	Direct
B	Pre inspection and stripping	Pre-inspection of deficiency	Outside CR shed	1	Parallel to Act. A
C	Pre inspection and stripping	Testing and analyzing of coach defects, panel equipment, AC plant, water Pump, transformer etc.	RAC Shed	2	Direct
		Stripping of all equipment.			
D	Lifting and Lowering	Before lifting off the coach, dismantling of bogie components under pit under such as traction lever anti-roll bar control arm etc.	Lifting	4	Direct
		Lifting of the coach and washing of bogie.			
		Repairing of bogie control arm fitting on wheel and lowering of coach.			Direct
		CBC and WSP system Repair.			
		Repairing of Air brake components on panel, fitting of silent blocks, fitting of bogie components under pit and air brake testing.			
E	Bio-Toilet and Intermediate tank cleaning and testing	Dismounting of Bio-tank. Washing and cleaning of Bio-tank.	Plumbing	1	Parallel to Act. D

F	Body Repair and furnishing work	Body panel repair, Stripped body repair. Repair of inner members like partition frames. Chair angles and seat supports etc. Repair of battery box ,doors, reclining gear, foot rest, snack table, etc.	CR Shed	4	Direct
G	Fitment and testing of electrical equipments	Loading of all equipments, battery etc. except RMPU	RAC Shed	3	Direct
		RMPU loading, loading of pantry equipment etc.			
		Complete testing fault diagnosis and their remedy.			
H	Other body repair works	Stripping and Fitting of window glasses, Flooring work etc.	CR shed	1	Parallel to Act. F
		Repair and fitment of entrance door, electrical panel door etc.		1	
		Fitting of partition and ceiling, doors etc. other fittings etc.		1	
I	Exterior Painting	Washing with suitable detergent	Paint	4	Direct
		Application of Putty			
		Rubbing down putty & application of surfacer.			
		Window Masking, Roof Painting, End painting and painting of side Panels leaving down side area.			
		Masking of upper area and down side painting.			
		Removal of mask, touch up, lettering, cleaning and other works.			
J	Interior Painting	Internal Painting	Paint	1	Parallel to Act. I
K	Fitting Work	Body panel repair, stripped body repair, Repair of inner members like partition frames, chair angles and seat supports etc.	Fitting	2	Parallel to Act. F
L -1	Trimming Work	Stripping of curtains on stripping line	Trimming	1	Parallel to Act. A
L-2		Stripping of seats in Carriage AC shop		1	Parallel to Act. F

L-3		Fitting of seats and curtains in the coach.		1	Parallel to Act. G
L-4		Cleaning of the seats and other activities.		1	Parallel to Act. N
M-1	Water tank testing	Dismounting of under slung /overhead water tank.	CR shed	1	Parallel to Act. C
M-2		Fitting and testing of the water tank.		1	Parallel to Act.G
M-3		Fitting of Bio-tank		1	Parallel to Act. N
N		Final Air Brake testing.	NTL	1	Direct
O		Final Inspection and dispatch	NTL	1	Direct
Total days of Direct activities				**21**	

PERT Chart for schedule of AC LHB coaches



POH cycle time for NON AC LHB coaches along with activities

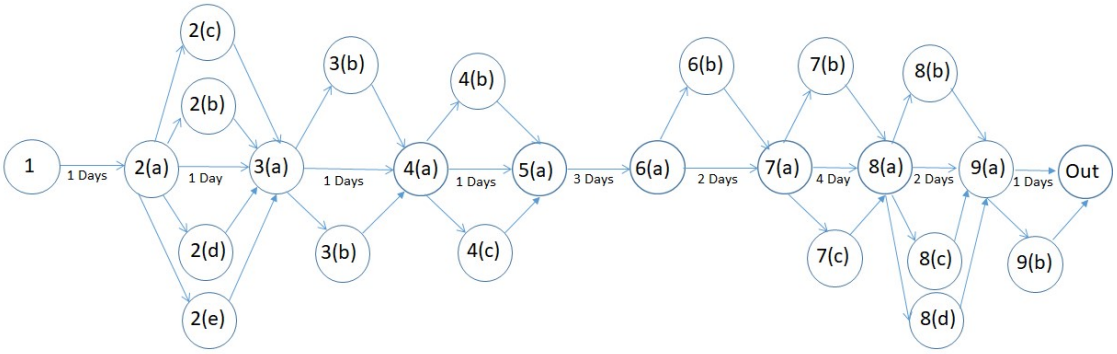
The detailed break up of each activity carried out (for POH of NON-AC LHB) for the workshop, along with parallel activities that can be carried out simultaneously.

Activity Code	Brief of Activity	Shop	Days	Type of Activity (Direct or Parallel)	Activity Code in case of Parallel Activity
1	Coach intake from Exchange yard, Incoming inspection for missing fittings	Yard	1	Direct	-
2(a)	High-pressure water jet cleaning of under frame, sub-assemblies, Coach exterior.	CRS	1	Direct	-
2(b)	Corrosion survey	CRS	0.5	Parallel	2(a)
2(c)	Seat / Berth survey	Trimming	0.5	Parallel	2(b)
2(d)	Electrical survey	TLS	0.5	Parallel	2(c)
2(e)	Bio tank unloading	CRS	0.5	Parallel	2(d)
3(a)	Battery unloading	TLS	1	Direct	-
3(b)	Seat / Berth unloading	CRS	0.5	Parallel	3(a)
3(c)	Fans / Lights / Regulator unloading	TLS	0.5	Parallel	3(b)
4(a)	Dismantling of body and bogie connections, air brake sub-assemblies and lifting of the coaches.	CRS	1.0	Direct	-
4(b)	Dismantling of Center Buffer Coupler.	CRS	0.5	Parallel	4(a)
4(c)	Movement of sick bogies to BRS	CRS	0.5	Parallel	4(b)
5(a)	Corrosion attention	CRS	3.0	Direct	5
5(b)	Water jet cleaning of bogies / Grit blasting	BRS	0.5	Parallel	5(a)
5(c)	Dismantling of bogies, overhauling of sub-assemblies of bogies.	BRS	1.0	Parallel	5(b)
5(d)	Renewal of brake gear bushes, assembly of brake gear, bolster and air brake attention of bogies.	BRS	1.0	Parallel	5(c)
5(e)	Movement of wheel sets to wheel shop.	BRS	0.5	Parallel	5(d)
5(f)	Overhauling of wheel sets, wheel	Wheel	1.0	Parallel	5(e)

	turning.	shop			
5(g)	Movement of coil springs/ air springs to Spring shop.	BRS	0.5	Parallel	5(f)
5(h)	Overhauling of springs	Spring shop	1.0	Parallel	5(g)
5(i)	Movement of overhauled wheel sets back to BRS	Wheel shop	0.5	Parallel	5(h)
5(j)	Movement of overhauled springs back to BRS.	Spring shop	0.5	Parallel	5(i)
5(k)	Completing Bogie assembly with springs & lowering on overhauled wheel sets,	BRS	0.5	Parallel	5(j)
5(l)	Air Brake components overhauling and fitment.	CRS	2.0	Parallel	5(k)
5(m)	CBC attention.	FSS	1.0	Parallel	5(l)
6(a)	Lowering corrosion attention, completed coach in overhauled bogies set	CRS	2.0	Direct	-
6(b)	Fitment of CBC in corrosion completed coach.	CRS	0.5	Parallel	6(a)
7(a)	Painting of corrosion attention, completed coach.	PS	4.0	Direct	-
7(b)	Trimming of seat / berth	PS	2.0	Parallel	7(a)
7(c)	Interior furnishing / Lavatory furnishing and fitment of Bio-tank.	CRS	3.0	Parallel	7(b)
8(a)	Air brake system testing, inspection and Electrical attention.	Pit line	2.0	Direct	-
8(b)	Fitment of overhauled fans / lights in POH coaches, wiring, inspection, TL testing	Pit line	2.0	Parallel	8(a)
8(c)	Fitment of wash basin, amenity items, water pipelines and testing	Pit line	2.0	Parallel	8(b)
8(d)	Completion of finishing works pertaining to paint touch-up of exterior/interior / footsteps / bogie assemblies, water pipelines, air brake pipe lines	Pit line	0.5	Parallel	8(c)
9(a)	Single car testing and SSE/NC certification	Pit line	1.0	Direct	-

9(b)	Final cleaning, Divisional TXR certification and Dispatch of coaches	Pit line	0.5	Parallel	9(a)
	Total		**16**		

PERT Chart for schedule of Non AC LHB coaches



Annexure 2.2

भारतीय रेल
Indian Railways
ब्रेक पावर प्रमाण पत्र
BRAKE POWER CERTIFICATE

1. Date दिनॉक		**2. Station/Railways** स्टेशन/ रेल्वे	
3. Train No. ट्रेन नं.		**4. Load** लोड	
5. Engine No. इंजन नं.		**6. Attached at** गाडी पर लगने का समय	

7. Air Pressure ready
एयर प्रैशर
तैयार होने का समय

8. Air Pressure. on Departure
एयर प्रैशर
चलते समय

In engine
इंजन में

In Brake Van
ब्रेकवान में

Air Pressure ,vj çS'kj		
FP	**BP**	

9. Pressure of Brake Power
सुचलित ब्रेक पावर का प्रेशर

Air Brake Train **100%**
एयर ब्रेक ट्रेन

9. A.i) Total No. of brake/Cylinders
ब्रेक/सिलेंडरों की कुल सं.

No. of operative Brake Cylinders
ऑपरेटिव ब्रेक सिलेंडर की सं.

10. Individual numbers of two coaches next to the Engine and at rear end and 4 middle coaches.
एयर प्रैशर ट्रेनों में इंजन/ ब्रेकवान में लगे दो कोच के नं. इनके अतिरिक्त बीच के चार कोचों के न. भी अंकित करें।

Engine end इंजन से					**Rear end** ना सिरा
Middle मध्य					

"THIS CERTIFICATE IS VALID PROVIDED THE RAKE INTEGRITY IS NOT BROKEN OR CHANGED, OR THE TRAIN ENGINE IS NOT CHANGED. IF RAKE INTEGRITY IS BROKEN OR THE TRAIN ENGINE IS CHANGED, THIS CERTIFICATE SHOULD BE REVALIDATED BY ENGINEER (C&W) THROUGH ENDORSEMENT IN THE COLUMN PROVIDED ON REVERSE AFTER ENSURING BRAKE CONTINUITY, PROVIDED THE COACH (ES) BEING ATTACHED, IF ANY, HAVE BEEN MAINTAINED AS PER EXTANT INSTRUCTIONS".

"यदि रेक खंडित न हुई हो या रैक फोर्मेषन में कोई बदलाव न किया गया हो अथवा गाडी का इंजन बदली न किया गया हो तो यह प्रमाण पत्र वैध होगा। यदि रेक खंडित हुआ है या रैक फोर्मेषन में कोई भी बदलाव किया गया है अथवा गाडी का इंजन बदली किया गया हो तो लगाये गये यान (यानों) जो लागू निर्देशों के आधार पर अनुरक्षण किये गये हों. सहित ब्रेक निरन्तरता सुनिश्चित कर अभियंता (कै. एवं वैगन) द्वारा पिछली ओर लिखे कॉलम में अंकित करके ब्रेक प्रमाण पत्र की पुनः वैधता प्रमाणित की जायेगी।

Loco Pilot's name & signature लोको पायलट का नाम व हस्ताक्षर	**Guard's name & signature** गार्ड का नाम व हस्ताक्षर	**Engineer (C&W)** अभियंता (कै एवं वै.)

(Space for enroute endorsement & Loco Pilot's remarks on the reverse)
लोको पायलट की ि◌ाकायतें पीछे पन्ने पर

II. Loco Pilot's remarks & enroute endorsements by Engineer (C&W)
रास्ते में लोको पायलटों द्वारा की गयी टिप्पणी के अनुसार अभियंता (कै एवं वै.) द्वारा की गयी प्रवृष्टि सही करना।

Station/Rly. where examined स्टे□न / रेलवे जहां परीक्षण किया गया हो	**Engine No.** इंजन नं.	**No. of vehicles without brake power**			**Percentage of brake power** ब्रेक पावर का प्रतिशत	**Signature of Engineer** गाड़ी परीक्षक के हस्ताक्षर
		DV डी वी आइसोलेट	**S.A.B** एस ए बी खराब	**Brake rigging** खराब ब्रेक रिगिंग		

IMPORTANT

1. The incoming Loco Pilot's shall handover the certificate to relieving Loco Pilot. If he is leaving the train without relief, it shall be deposited with the authority nominated to receive it, who will give it to the outgoing Loco Pilot.

इनकमिंग लोको पायलट को चाहिए कि वह अपने प्रमाण पत्र आउट गोइंग लोको पायलट को सौंप दे और यदि वह बिना रिलीवर के ट्रेन छोड़ रहा है तो वह अपने प्रमाण पत्र उस अधिकृत व्यक्ति के पास जमा करें जो रिलीविंग लोको पायलट को सौंपें।

2. The outgoing Loco Pilot & Guard will satisfy themselves from the coach nos. given in item 10 that the certificate pertains to their train.

जाने वाले लोको पायलट तथा गार्ड, कमांक 10 में लिखे हुए कोच नं. से अपनी गाड़ी के कोच नं. को मिलाऐं।

3. It is the responsibility of the Loco Pilot of train to satisfy himself that the brake power certificate is proper and valid, before working the train .यह ट्रेन लोको पायलट की जिम्मेदारी है कि वह ट्रेन स्टार्ट करने से पहले सुनिश्चित करे कि ब्रेक पावर सर्टिफिकेट पूरी तरह से सही एवं वैद्य है।

Annexure 2.3

_____ RAILWAY

DRS CARD IN THE TRAIN SHOWING CONDITION OF MECHANICAL EQUIPMENT

Rake No. _____ Train No. _____ Date:_____ Card No. _____

Coach NO. Type & Owning Rly.	FRP Panels	Arm rest	Mirrors	Upholstery	Upper Berth Fenders	Snack Table	Folding Table	Bottle Holder	Coat Hooks	Ladder or foot steps	Any other amenities equipments	Check en route	Remarks
1	2	3	4	5	6	7	8	9	10	11	12	13	

Signature of inspecting staff	On Arrival	
	Engineer (C&W)	
	RPF	

Checking official will enter the date, time, and place after signature

Annexure 2.4

WARRANTY CARD

PROFORMA FOR REPORTING DEFECTS ON THE NEWLY BUILT COACHES DURING THE WARRANTY PERIOD

1. Coach No. :

2. Code transportation …….Mechanical code

3. Owning Railways :

4. Name of manufacturer :

5. Date of manufacture :

6. Date of commission :

7. Due date of warranty inspection :

8. Date of inspection(by the depot) :

9. Defects attributable to the manufacturers :

Remarks ……. (cost will be advised by the Railway Board)

Report No. …….

Engineer (C&W)
(Rubber stamp of the depot)

Annexure 2.5

_____ Railway

Carriage Depot _____ (station)

COACH FAILURE REPORT

Train Details:

Date

Station

Originating Stn.

Prim. Maint. Depot

Train No.
Division
Last Exam. Stn
Sec. Maint. Depot.

Coach Details:

Coach Number

Coach type code

Last POH Date & Shop

Owning Railway & Base Depot
Coach Make: ICF/RCF
Return Date

Failure Particulars:

Cause of Failure (Detachment)

Defect found (on examination)

Remarks:

File No.

DRM(M)'s Office,
_____ Railway
_____(Station)
Date_____

Copy forwarded to:

CME, (owning) Railway
CME, (reporting) Railway
Sr. DME, (C&W), Division Railway (of primary maint. depot)
Sr. DME, (C&W), Division Railway (of Secondary maint. depot)
CWM, Railway, and Workshop (of last POH)

(Signature)
(Name and Designation)

Annexure 2.6

File No.

CWM's Office
Carriage Workshop
_____Railway
Tele/Fax. No., e-mail no.
Date:

To,
M/s
_____
_____

Sub: Warranty claim for failed /defective item (name) _____

1	Reporting workshop & Railway	
2	a) Coach no. & type	
	b) POH date	
	c) Return date	
3	a) Manufacturer's name	
	b) Date of Manufacture	
	c) No. given by Manufacturer	
4	Date of supply to workshop	
5	a) P.O. No.	
	b) Name of Inspecting agency	
6	a) Date of first fitment	
	b) Date of failure	
7	Type of service to which coach is generally attached	
8	Defects found/ cause of failures	
9	Other observations and remarks i) ii) iii) iv) v)	

Inspecting Officer
For CWM

Copy to:-

1. CME/ Rly. for kind information
2. COS/ Rly. for kind information
3. ED/Carriage/ RDSO Manak Nagar Lucknow - 226011
4. CME/ ICF Perambur, Chennai/ RCF Kapurthala & BEML Bangalore
5. COS/ ICF Perambur, Chennai/ RCF Kapurthala & BEML Bangalore
6. Dy COS/Workshop for proper storage, delivery, and receipt
7. Inspecting agency

Annexure 2.7

File No.

CDO's/ DRM's Office
_____Division
_____Railway
Tele/Fax. no.
Date:

To,
M/s

_____
_____

Sub: Warranty claim for failed /defective item (*name of item)*

1	Reporting Division/Depot & Railway	
2	a) Coach no. & type	
	b) POH date	
	c) Return date	
3	a) Manufacturer's name	
	b) Date of Manufacture	
	c) No. given by Manufacturer	
4	Date of supply to workshop	
5	a) P.O. No. (if available)	
	b) Name of Inspecting agency (if available)	
6	a) Date of the first fitment	
	b) Date of failure	
7	Type of service to which coach is generally attached	
8	Defects found/ cause of failures	
9	Other observations and remarks i) ii) iii) iv) v)	

Depot Officer/DME
For DRM(M)
Inspecting agency

Copy to:-

1. CME/ Rly. for kind information
2. COS/ Rly. for kind information
3. ED/Carriage/ RDSO Manak Nagar Lucknow - 226011
4. CME/ ICF Perambur, Chennai/ RCF Kapurthala & BEML Bangalore
5. COS/ ICF Perambur, Chennai/ RCF Kapurthala & BEML Bangalore
6. CWM/Workshop
7. Dy COS/Workshop for proper storage, delivery, and receipt.