10 MAINTENANCE SCHEDULES (MECHANICAL)

Version: 1.1



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Amendment and Revisions

Version	Date	Corrections	Remarks
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10.1 General

The following maintenance schedules are to be carried out.

Coaching Depot Schedule

- Schedule D1 : Every Trip/Weekly
- Schedule D2 : Monthly ± 3 days
- Schedule D3 : Half Yearly ± 15 days

Shop Schedule

- Shop Schedule I : 18 months + 30 days/ 6 lakhs Kms whichever is earlier
- Shop Schedule II : 36 months/ 12 lakhs Kms whichever is earlier
- Shop Schedule III : 72 months/ 24 lakhs Kms whichever is earlier

The details of activities to be carried out during these schedules are given below and a summarized checklist is given in Annexure 10.5.

10.2 Schedule D1 (Every Trip/Weekly)

The following items shall be attended during schedule D1.

Bogie Frame and Bolster Assembly

- Perform a visual check on longitudinal beams, cross beams & bolster for cracks, damages and corrosion.
- Perform a visual check on brake supports, damper supports, traction centre supports and anti roll bar supports for cracks, damages and corrosion.
- Check bogie bolster sub-assembly and brackets for cracks, damages and corrosion.
- Washing of Bogie frame should be done in every trip during primary Maintenance.

Brake Equipments

Brake Equipments with No Air Pressure

- Perform a visual check on Brake Cylinders/Brake Calipers for damage, cracks and corrosion and foreign bodies and check free movement of brake calipers by manually shaking them for proper working.
- Lubricate the Brake levers, pins & bushes and all moving parts with oil for to ensure free movements of calipers. There should not be any drop of lubricant on the Brake Disc.
- Perform a visual check on brake discs for proper fixing.
- Verify axial movement of Brake Disc along the axle.
- Check brake discs for cracks/fracture/damage/wear. If groove marked on disc is flushed with, wearing face of disc then it is necessary to replace the disc.
- Perform a visual check of brake pads for damage and foreign bodies
- Check play of brake-pads in holders and monitor wear. If Brake Pad(s) is worn out it is necessary to replace them in a full set formation.
- Visually inspect steel piping, air hoses and joints for cracks/damages/ballast hitting.
- Air reservoirs to be drained.
- Dismantle and thorough clean the air breather plug of brake cylinder/actuator followed by further assembling it (on trip/weekly basis as per the condition).

Brake Equipments With Air Pressure

- Perform a functional test on pneumatic brake system as per standard format.
- Air-pipes and connections: Check leakage by noise of escaping air and by

applying soap solution on joints and arrest the same if noticed.

- Check functionality of pneumatic brake system by physically shaking the brake calipers as per required brake positions.
- Check operation of passenger emergency valve & pull box (including leakages). Proper resetting of PEASD must be ensured.

Hand Brake In Power Cars

- Perform visual check on hand-braking equipment for damage, breaks, cracks & corrosion.
- Perform a visual check on all fixings for loosening &/or missing components. Replace the loose & missing fixing with new ones & tighten them.
- Check functionality of hand braking equipment: operate the hand brake wheel on the car body & check that assemblies move freely & without hardening. Check flex ball arrangement for proper working.

Wheel Slide Protection Device

- Perform a visual check on all grounding cables & WSP equipment cables for breaks/damages.
- Check functioning of WSP & dump valves operation during static testing.

Note: For attending the defects noticed in Brake Discs, please refer respective OEM's manual'.

Axle Bearing Instruments

- Perform a visual check on all grounding cables & WSP equipment cables for breaks/ damages.
- Visually check equipment for absence of damages, cracks, and corrosion marks.
- Check functioning of WSP equipment. Verify that the signal arrives correctly to the diagnostic equipment.

Primary & Secondary Suspension

- Visually check springs for cracks, damages, corrosion or foreign objects presence.
- Check miner pads for cracks, damages and ageing.
- Visually check safety cables for damages, cracks and corrosion.

Primary/Secondary/Yaw dampers

- Perform a visual check on dampers for damage, cracks and oil leaks.
- Perform a visual check on all fixings for loosening and/or missing components.
- Perform a visual check on rubber elements for cracks and ageing.

Bearings

- Carry out bearing feeling for detection of hot bearing.
- Check bearings for grease leakage.

Wheel & Axle

- Perform a visual check on wheels for cracks, damages and tyre defects.
- Check by wheel profile gauge, the wheel flange thickness and profile.
- Check axle for cracks and signs of corrosion, if any.

Note: please refer to RDSO CMI – K 003 (Guidelines for interpretation of wheel defects) and ‘Maintenance Manual for ICF design BG coaches’ for details.

Control Arm

- Perform a visual check on all fixings for loosening and / or missing components.
- Visually check control arm parts for damages, cracks or corrosion marks.
- Inspect the rubber joint until it is visible for cracks, damages and ageing.

Anti Roll bar Assembly

- Perform a visual check on Anti roll bar, links and brackets for cracks, damages and corrosion.
- Perform a visual check on rubber joints for cracks, damage and ageing.
- Visually inspect for grease oozing out of anti roll bar bearings, which may result in bearing failure.
- Perform visual check on all fixings for loosening/missing fittings.

Traction Centre

- Perform a visual check on the traction centre lever and on the rods for cracks, damages and corrosion.
- The assembly should be free to move, and not blocked by any foreign objects.
- Perform a visual check on all fixings for loosening.
- Perform a visual check on rubber joints for cracks/damages.

Rotation Limiter

- Perform a visual check of rotation limiter- components.

Rubber and Rubber/Metal Bonded Parts

- Perform a visual check on rubber and rubber/metal bonded parts for cracks, damages and ageing.

10.3 Schedule D2 (Monthly)

Perform all the items of schedule D1. In addition to this perform the activities- as given below.

Bogie Frame

- Wash the bogie frame thoroughly with water jet in washing line, making sure that water is not directed towards pneumatic / electrical connections and axle bearings.

Brake Equipment

- Perform all the operations mentioned in trip schedule including the given below.
- Check wear of brake pads/ brake discs. If worn limitis reached, it is necessary to replace the brake pads/brake discs.
- Check all fixings parts of airbrake in bogie and under frame are properly secured
- Thoroughly check all air-pipes &connections are properly fixed with under frame.
- Removal of dust &greasy type material sticking on Brake calipers &actuators with suitable tool.
- Properly lubricate the all Brake levers, pins &bushes and all moving parts using prescribed grease (Autol Top 2000 spray). There should not be any drop of lubricant on the Brake Disc.
- Lubrication of brake panel's isolating cock.
- Clean BP&FP air filters and strainers.
- Check air-coolers, scoops and fins of brake disc etc., for foreign bodies
- Verify that the clearance between each pad and disc surface is 1-1.5 mm.
- Inspect WSP equipment as per schedule given by OEM.

- While doing the function test, Brake Cylinder pressure to be measured through test points in brake panes for ensuring desired values and also check functioning of safety valves apart from all other functional test done as per trip schedule.

Axle Bearing Instruments

- Inspect the Earthing equipment for wear of slip assembly / carbon bars.
- Monthly / Quarterly inspection of WSP equipment to be carried out as per schedule given by OEM.
- Wheel & Axle Check treads diameter and wear of wheel profile. If necessary, perform re-profiling.

Pins and Bushes

- Lubricate all pins and bushes.

10.4 Schedule D3 (Half Yearly)

Perform all the activities of schedule D2. In addition to this, perform the activities, as given below

Bogie Frame

- Examine the bogie frame for corrosion / damages, especially at critical locations.
- Carry out paint touch up with high built epoxy primer and paint as per RCF specifications MDTS – 166.

Wheel

- Railways may use Eddy Current Array (ECA) Testing technique as an alternative method to DPT for testing of LHB wheels for detection of surface cracks. (RDSO Letter No. MC/WA/Genl. dated 02.09.2019.

Control Arm

- Renew protection treatment with TECTYL / CORTEC VC 1368 on the rubber joint on visible areas.

Axle Bearing Instruments

- Replace all carbon brushes on earthing devices.

10.5 Shop Schedule-I (18 Months)

The following activities shall be carried out in Shop Schedule-I.

Brake Equipment

- Perform function test of the Air Brake system components:
- Distributor valve
- Check valve
- Isolating cocks/angle cocks
- Filters, indicators, test fittings.
- Emergency brake valve & pull box
- Brake cylinders
- WSP Equipment
- Brake gear pins and other bogie pins must be examined for wear and re-greasing. Replace, if necessary.
- Examine BP/FP couplings and hoses. Replace, if necessary.
- Examine the Brake calipers and Brake pads for wear and damages. Replace, if necessary.
- Check the functioning of hand brake equipment. Replace the defective components.

- Examine the brake discs to detect any thermal or fatigue cracks. Replace, if necessary. Brake disc bolts should be checked for tightness.

Axle Box Instruments

- Overhaul the grounding equipment. Check spring mechanism for self-regulation. Replace carbon bar and slip assembly. Replace all worn parts.
- Carry out overhauling (not required/recommended)and testing of WSP equipment as per OEM's instructions.

Primary/Secondary Suspension

- Attention to springs during Shop Schedules shall be as given under Para 10.12.
- Examine the condition of lift stop pin and safety cables. Replace, if necessary.
- Check lower and upper centering discs for corrosion, wear, damage and cracks. Replace, if necessary.
- Examine the condition of rubber and rubber/metal bonded parts for damage, cracks and ageing. (Miner pads, rubber springs etc.). Replace, if necessary.

Dampers

- Check dampers for silent bushes and correct functionality, absence of deformations and oil leakages. Replace fixings/fasteners, if necessary.
- Damper should be tested during Shop Sch.-II (or early in case of oil leakages) as per parameters given in RCF drawings, read along with FIAT specification no. 17.560.100. Dampers should be replaced during Shop Schedule -III (6 years).

Damper	RCF Drg. No.	PL No.
Primary Vertical Damper	LW 05102	00920083
Secondary Vertical Damper	LW 05101	00920060
Secondary Lateral Damper	LW 05100	00920058
Yaw Damper	LW 05103	00920071

Bearings

- Rotate the bearing assembly to detect any abnormal condition. Check the bearing mounted end play. If end play is beyond permissible limit or if any roughness is detected while rotating the bearing, dismount the bearing and send for reconditioning.

Note:

- Bearing reconditioning is to be carried out whenever bearing is removed from axle due to wheel-shelling / bearing failure.
- If new bearing or reconditioned bearing is fitted, identification marking can be done on the face of out-board distance ring/backing spacer with format "MM YY Workshop Code" with the help of electronic vibratory pen/pencil grinder. It should be also ensured that residual magnetism in the bearing should not exceed 3 Gauss/0.3mT. (RDSO letter No. MC/CTRB/Genl. dated 19.01.2022)
- If the wheel sets are sent for re-profiling without dismounting bearings, lubricate the lathe centres with heavy grease.
- For reconditioning of bearings, please refer to OEM's instructions.

Wheels and Axle

- Perform wheel profiling and wheel balancing (for Speed >= 130 Kmph). Refer to RCF specn.no. MDTS – 168 for balancing procedure.
- Perform a general overhaul of the axle, remove signs of corrosion, renew corrosion protection and repaint the axle.

- Check wear of wheels, if necessary, replace them.
- Perform an ultrasonic test on the wheel and axle to verify absence of internal cracks and damages.
  Note: While wheels are received in workshop for tyre-turning, Railways may use Eddy Current Array (ECA) Testing technique as an alternative method to DPT for testing of LHB wheels for detection of surface cracks. (RDSO Letter No. MC/WA/Genl. dated 02.09.2019.

Control Arm

- Perform a general overhaul of the control arm: remove signs of corrosion, renew corrosion protection and repaint the components.
- Check wear limit of control arm bore as follows; (Ref: RCF's letter no. MD 44121 Dt: 13.08.08)
- If the control arm bearing surface reaches a diameter of 230.5 mm (i.e. wears out by more then 0.5 mm), the control arm should be considered worn out and rejected.
- In case, the dia. is between 230.5 mm and 230.312 mm, the control arm may be re-machined by providing a cut of 0.3 to 0.5 mm on the face of control arm. (This machining operation should not be carried out more than once).
- In case, the diameter is less than 230.312 mm, the control arm may be reused without remachining.
- The control arm mating surface with bearing should be coated with "Blasol – 135" solution, to prevent corrosion.
- Examine the rubber joint for cracks/damage and ageing. Replace, if necessary.

Bogie Frame and Bogie Bolster

- Examine the bogie frame and bolster for cracks, damages and corrosion. Check all the welded joints with dye penetration. If crakes are found, hold the bogie frame in a suitable manipulator, and rectify.
- Corroded bogie frames should be attended as follows:-
- Cleaning/washing of bogie frames.
- De-scaling/rust removal with rust converter to IS: 13515
- Touch-up with high build epoxy primer and paint as per RCF's specification no. MDTS 166 (Rev.2) and MDTS 094.

NOTE:"After cleaning, scrapping and rust removal, check the depth of dent marks. Small pitting holes upto a minimum depth of 04 mm may be permitted provided these are (a) straggled and not continuous. (b) Are not concentrated on the bottom bend portion of the side frame". .(Ref: RDSO No SV Bogie General dt. 14.07.2022)

Anti-Roll Bar Assembly

- Perform a general overhaul of the anti-roll bar. Remove signs of corrosion, renew corrosion protection and repaint the anti-roll bar and the links
- Examine the condition of the brackets: remove signs of corrosion, renew corrosion protection and repaint the block.
- Replace fixings, rubber joints and sealings, on condition basis.
- Replace anti roll bar bearings, if necessary.

Traction Centre

- Perform a general overhaul of the traction centre components (Traction lever, Traction Rods). Remove signs of corrosion, renew corrosion protection and

repaint the components.

- Replace the rubber bush and the rubber joints, if necessary.

Rotation Limiter

- Check condition of the steel roll and pin for wear/damages. Replace, if necessary.

Rubber and Rubber/Metal Bonded Parts

- Examine the Rubber and Rubber/Metal Bonded parts for ageing / damages/ failure of bonding. Replace, if necessary.
- Examine the rubber joint of control arm for cracks/damage and ageing. Replace, if necessary

Bogie Pins

- Examine brake gear pins and other bogie pins for wear/ damages.
- Replace the pins with hard chrome plated pins as per RCF drawings.

NOTE: committee have issued a check sheet for Bogie inspection of LHB coaches during SS-I & SS-II, vide letter no. No: IRCAMTECH/M/GWL/Check-Sheet LHB Bogies Date-25 .02.2020

CBC

- Attend the Tight lock CBC as given in RDSO's CMI no. RDSO/2006/CG/CMI -01

Under Frame & Running Gear

- Examination of body bolster.
- Examination of Coach shell (exterior)
- Coach exterior painting condition.
- Inspect trough floor- for corrosion and damage
- Inspect water tank frame- for corrosion and damage
- Inspect air brake module frame- for corrosion and damage
- Inspect air brake pipe lines- for corrosion and damage
- Inspect water system pipe line- for corrosion and damage
- Inspect emergency battery box frame- for corrosion, fixation bolt
- Inspect head stock for corrosion, damage
- Inspect sole bar for corrosion, damage.
- Inspect Gusset plate for corrosion, damage
- Inspect cross member for corrosion, damage

Water Supply

- Water tank tightening bolts- for tightness
- Water level Indicator - damage, leakage, working
- Rubber hose connection -replace of all rubber hose connection
- Drain cock protection cover - damage, availability
- Water inlet cover - provided
- Water tank sensor & its bracket -damage, broken

Roof

- Roof sheet- inspect for corrosion, damage, cracks
- Ventilator- inspect for corrosion, damage, deficiency of louvers
- Roof leakage- conduct leakage test

Exterior- Coach Body

- Window glasses, cracked, moist, opaque
- Window glasses rubber profiles
- Entrance doors outside rubber gaskets

- Destination board cover with locking arrangement , function of lock
- Entrance hand rails (body handles)- for tightness, condition of plating, cleanliness
- Footsteps – for corrosion, damage, fixation, tightness
- Ventilation grills of generator cars – for corrosion, damage, deficiency

Entrance Door (Main Door)

- Entrance door glass for cracked, moist, opaque, fixing with frame.
- Locking mechanism including locking cam top & locking pin bottom, universal lock, pad lock arrangement for working condition, damage, worn out, lubrication
- Locking handles for working condition
- Hand safe gasket for damage, worn-out
- Barrel Bolt(locking arrangement) for well positioned
- Entrance door, flap complete, panel, FRP cover, arm cylinder -Remove door flap in SS-II and fill up the gap by extending floor .
- Door stopper (All types)- Condition, deficiency
- Door Assembly -Proper alignment & working.

Luggage Door

- Top & Bottom Sliding Mechanism including guide rail, rollers, bearings, holding brackets, for working condition, worn, damaged
- Locking mechanism, for working condition
- Key locking arrangement, for working condition
- Rubber gasket , for damaged, worn out
- Door Flap Elements viz. Inner & outer locking handle, louvers, etc., for bent, broken or external damage.

Interior- Passenger Area

- Upholstery-condition of cushioning, rexene, leveling.
- Curtains (partition & window)-torn, stains
- Upper berth fenders- fixation, tightness
- PVC - aisle area-worn out, shabby look, torn.
- Snack table- cracks, damaged, shabby look, cleanliness
- Compartment mirror - dusty, cracked, de-silvering
- Magazine pocket
- Bottle holder
- Coat hooks
- Berth holder
- Luggage racks, luggage ropes
- Carpet (I class) - torn, stains, cleaned, dust free (replace if required)
- Locks of ceiling panels - working condition, lubrication
- Emergency window - working condition, availability of handles & instruction stickers.
- ICV pull Box
- All mandatory instructions stickers - availability in good condition

Saloon Sliding Doors

- Nylon wire/Rubber rope -damaged, worn out
- S S wire rope- damaged, worn out
- Top mechanism including pneumatic cylinder - working condition, smooth

working
- Guide shaft - lubrication by suitable lubricant.
- Locking mechanism - working condition
- Key locking arrangement - working condition
- Hand safe gasket - damaged, worn out
- Glass, glass film & rubber profiles - cleanliness, dusty, cracked
- Grill & grill rubber profiles
- Door flap elements viz. inner & outer locking handle, locking pin, moldings, rivets etc. - bent, broken or external damage

Doorway & Gangway Area
- Mirror (outside) - dusty, cracked.
- Wash basin/ FRP embedding- stainless steel or FRP (painted)
- Tap (gravity or auto sensor) - for working condition, leakage
- Dust bin with fire extinguisher stand - stainless steel or FRP(painted)
- Floor area(anti slip PVC or aluminum chequered plate) - worn-out, shabby look, tear off .
- Cup boards for linen and catering items - working condition, broken, damaged, availability of all fittings i.e. hinges, locks, stoppers etc.
- Attendant berth/seat - damaged, torn, broken, condition & securing of holding brackets
- Square key locks of ceiling panels - working condition, lubrication
- Leveling of ceiling panels
- Moldings, vestibule door cover, soap dish, securing brackets of fire extinguishers

Electrical Panel door
- Door elements like glass, glass gasket, door frame moulding, side & middle hinges, key locking arrangements- damaged, alignment, working condition

Lavatory Area
- Mirror (inside) - cracked, poor silver plating
- Wash basin - stainless steel or FRP painted, clean
- Tap (gravity tap / luxury tap) - working condition, leakage
- Soap dispenser - working condition, leakage
- Paper roller - loose, deficient
- Hopper window glass - condition of rubber, glass, operation of upper glass, locking arrangement of upper glass
- Dust bin - stainless steel or FRP(painted)
- Tube light column & its fittings -crack, broken, damaged
- 30 litres water tank - crack, broken, damaged, leakage, clean as per procedure given in RCF Manual
- Pipes, fittings, filters, timers (after opening ceiling panel) - crack, broken, damaged, leakage, clean as per procedure given in RCF Manual
- Painting of FRP panels.(If required)

Lavatory Door (Toilet Door)
- Guide roller channel - fixation, tightness, lubrication
- Guide roller channel - lubrication by suitable lubricant.
- Pivot (top) for fixation, tightness
- Pivot (bottom) for fixation, tightness
- Top roller for fixation, tightness, and lubrication.

- Middle hinges gasket for damaged, worn out
- Hand safe gasket for damaged, worn out
- Bottom grill for damaged, bent
- Barrel bolt (locking arrangement) including arrangement for toilet occupation indication., for working condition
- Provision of extra handles (inside) & existing handles & turn-over latches - damaged, missing.
- Coat hook - damaged, missing
- Door flap elements for bent, broken or external damage

Vestibule Sliding Door & Gang Bridge

- Nylon belt/Rubber rope for damaged, worn out .
- Nylon/ steel wire rope for damaged, worn out
- Top mechanism including pneumatic cylinder for working condition, damage, defective
- Guide shaft - lubrication by suitable lubricant.
- Locking mechanism for working condition
- Key locking arrangement for working condition
- Male & Female hand safe gasket for damaged, worn out
- Glass & glass frame for cracked, opaque
- Door flap elements viz. inner & outer locking handle, locking pin, moldings, rivets etc. for bent, broken or external damage
- Gangway bridge (vestibule foot) plate including roller, channel, spring, fasteners for damaged, working mechanism / condition
- Vestibule foot plate pin for wear, damage
- Vestibule foot plate split pin for wear, damage.
- Vestibule Rubber for crack, damage.

10.6 Shop Schedule-II (36 Months)

In addition to the activities listed under Shop Schedule-I, the following activities shall be carried out in Shop Schedule-II.

Brake Equipment

- Perform overhauling and function test of the brake system components:
- Distributor valve
- Check valve
- Isolating cocks/angle cocks
- Filters, indicators, test fittings.
- Emergency brake valve & pull box
- Brake cylinders
- WSP equipment
- Replace brake gear pins and other bogie pins/bushes.
- Replace Air Brake Hoses

Bogie Frame and Bogie Bolster

- Check the dimensional and geometrical tolerances of bogie frame as per FIAT drg. No. 1267505. Rectify/replace as necessary.
- Primer and paint as per RDSO specification No M&C/PCN/123/2006 and MDTS-094 total DFT 265 microns (As per M&C/PCN/123/2006 - 125 micron. and as per MDTS - 094_ 140 micron.)

NOTE: After cleaning, scrapping and rust removal, check the depth of dent

marks. Small pitting holes upto a minimum depth of 04 mm may be permitted provided these are (a) straggled and not continuous. (b) are not concentrated on the bottom bend portion of the side frame". .(Ref: RDSO No SV Bogie General dt. 14.07.2022).

Bearings

- Dismount the Bearings and send for inspection/reconditioning.

Anti-Roll Bar Assembly

- Perform overhaul of the anti-roll bar. Repair/replace the defective/worn out components.
- Replace all rubber joints, sealings and anti roll bar bearings.

Traction Centre

- Perform a general overhaul of the traction lever.
- Replace the rubber bush and the rubber joints.

Rubber and Rubber/Metal Bonded Parts

- In addition to the activities listed above i.e. in Shop Schedule-I, the following activities shall be carried out in Shop Schedule-II.
- Replace all the rubber and rubber/metal bonded parts as per must change item for AC & Non AC Coaches. Must change items List of during Shop Schedule –II is enclosed as Annexure '10.6

Under Frame & Running Gear

- Inspect head stock for corrosion, damage
- Inspect sole bar for corrosion, damage.
- Inspect Gusset plate for corrosion, damage
- Inspect cross member for corrosion, damage

Water Supply

- Water tank and water supply pipe line- cleaning as per procedure given in RCF maintenance manual.
- Pressure testing

Exterior- Coach Body

- Condition of exterior paint for peeling off, loss of gloss, scratches
- Exterior body check for corrosion, damage

Entrance Door (Main Door)

- Pivot (top) for working condition
- Pivot (bottom) for working condition

Complete overhauling of main doors/Vestibules doors/sliding doors and Lavatory doors.

Interior- Passenger Area

- FRP panels including ceiling panels for cracks, damaged, condition of paint, shabby look (clean by soap water), and follow repair guidelines circulated by RCF.
- PVC (inside the compartment) for worn out, shabby look, torn
- Ladder - condition, painting.
- Non upgraded PVC flooring should be replaced.

Electrical Panel door

- Switch board doors - Replace FRP doors by better FRP.

Lavatory Area

- FRP panels (Ref. RCF guidelines) - cracks, damaged, condition of paint, shabby look (clean by soap water) apply putty & paint the FRP panels

Furnishings

- 100% replacement of Rexine.
- 100% replacement of carpets of Exec. Chair car, thereafter, carpet is to be provided in Aisle portion only as per extant instructions.

10.7 Shop Schedule-III (72 Months)

In addition to the activities listed under Shop Sch.-I and Shop Sch-II, the following activities shall be carried out in Shop Sch-III.

Dampers

- Replace all dampers during Shop Schedule-III.

Rubber and Rubber/Metal Bonded Parts

- All the activities listed under Shop Sch.-I and Shop Sch-II,
- Replace all the rubber and rubber/metal bonded parts as per must change item for AC & Non AC Coaches. Must change items List of during Shop Schedule –II is enclosed as Annexure ’10.6

CBC

Dismount the CBC from coach, disassembled and overhauled as given in RDSO’s CMI No. RDSO/2006/CG/CMI-01

Interior- Passenger Area

- Replacement of up graded specification PVC flooring.

10.8 Must Change Items during Shop Schedule –II

List of must change items during Shop Schedule –II is enclosed as Annexure ’10.6’

10.9 Tool and Equipments

Tools and Equipments for maintenance of FIAT bogie and Tools and equipments for Depot maintenance are given as Annexure ’10.7**.**

10.10 Rubber and Wear Parts

The major rubber and wear parts of FIAT bogie are:

- Rubber bush for traction centre
- Rubber joint for control arm
- Elastic joint for traction rods
- Joints for anti roll bar
- Longitudinal bump stops
- Lateral bump stops
- Rubber disc and bump stop for primary suspension
- Rubber ring and rubber spring for secondary suspension

Examine all rubber and wear parts for external condition, cracks, detachment between rubber & metal, and permanent set during shop schedule-I. Replace, if

necessary.

Rubber and Rubber / Metal Bonded Parts

- Replace all the rubber and rubber/metal bonded parts as must change item list

10.11 General Instruction for Rubber Metal Bonded Parts & Damper:

Instructions regarding the parameters / physical condition of rubber/metal bonded parts to be checked during maintenance are displayed in Workshop for the following components:

- ✓ Primary Bump Stop.
- ✓ Primary Suspension Rubber Pad.
- ✓ Ball Joint Control Arm.

External conditions, cracks, detachments and Permanent deformation are to be checked.

- Proper tools are available for fitment / removal of damper Rubber and Rubber/Metal Bonded items.
- Testing machine / gauges for testing of Rubber and Rubber/Metal Bonded items are available.
- Testing machine / gauges for testing of Rubber and Rubber/Metal Bonded items are calibrated and calibration certificates are available.

10.12 Primary & Secondary Springs

The primary & secondary suspension springs used in various LHB coaches are given as follows:-

Primary Suspension Springs

Coach type	INNER (Drg.No.)	OUTER (Drg.No.)
AC-Chair car Ist& 2nd	1267412	1267411
ACCN/EOG	1277143	1267411
ACCW/EOG	1267412	1267411
FAC/EOG	1267412	1267411
Hot buffet car	1267412	1267411
Power Car	1277143	1277142

Secondary Suspension Springs

Coach type	INNER (Drg.No.)		OUTER (Drg.No.)	
AC-Chair car Ist& 2nd	1269513		1269514	
ACCN/EOG	1269513		1268836	
ACCW/EOG	1269513		1269514	
FAC/EOG	1269513		1269514	
Hot buffet car	1269513		1269514	
Power Car	Side 1	Side 2	Side 1	Side 2
	1277145	1268837	1277146	1268836

Coupling and Installation Instruction for Flexi Coil Secondary Springs

Please refer to FIAT-SIG technical specification No. 17.471, part document 101, version 01 for coupling and installation instructions of flexi coil secondary springs.

Colour Coding of springs for Identification

For identification of springs to be used in different types of LHB Coaches, middle coil of the primary & secondary springs to be painted with compatible paint of springs in different colours indicated against each group as shown below:
(Ref: RCF's letter No. MD 23151 dt. 23.11.2002)

Primary Springs		Secondary springs		Paint colour to be painted on middle coil
Inner	Outer	Inner	Outer	
1267412	1267411	1269513	1269514	Green
1277143	1277142	1268837	1268836	Yellow
---	---	1277145	1277146	Blue
LG01101	LG01100	LG05100	LG05101	Black

The paint should be compatible with the paint of spring as specified in clause 8.3 of specification no. 17.248.100 version 05.

10.13 Maintenance of springs

Primary & secondary springs are protected against corrosion by a paint coating. This surface protection should remain undamaged, otherwise there can be local corrosion attack, resulting in spring failures.

10.13.1 Trip Schedule (D1)

Carry out visual inspection of springs for damages, corrosion, cracks or broken springs.

10.13.2 Monthly Schedule (D2)

Same as Trip schedule.

10.13.3 Half Yearly Schedule (D3)

Same as Trip schedule

10.13.4 Shop Schedule I, II (18 Months/36 Months)

- Clean the primary/ secondary springs thoroughly (with suitable detergent water jet) in disassembled condition.
- Inspect visually for any cracks, damages, corrosion and breakage.
- Any damage to coating may be repaired by primer and high build epoxy paint
- to RCF specification.
- If rust is visible, de-rust with the steel brush, and repair the coating as given above.
- In case of corrosion –pitting, cracks or breakage, replace the spring.

10.13.5 Shop Schedule – III (72 Months)

In addition to activities given under Shop Schedule –I, carry out the following-

- Testing of springs for free height (permanent set)
- Testing of spring for load/deflection characteristics as given in drawings and specification no. 17.248.100.
- Replace the spring, if free height/deflection is beyond permissible limits

SPRING PARAMETERS

Drawing No.	Bar dia (mm)	Mean Coil dia (mm)	No of active coils	Total no. of coils	Test load (KN)	Height under test load (mm)	Vertical stiffness (N/mm)	Lateral stiffness (N/mm) for information	Other controlled Dimension	Direction of coiling
1267411	38	219	4.1	5.6	28.91 ± 1%	264 +0/-4	475 ± 5%	Not Reqd.	I.D.=181+3/-0	Right hand
1267412	26	138	6.1	7.6	17.02 ± 1%	264 +0/-4	280 ± 5%	Not Reqd.	I.D.=112+3/-0	Left hand
1269513	34	246	6.8	8.3	25.24 ± 1%	468 +0/-5	129.5 ± 5%	31.1	O.D.=280+0/-2	Left hand
1269514	50	368	5.1	6.6	47.02 ± 1%	512 +0/-5	241.1 ± 5%	164.5	I.D.=318+3/-0	Right hand
1277142	40	219	4.3	5.8	47.32 ± 1%	252 +0/-4	556 ± 5%	Not Reqd.	I.D.=179+3/-0	Right hand
1277143	27	138	6.4	7.9	26.38 ± 1%	252 +0/-4	310 ± 5%	Not Reqd.	I.D.=111+3/-0	Left hand
1277145	38	243	7.2	8.7	38.695 ± 1%	468.5 +0/-5	197.9 ± 5%	43.9	O.D.=281+0/-2	Left hand
1277146	57	372	5.5	7.0	71.48 ± 1%	512.5 +0/-5	365.6 ± 5%	254.5	I.D.=315+3/-0	Right hand
1268836	55	372	5.5	7.0	59.226 ± 1%	515 +0/-5	317 ± 5%	224.2	I.D.=317+3/-0	Right hand
1268837	37	243	7.0	8.5	34.19 ± 1%	471 +0/-5	183 ± 5%	43.3	O.D.=280+0/-2	Left hand
LG01100	40	219	4.1	5.6	26.118 ± 1%	268.2 +0/-4	583 ± 5%	Not Reqd.	I.D.=179+2/-0	Right hand
LG01101	27	138	6.2	7.7	14.336 ± 1%	268.2 +0/-4	320 ± 5%	Not Reqd.	I.D.=111+2/-0	Left hand
LG05101	55	376	5.0	6.5	40.79 ± 1%	516.2 +0/-5	337.6 ± 5%	284.8	I.D.=321+3/-0	Right hand
LG05100	36	245	7.25	8.75	18.665 ± 1%	472.2 +0/-5	154.5 ± 5%	61.8	O.D.=281+0/-2	Left hand

10.14 Operational Guidelines for Trains with LHB Coaches

10.14.1 Operation of LHB Rake At 130 Kmph

in terms of para 2.1 of Policy Circular 6 (Revised 2018), sanction of the General Manager is to be obtained for the introduction of any new variant of LHB coaches for which sanction already given by the Central Government (Railway Board).

For upgrading the speed to 130 kmph, Confirmatory Oscillograph Car Run (COCR) is to be done and sanction of CRS is to be obtained for upgrading the speed of the section to 130 kmph. Sanction of GM is to be obtained for upgrading the speed of trains with an LHB rake.

In terms of para 6.5.1.3 of ACS No. 2 of Policy Circular, for upgrading the speed of any new variant of LHB coaches, not included in the COCR trial run, Route Proving Run is to be conducted.

10.14.2 Procedure for Checking Capability of Air Brake Locomotives

SN	Type of test	Procedure	Prescribe limit
	Locomotive leak test (BP)	Close Loco BP angle cock. Create 5 kg/ cm^2. Drop BP Press. by 0.6 $kg/cm^{2.}$ Stabilized BP at 4.4 kg/cm^2. Isolate lead & trial cock.	Drop - not more than 0.7 kg/cm^2 in 5 min.
	Locomotive leak test (FP)	Close Loco FP angle cock. Create 6 kg/ cm^2. Isolate Feed valve isolating cock.	Drop - not more than 0.7 kg/cm^2 in 5 min.
	Loco capability test	Close Loco BP & FP angle cock. Keep A-9 valve in emergency position. Build up MR press. to 8-10 kg/cm^2. Couple 7.5 mm dia hole test coupler (DRSO –SK.DP-2691) with BP coupling of Loco. Charge BP press. to 5 kg/cm^2. Open BP angle cock.	BP press. should not fall below 4 kg/cm^2 within 60 seconds.
	Load leakage (BP)	Ensure 5 kg/cm2 BP press. on loco & 4.8 kg/cm2 in rear SLR Reduce 1kg/cm2 BP press. to 4kg/cm2 (stabilized) by A- 9 valve application. Close BP isolating cock. Note BP press. drop in 5 min.	Drop - not more than 1 kg/cm^2 in 5 min.
	Load leakage (FP)	Ensure 6-kg/cm2 FP press. on loco & 5.8 kg/cm2 in rear SLR. Close Feed valve isolating cock. Note FP press. drop in 5 min.	Drop - not more than 1 kg/cm^2 in 5 min.

10.14.3 Guidelines for Driver

All Running Staff should be counseled to wait for the release of the brake after service application and emergency application to avoid wheel **skid and train parting.**
After brake application –the driver should wait:-

Issue of BPC and Endorsement in the upper right-hand corner of the BPC:

Twin pipe	40 Sec. After full application
	90 Sec. After Emergency application
Single pipe	120 Sec. After Emergency application
(Ref: TSO No. Coaching & Freight /99/1(Rev-1), Para-1.1 – Train parting)	

i) Maintenance pattern as per Policy circular No. 4 (3. b etc).

ii) Type of coaches comprising the rake (LHB/ICF/DMU etc)

(Ref: DME/Chg/RB's no. 95/M(C)/141/1 Dt. 8.7.02)

At the train examination stations where locomotives are changed on through trains, the level of air pressure/vacuum created on the locomotive and brake van gauges should be recorded on the certificate to be issued to the guard and driver on the 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. Ref: Chapter-1 , Para-107 b.xiv of BG M/Manual- July'02**

10.14.4 Standardization of Brake Van Equipment For Coaching Trains. (Ref: Working Timetable)

Consequent to the recommendation of the Commissioner of Railway Safety on various Railway accidents on the subject matter the board has reviewed and decided on the following complement of Brake Van equipment for Coaching trains: -

Item	No.	Maintained/supplied by
Portable control telephone	2*	Jr. Eng. (Tele)
Portable Train Lighting Equipment	1	Jr. Eng. (Elec. G)
Portable Fire Extinguisher	2	Jr. Eng. (C & W)
Wooden wedges / Skids	2	Jr. Eng. (C & W)
Stretcher	1	SS/SM

Provision of Dry chemical Powder type Fire Extinguishers in coaches.

(Ref: -Letter of Asst. Inspector General/fire, Rly. Bd. Pdt. 30.05.97.)

1	Each Brake Van (Front & Rear)	2 nos.
2	Each Ac Coaches	2 nos.
3	Each Pantry Car	4 nos.
4	Each Generator Car	4 nos.

As per RB letter No. 76/M (c)/137/31, vol IV pt dtd 21.11.2017 all new Non-AC coaches shall have the provision of fire extinguishers (2nos./coach)

10.14.5 Maintenance of Fire Extinguishers

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, head sorter, etc., as the case may be, and replaced. (Ref *:* BG Maintenance Manual – July'03. Chapter-1, 111 f)

NOTE: At least 5 percent of the fire extinguishers on locomotives / coaches / brake vans should be tested at random by the custodian depot/shed in the presence of an officer and a proper record maintained of these tests.
(RSRC recommendation, Para 3.15.3 & RB's letter no.2002/M (L)/466/7101 dt. 17.12.02)

Maintenance of DCP type Fire Extinguisher:
[Ref: IS 2190-1992, Third Revision]
Monthly maintenance

- Make sure that the PE is in proper condition and is not accidental discharged.
- Exterior cleaning.
- Checking of nozzle and vent holes.
- Check cap washer and grease threads of the cap.

Annual inspection

- All items of monthly maintenance.
- Empty the contents of the FE in clean buckets and remove all components.
- Examine inside surface of the cylinder, if rust marks – clean and wash with clean water – sun dry. If plate thickness is not adequate, the surface to be freshly plated or the cylinder to be changed.
- Examine external surface – painted.
- Checking of level, if not in order, to replace with correct level.

Hydraulic Pressure testing

- Test interval : 3 years
- Test pressure : 25 Kg/cm2
- Pressure maintained for : 2.5 min.

Refilling schedule.

- **Powder**: Should be replaced during annual inspection.
- **Gas Cartridge**: The cartridge is to be weighted during annual maintenance. Should be replaced if there is loss of weight by 10%, lasting of container or if the container is more than 5 years old (before put in service correct weight of the gas cartridge to be marked on the cartridge)

10.14.6 Schedule Examination of Automatic Fire Detection and Suppression System Provided in Pantry Car & Generator Car:

There are two types of Automatic Fire Detection and Suppression System provided in pantry car & Generator Car:

- Manual system (Revision 1)
- Automatic system (Revision 2)

In both the system, the following checking should be carried out:

SN	Schedule	Details
1	D2	Check suppression system pressure in Nitrogen cylinder. If pressure is less than 150kg/-cm², inform to supplier/OEM for further guidance. Check smoke and heat detection physical condition if required, clean it with soft cloth in-situ.
2	D3	Carryout smoke detection test for point type smoke detector. Check condition of pipe line. Pipe line should be securely clamped. Check the condition of nozzles. Nozzles should be free from deposition of dust soot etc.

3	SS1	Carryout heat detection test for point type heat detection. System integrity at least up to activation signal of solenoid valve to be ensured
4	POH	Complete testing of the system.

10.14.7 Schedule Examination of Automatic Smoke/ Fire Detection with Alarm System Provided in AC Coaches:

There are two types of Automatic Smoke/ Fire Detection with Alarm System provided in AC Coaches – with brake application or without brake application in case of Alarm is operated.

The following checking should be carried out:

SN	Schedule	Parameter	Acceptance criteria
1	D1	Incoming Power (110V DC) to Power Supply	Continuous Supply Of 110V DC to Power Supply from Railway source
2	D1	Visual Inspection of Panel	Panel Power Led and Brake Valve Led Should In On Condition
3	D1	Visual Inspection of All Parts (Panel, Power Supply, Battery, STOBE Light with Hooter, Electronic Voice Messenger, Air Sampling Points, HASP Etc.)	Check for Presence/ Intactness of All Parts and without any Physical Damages
4	D2	All items of D1 and check Air Flow Reading*	It should be within the Range i.e Fn+/-20%
5	D3	All items of D2 and check Pipe Network Connectivity and Verify Detector Performance	It can be Conducted, either by Smoke Generator, Burning Incense Stick or Hot Transformer from farthest point from Panel to check intactness of Piping Network, Capillary and Air Sampling Points
6	SS1 SCHEDULE	All items of D3 and Cleaning of Sampling Point and Pipe Network	Clean the Sampling Points, Sampling Pipe and Capillaries by Vacuum Cleaning

NOTE:

* To check air flow reading the ceiling of the coach above the Fire Detection Panel will need to be dismantled. The piping will also need to be cut before the flow meter can be placed in the suction line and measurement taken. Once the testing is completed the pipe line will again need to be assembled and smoke test done to establish the integrity of piping is maintained. Railway has to purchase air flow instrument with fitting along with cables (moxa, HLI). This can also be ensured by using software of OEM and downloading of data in laptop.

** During shop schedule attention SS-II, ensure all items of SS-1 and replace the

damage components as well as replace 24 V DC batteries.

10.14.8 Rolling In Rolling Out Items In LHB Coaches: [Ref: Camtech's Pamphlet On Rolling In/Rolling Out For ICF & LHB Coaches]

- **Hanging Part**: Securing arrangement Anti-roll bar, Axle box face plate,WSP Cable, Link, Water pipe and Battery box etc.
- **Hot axle**: Smell / smoke from axle box
- **Broken part**: Primary & secondary springs, Deflated air spring etc.
- **Wheel skidding**: unusual sound from wheel tread.
- **Air Pressure leakage**: Hissing sound from air brake pipes.
- **Deflated Air Spring**: Uneven Air Spring.
- **Brake binding**: Brake indicator applied or released [Green or Red] FIBA.
- **Securing arrangement of all tanks**:, Bio-toilet tanks, under-slung tank, AR tank & Brake control module Including footboard and CBC uncoupling device.
- **I.V. Coupler sagging**: Sagging of IV coupler.
- **Whistling sound**
  From brake pad
  Brake disc
  Bearing front & back
  Earthing box.

10.14.9 En-Route/Rolling In Examination of Passenger Trains

- Site shall provide unobstructed view of under gear from both sides.
- Speed of the train shall not be more than **30 KMPH**,
- It should cover the entire length of train,
- Should have adequate space for fixing the lighting arrangement and for staff.
- 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.

Standardization of location for axle box temperature measurement by non-contact type of thermometer. (Ref**:** CAMTECH's Pamphlet on Rolling in/Rolling Out for ICF & LHB Coaches)

Measurement of Axle box temperature by non-contact type thermometer is to be taken of Axle box showing axle box temperature above 80^{o} C should be detached en-route from service.



10.14.10 Miscellaneous Guidelines for Train Operation:

Broken Coil spring: En-route

If only one broken Axle box coil spring with no excessive tilt of the Axle box is detected en-route a running train, the coach may be allowed to continue journey up to the destination with the condition that the speed shall not exceed 80 KMPH in case of

breakage of one coil of primary spring and 90 kmph in case of breakage of one outer coil of secondary spring

Failure/Leakage Air Suspension: En-route

In case of heavy leakage or deflated air spring, the defective bogie is to be isolated with the help of isolating cock and the coach may be permitted with speed restriction of 60 kmph upto terminal point for maintenance

RED PROTECTION

In order to afford necessary protection to the SSE/SE/JE(C&W) staff, a banner flag or a board about 0.40 x 0.30 meters painted red and inscribed with the word “STOP” in white, erected about 1.20 meter above ground level, will be exhibited by the SSE/SE/JE(C&W) at both ends of the load of the train/vehicles.

Between sunset and sun-rise or during thick, foggy or tempestuous weather impairing visibility, the Banner flag/Stop board should be replaced by red lamps.

Ref : SR 4.31.02 of GR &SR 2011

RETURN OF POH COACHING STOCK:

Coaching stock whether booked to shop for POH, or return to base station or booked to other stations must be moved by passenger trains or by coaching specials, unless otherwise advised by Train Examiner

DAMAGE LABELLING OF COACHES:

[Ref : IRCA Part – IV Para-3.9.1]

Should it be necessary to detach a vehicle, it must be damage-labeled and advice sent to the Station Master or appropriate authority, a second advice being sent when the vehicle is fit for traffic

Standard facilities in Carriage Maintenance Depots

(Ref: CAMTECH Maintenance Manual for BG Coaches of ICF design,1st correction slip– CAMTECH/2002/M/C/CMM/1.0/CS-01(07.2006)

Classification of depots

Classification	No. of coaches based
Minor Depot	Below 100
Medium Depot	100 to 250
Major Depot	Above 250

RPC 4 recommendation

Ref: Board’s letter No.95/M(C) /-141/-1 pt. dated 14.6.2017

The following guidelines for maintenance of coaching trains should be followed.

S N	Category of Train	Preventive maintenance schedule at pit line	Under gear exam and brake system maintenance schedule	Remarks
1.	Rajdhani/ Duranto trains	At primary end	At both the ends	Complete air brake testing with issue of fresh BPC at both ends

S N	Category of Train	Preventive maintenance schedule at pit line	Under gear exam and brake system maintenance schedule	Remarks
1A	Shatabdi trains	At primary end	At primary end	Only continuity check if stabled at platform, otherwise, brake power check with endorsement on original BPC.
2	Main/-Exp. Trains RTKM > 4000 kms LHB	At primary end	At both the ends	Complete air brake testing with issue of fresh BPC at both ends.
3(a) (i)	Main/Exp. Trains RTKM upto 4000 Kms for LHB (excluding category 1 trains)	At primary end	At primary end	Only continuity check if stabled at platform, otherwise, brake power check with endorsement on original BPC.
3(a) (ii)	Mail/Exp. Trains that touch the Primary Station more than once within 4000 Kms (LHB) and 96 hrs. whichever is earlier	At primary end	At primary end only once within the limit of 4000 Kms (LHB)/96 hrs. whichever is earlier	Only continuity check if stabled at platform, otherwise, brake power check with endorsement on original BPC.
3(b)	Interconnected Mail/Exp.Round Trip run upto 3500 Kms (ICF) or 4000 Kms (LHB)	At primary end	To be done within 3500 Kms (ICF) or 4000 Kms (LHB) and 96 hrs. after the issue of original BPC, whichever is earlier, only at primary end.	Only continuity check if stabled at platform, otherwise, brake power check with endorsement on original BPC.
4	Passenger trains with toilets including interconnected passenger trains/shuttles	At primary end	To be done within 3500 Kms or 96 hrs. after the issue of original BPC, whichever is earlier, only at primary end.	Only continuity check if stabled at platform, otherwise, brake power check with endorsement on original BPC.
5	Passenger	At primary end	To be done within	Only continuity check

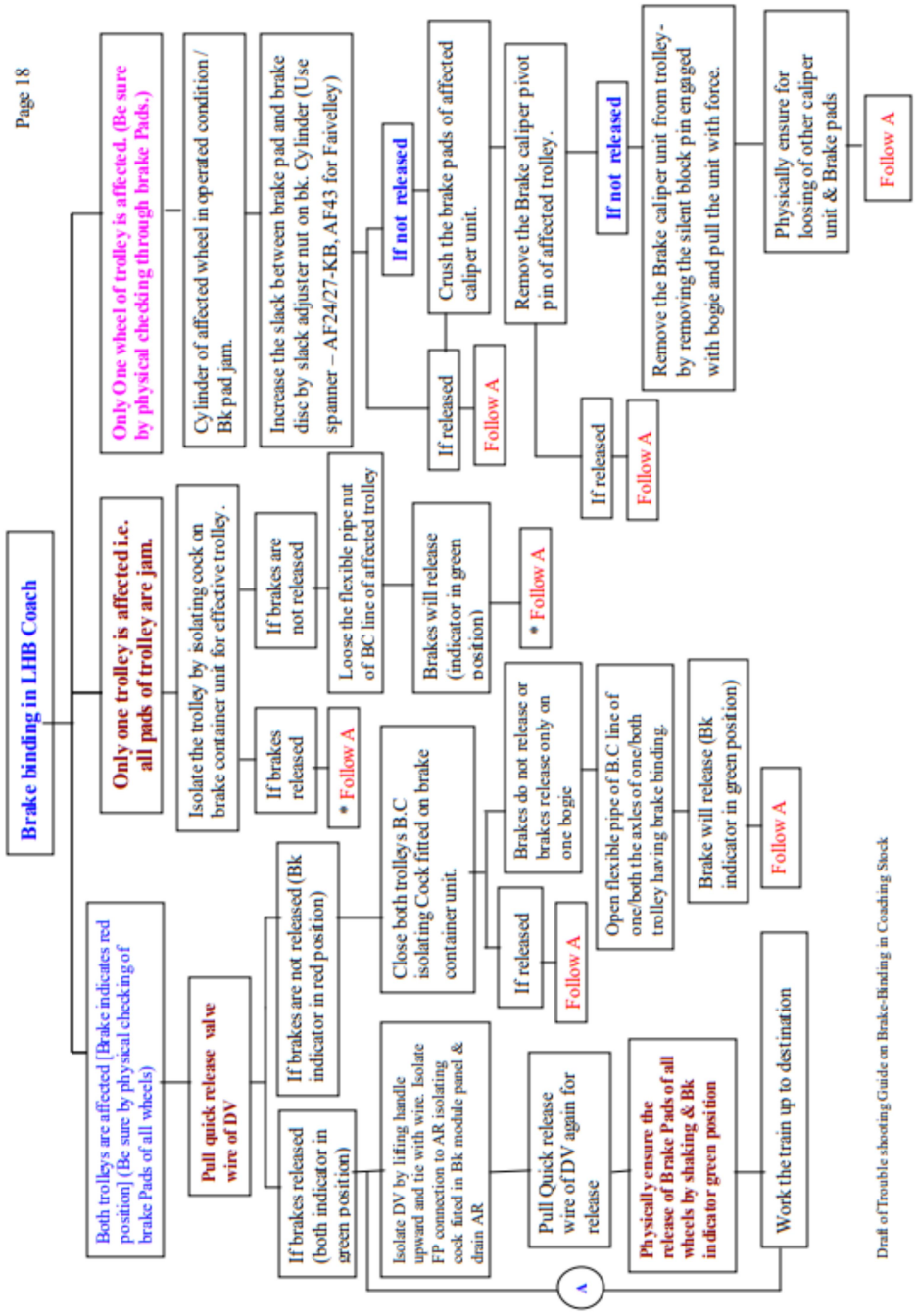
S N	Category of Train	Preventive maintenance schedule at pit line	Under gear exam and brake system maintenance schedule	Remarks
	trains without toilets		3500 Kms or 7 days, whichever is earlier, only at primary end.	if stabled at platform, otherwise, brake power check with endorsement on original BPC.
6	Dedicated Parcel Trains	At primary end	To be done within 4500 Kms or 10 days, whichever is earlier,	Only continuity check if stabled at platform, otherwise, brake power check with endorsement on original BPC.
7	Military/Election Special train	At primary end	To be done within 3500 Kms (ICF) or 4000 Kms (LHB) or 96 hrs., whichever is earlier, only at primary end.	Only continuity check if stabled at platform, otherwise, brake power check with endorsement on original BPC

Trouble shooting guide of brake binding en-route & FIBA attention en-route

Procedure to Release and Isolate Brake Binding of LHB Coach With Fiat Trolley At En route Stations:

- In case of brake binding, the brake indicator of the affected bogie will show red colour.
- Pull the release lever of DV
- Rotate the isolation cock of the affected bogie provide d on the brake panel in anti-clockwise direction by 90 degrees to release and isolate the brake cylinders of the affected bogie
- If brakes are released, brake indicator of the affected bogie will change colour from red to green as shown. Check that the brakes are released by shaking the brake calipers. If brakes are released, work the train.
- If not released, Loosen the hexagonal nut of the brake cylinder by 27 no. or 46 no. spanner. Check that the brakes are released by shaking the calipers and work the train.

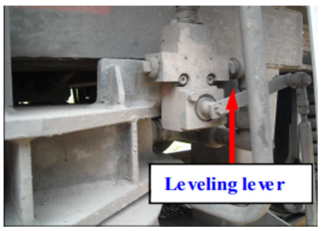
10.14.11 Brake Binding in LHB Coaches



10.14.12 Air Springs Attention:

Trouble shooting of Air Springs provided in Secondary Suspension of Bogies

In case of punctured / deflated air bellows, leveling valve lever will be in an inclined position as shown in the figure



Close the isolation cock of the air supply pipe to the air spring (painted in red colour) of the affected bogie. Work the train at restricted speed of 60 km/hr upto the next train examination point.



In case of main reservoir of air spring damaged and leaking, close the isolation cock of the main reservoir. Work the train at restricted speed of 60 km/hr up to the next train examination point. However, in case of leakage from drain cock due to opening of cock, close the drain cock and work the train at prescribed speed after ensuring that there is no leakage in the system



Working of LHB trains in case of en-route BP/FP metallic pipe failure:

A. FP Failure:

a) Bring the flexible coupling pipe having FP palm end of one coach length, kept in Guard's compartment / Pantry car or at any other location as mentioned on the BPC.
b) Lay the flexible coupling pipe from one end of the coach to the other end from outside / inside of the affected coach. Secure / clamp the coupling pipe to pre vent it from falling off / hanging.
c) Close the FP cut off angle co ck s of the coach in the front and of the affected coach. Uncouple any one of FP air hoses. Couple the palm end of the flexible pipe to the palm end of the uncouple d FP air hose of the coach at the front of the affected coach.
d) Close the FP cut off angle co ck s of the coach in the rear and of the affected coach. Uncouple any one of FP air hoses. Couple the palm end of the flexible pipe to the palm end of the uncouple d FP air hose of the coach at the rea r of the affected coach.
e) First open the FP cut off angle cock of the coach at the rea r and then open the FP cut off angle co ck of the coach at the front of the affected coach.
f) Isolate the brake system of the affected coach. Ensure that brakes are released
g) Conduct air pressure continuity test
h) Work the train at prescribed speed.

B) BP Failure:

Procedure for By-passing BP pressure of a coach in case of Brake pipe failure at en-route stations

a) Bring the flexible coupling pipe having BP palm end of one coach length, kept in Guard's compartment / Pantry ca r or at any other location as mentioned on the BPC.
b) Lay the flexible coupling pipe from one end of the coach to the other end from outside / inside of the affected coach. Secure / clamp the coupling pipe to pre vent it from falling off / hanging.
c) Close the BP cut off angle cocks of the coach in the front and of the affected coach. Uncouple any one of BP air hoses. Couple the palm end of the flexible pipe to the palm end of the uncoupled BP air hose of the coach at the front of the affected coach.
d) Close the BP cut off angle cocks of the coach in the rear and of the affected coach. Uncouple any one of BP air hoses. Couple the palm end of the flexible pipe to the palm end of the uncoupled BP air hose of the coach at the rear of the affected coach.
e) First open the BP cut off angle co ck of the coach at the rea r and then open the FP cut off angle cock of the coach at the front of the affected coach.
f) Manually re lease and isolate the brake system of the affected coach.
g) Conduct air pressure continuity test and work the train at prescribed speed.

C) Trouble shooting in case of BP-FP cut off angle failure on the last coach (LHB coach FIAT Bogie)

a) Close rear Cut off angle co ck of adjacent coach of the affected pipe.
b) Loosen the check nut fitted on 'T' jo int and affected angle co ck pipe.
c) Disconnect the affected pipe from 'T' jo int by loosening holding clips.
d) Tighten the Dummy plug to that end.

D) Procedure for By-passing BP pressure of a coach in case of Brake pipe failure at en-route stations

a) Collect two nos. of BP-FP BY-PASS Coupling from Pantry Car/AC II or Guard cab as per provision made.
b) Close the FP and BP cut off angle cocks of lo co end adjacent coach and the affected coach respectively. Wait till pressure of both air hoses releases. Uncouple BP and FP air hoses. Couple BP-FP BYPASS coupling between BP air hose of lo co end adjacent coach and FP air hose of the affected coach. Place the spare hanging air hoses on hooks.
c) Similarly, close cut off angle cocks of FP and BP of rear end adjacent coach and the affected coach. Uncouple BP and FP air hoses. Couple BP-FP BYPASS coupling between BP air hose of rea r end adjacent coach and FP air hose of the affected coach. Place the spa re hanging air hoses on hooks.
d) Open cut off angle cocks of BP of rear end adjacent coach, both FP cut off angle cocks of affected coach and BP cut off angle co ck lo co end adjacent coach respectively.
e) Manually release and isolate the affected coach.
f) Conduct air pressure continuity test and work the train.

10.14.13 Coupling/Uncoupling Procedure of CBC Fitted Coaches

Coupling Procedure:

a) Bring the coaches near each other at a slow speed and stop the coach at

approximately one meter distance of each other.

b) Ensure that locking screw is in unlocked position otherwise unlock the operating handle by rotating locking screw anti-clock wise with key.
c) Lift the operating handle and turn it in clock wise direction (by minimum 900) to a horizontal position to open the CBC.
d) Check alignment and position of coupler centres and attach at approximately 2 to 3 km/hr speed.
e) Check position of tell-tale device for proper coupling (location of the tell-tale is shown in figure).



f) Lock the operating handle by rotating the locking screw clock wise with key. In addition.
g) After coupling of the CBC, pull the train slightly for reconfirming positive coupling.

Uncoupling Procedure

a) Unlock the handle by rotating locking screw anti- clock wise as well as unlock the rotary lock lifter assemble.
b) Lift the handle and turn it in clock wise direction to a horizontal position by minimum 900 and pull the loco /coaches apart.
c) Before uncoupling, make sure that the couplers are not subjected to any tensile load and the operating handle is free to rotate.

10.14.14 Schedule of Passenger Amenity Fittings for BG Coaches

Description	AC coaches				Non AC coaches				
	1st AC	2nd AC	3rd AC	Chair car	WFC	sleeper	Day coach	General	Double decker
Compartment and doorway fittings									
Folding or fixed table	Y	Y	Y	Y	Y	Y	No	No	No
Bottle Holder	Y	Y	Y	Y	Y	Y	No	No	No
Waste Paper basket									
(i) Compartment	Y	No	No	No	No	No	No	No	No
(ii) Door way	Y	Y	Y	Y	No	No	No	No	No
Foot rest	No	No	No	Y	No	No	No	No	No
Notices	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mirror with shelf									
i. Compartment	Y	Y	Y	No	Y	Y	No	No	No

Description	AC coaches				Non AC coaches				
	1st AC	2nd AC	3rd AC	Chair car	WFC	sleeper	Day coach	General	Double decker
ii. Door way	No	Y	Y	Y	Y	Y	Y	Y	Y
Coat Hook	Y	Y	Y	Y	Y	Y	Y	Y	Y
Foot step	Y	Y	Y	NA	Y	Y	No	NA	No
Magazine Pouch	Y	Y	Y	Y	Y	Y	No	No	No
Wash basin									
(i) Compartment	Y	No	No	No	No	No	No	No	No
(ii) Door way	No	Y	Y	Y	Y	Y	Y	No	Y
Ward robe with fixed hanger	Y	No	No	No	No	No	No	No	No
Water cooler	Y	No	No	Y	No	No	No	No	No
Drinking water with container	Y	No	No	No	No	No	No	No	No
Thali rack	No	Y	No	No	No	No	No	No	No
Linen room	Y	Y	Y	No	No	No	No	No	No
Ring below berths for securing luggage	No	Y	Y	No	Y	Y	No	No	No
Lavatory fittings									
Shower bath	Y	No	No	No	Y	No	No	No	No
Wash basin	No	Y	Y	Y	Y	Y	Y	Y	Y
Towel rail	Y	Y	Y	Y	No	No	No	No	No
Flushing commode	3	1	1	1	1	1	Nil	Nil	Nil
Flushing pan	1	3	3	3	3	3	All	All	All
Push cock for lotah filler	Y	Y	Y	Y	Y	Y	Y	Y	Y
Commode rail	Y	Y	Y	Y	Y	Y	Y	Y	Y
Mirror shelf	Y	Y	Y	Y	Y	Y	Y	Y	Y
Bottle opener	Y	No	No	No	No	No	No	No	No
Coat hook	Y	Y	Y	Y	Y	Y	Y	Y	Y
Soap Dish (SD) Liquid soap container (LC)	Both	LC	LC	LC	SD	SD	SD	SD	SD
Lavatory engagement display	Y	Y	Y	Y	No	No	No	No	No

External fittings

Description	AC coaches				Non AC coaches				
	1st AC	2nd AC	3rd AC	Chair car	WFC	sleeper	Day coach	General	Double decker
Destination Board /LED Digital Destination Board	Both ends of the train								
No plates on mail & express trains	Y	Y	Y	Y	Y	Y	Y	Y	Y

Note: Passenger information system, digital display board, public address system, CCTV camera etc may also be included in list of passenger amenities items.

Safety requirement
SCHEDULE OF PASSENGER AMENITY FITTINGS FOR LHB COACHES

Description	AC coaches				Non AC coaches				
	1st AC	2nd AC	3rd AC	Chair car	WFC	sleeper	Day coach	General	Double decker
Alarms pull no. of per…									
i. Compartment	1per 2 berth	1 per bay	1 per bay	Total 6	1 per 2 berth	1 per bay	Total 6	Total 6	One
ii. Corridor	2				2				
(iii) lavatory	No	No	No	No	No	No	No	No	No
Emergency window	4	4	4	4	4	4	4	4	4
Fire extinguishers	2	2	2	2	2	2	2	2	2

Description	AC coaches				Non AC coaches				
	1st AC	2nd AC	3rd AC	Chair car	WFC	sleeper	Day coach	General	Double decker
Electrical requirement									
A- Lighting									
i) Minimum lux at horizontal plane 840 mm above floor level									
a) Compartment	120	120	120	120	80	80	80	80	80
b) Lavatory	100	100	100	100	100	100	100	100	100
c) Corridor	80	80	80	80	80	80	80	80	80
ii) Individual switches for ceiling light	Yes	Yes	Yes	No	Yes	Yes	No	No	No
iii) Berth reading light with switches	Yes	Yes	No	No	Yes	No	No	No	No
iv) Night light	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
v) Individual switch for night light	Yes	Yes	Yes	No	Yes	Yes	No	No	No
vi) Toilet engage light	Yes	Yes	Yes	Yes	No	No	No	No	No
vii) Toilet engage sign	No	No	No	No	No	No	No	No	No
viii) Socket out let 110V	No	No	No	No	No	No	No	No	No
ix) Call bell push button	Yes	No	No	No	No	No	No	No	No
x) Plug point & switch for 110V for Lap top & mobile	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Description	AC coaches				Non AC coaches				
	1st AC	2nd AC	3rd AC	Chair car	WFC	sleeper	Day coach	General	Double decker
B. Fannage									
i) No of fans									
a) Compartment			One per bay	One for two row	One per bert h	3 per bay	3 per bay	3 per bay	3 per bay
b) Lavatory	One per lav.	One per lav.	One per lav.	One per lav.	No	No	No	No	No
ii) Size of BLDC fan									
a) Compartment (Swivelling = S) (Fixed = F)	400 mm (S)				400 mm (S)	400 mm (F)	400m m (F)	400 mm (F)	400 mm (S)
b) lavatory	200 mm (F)	200 mm (F)	200 mm (F)	200 mm (F)	No	No	No	No	No
c) Regulator for fans	Yes	No	No	No	Yes	No	No	No	No
d) On/Off switch for fans	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Passenger Information System	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Automatic Smoke / Fire Detection With Alarm System	Yes	Yes	Yes	Yes	No	No	No	No	No

10.14.15 Machinery and Plant Required for Coaching Depot

Description	Minor Depot	Medium Depot	Major Depot
U/floor wheel lath	-	-	1
Whiting jacks (5 Nos.) – Cap 25 T	-	1 set	1 set
EOT crane 20T	-	-	1
Welding Plant	1	2	4
Gas Cutting Equipment	1	2	2
Air Compressor 30 cfm	1	2	2
2T Tram beam hoist	1	1	2
Sewing machine	-	1	1

Description	Minor Depot	Medium Depot	Major Depot
Truck 10T	-	-	1
Light Coml. Vehicle	1	1	1
Fork lift truck	-	-	1
Lister truck	1	1	2
Wood cutting saw machine	-	1	1
Hand shearing machine	-	1	1
Centre Lath	-	-	1
Bogie Manipulator	-	-	1
Ultrasonic Testing Apparatus	1	1	1
Tool post Grinder	-	1	1
Vacuum Cleaner	1	2	3
Pressure Jet Cleaner	1	2	4
Tools			
a. Pneumatic Hand Tools			
i. Grinder	1	1	2
ii.Drill	1	1	2
b. Electric Power Tools			
i. Pop Riveting Gun	-	1	1
ii.Drill	-	1	1
iii. Bolt Tightener	-	-	1
c. Hand Tools	As required		
d. Test Bench			
i. Water Tank Test Rig	-	1	1
ii.Rake test rig	1	2	4
iii. Air brake single coach test rig	-	2	4
e. Office Equipment			
i. Computer system	1	1	1
ii.Plain Paper Copier	1	1	2
iii. Telefax		1	1

Materials and tools required for LHB rake attention at PF and en-route:

Emergency materials and tools required at platform SSE (C & W) office:

S.No.	Description	Quantity
1	Adaptor (BF+FP) for by-passing	2 sets
2	Angle cock	4 nos.
3	Dummy Flange (A/B)	2 nos.
4	M.U. washer	10 nos.
5	BP hose	8 sets
6	FP hose	8 sets
7	BP pressure gauge for LHB power car/LSLRD	2 nos.
8	FP pressure gauge for LHB power car/LSLRD	2 nos.
9	Axle box front cover (Earthing) with bolts	1 set

10	Axle box front cover (Normal) with bolts	2 set
11	Brake pads (LH)	8 sets
12	Brake pads (RH)	8 sets
13	Brake pad lock	2 sets
14	Angle Cocks	4 nos.
15	Ferrule Joint 28 mm (main Line)	16 sets
16	Ferrule Joint 30 mm (main Line)	8 sets
17	Ferrule Joint 22 mm (Aux. reservoir Line)	8 sets
18	Ferrule Joint 25 mm (Aux. reservoir Line)	8 sets
19	Ferrule Joint 18 mm (BC Line)	8 sets
20	Ferrule Joint 10 mm (Bk. Indicator)	8 sets
21	Ferrule Joint 12 mm (Bk. Indicator) New pipe line	8 sets
22	M16 x 90 bolts with nut	10 nos.
23	M16 x 70 bolts with nut	10 nos.
24	M16 x 45 bolts with nut	20 nos.
25	M16 x 120 bolts with nut	20 nos.
26	M8 x 25 (Allen bolt)	20 nos.
27	M12 x 100 bolts with nut	20 nos.
28	Inspection torches	10 nos.
29	Laser Temperature Gun with storage	4 sets
30	Tyre defect gauge	1 no.
32	Screw driver set (Multipurpose)	1 set
33	Slide wrenches- 6 mm to 22 mm	1 set
34	Pipe wrench (with opening up to 60 mm) 2” Ø=60 mm	1 set
35	Pin Punch	2 sets
36	Chisel	2 sets
37	Spiked hammers	4 nos.
38	Ball peen hammers	4 nos.
39	Goggles for inspection staff	4 nos.
40	Measuring tape	4 nos.
41	Steel scale 12”	2 nos.
42	Wooden Plug (various sizes)	10 sets
43	Wooden wedge	10 nos.
44	Fly nuts	Ade. Qty
45	G.I. wire	Ade. Qty
46	Teflon tape	Ade. Qty
47	Hand Gloves	10 Pairs
48	Cable tie	50 pc
49	Air filter of KB make	2 pc
50	WSEE Face cover	2 pc
51	Leveling valve	2 nos.
52	Bypass hose 26 M	2 nos.
53	Air below measuring height gauge	1 no.
54	Installation lever	4 nos.
55	Dummy plug with dummy lever	8 nos.
56	500 mm Hose (FIBA flexible hose)	4 nos.
57	OTL	10 nos.
Special Tools		
1.	Tool Kit (Torque wrenches, Allenkeys, pliers, spanners set etc.)	1 set

2.	LHB reset key/universal lock key/CBC operating handle Key	2 nos.
3.	CBC height difference gauge	2 nos.
4.	CBC vertical restrictor	4 nos.
5.	SIM in between Engine and Power car 8mm and 12mm	10 nos.
6.	Round punch, square file, Hand saw for fixing ferrule Joint (full set)	1 set.
7	Torque wrench 50 – 250 Nm	1 set
8	Torque wrench 10 – 68 Nm	1 set

10.14.16 Tool List for C&W Staff for En-Route Troubleshooting:

SN	Description	Quantity
1.	Toolkit (Torque wrenches ,Allen keys, pliers, spanners set etc.)	1 set
2.	Laser Temperature Gun with storage	1 set
3.	Adaptor (BF+FP) for by-passing	2 sets
4.	Angle cock	2 nos.
5.	Dummy Flange (A/B)	2 nos.
6.	M.U. washer	10 nos.
7	BP hose	2 sets
8	FP hose	2 sets
9	BP/FP gauge	2 sets
10	Ferrule Joint 28mm, 30 mm (main Line)	8 sets each
11	Ferrule Joint 22 mm , 25 mm (Aux. reservoir Line)	8 sets each
12	Ferrule Joint 18mm (BC Line)	8 sets
13	Ferrule Joint 10mm, 12 mm (Bk. Indicator)	8 sets each
14	M16 x 45, M16 x 90, M16 x 70, M16 x 120 bolts with nut	10 nos. each
16	M8 x 25 (Allen bolt)	10 nos.
17	M12 x 100 bolts with nut	10 nos.
18	Inspection torches	4 nos.
19	Measuring tape	2 nos.
20	Steel scale 12”	1 nos.
21	Wooden Plug (various sizes)10 mm, 12 mm, 28 mm, 30 mm	6 sets
22	Wooden wedge	6 nos.
23	Hand Gloves	6 Pairs
24	Red flag	2 sets
25	Extension pipe (26-meter length fitted with B.P & FP Palm)	1 set

List of tools in tool kit box:

SN	Description of Tool Kit	Qty.
1.	Tool Bag with 3 compartments made up of good quality durable material (Rexine/Leather/Canvas) with approx. dimension of 15” width,18” length, 8” thick should have a shoulder strap.	1 no.
2.	Punch 12” for split pins and Bulb Cotter	1 no.
3.	Chisel Hexagonal Chrome Vanadium 10”	1 no.
4.	8” inches long ferrule punch (8mm x 32 mm) for replacing the	1 no.

	ferrule.	
5.	Nylon mallet Hammer 200 grams for tapping of Brake discs	1 no.
6.	Full set of Allen keys for tightening studs of longitudinal Bump stop	1 no.
7.	Ball Peen Hammer 900 gm for split pins.	1 no.
8.	Double ended Open Wrench of size (mm) – 10x11, 12x13, 16x17, 18x19, 24x27, 30x32, 32x36, 36x41, 41x46	01 piece each
9	Double ended Ring Wrench of size (mm) – 16x17, 18x19, 24x27	01 piece each
10	36/41/46 single wrench	01 piece each
11	Heavy Duty Ratchet handle with 3/8" Sq.drive with socket size 10 mm, 24 mm, 27 mm made up of high grade steel approved lab confirming composition of carbon range 0.45-0.5, Chromium 0.8-1.2 and Vanadium 0.15 minimum.	01 piece each
12	Adjustable wrenches with scales chrome- plated (Beta code 111G) having length 250 mm with A max 42mm. range upto-10 mm to 42 mm.	01
13	Adjustable wrenches with scales chrome- plated (Beta code 111G) having length 250 mm with A max 22mm. range upto-06 mm to 22 mm.	01
14	Heavy duty pipe wrench (with opening up to 60 mm) 2"Ø=60 mm as per IS – 4003 (Part-II)-1986	1 no.
15	Screw driver set (Flat/Philips) for WSP cards, connecters, hose clips for speed sensor etc.	1 no.
16	Slip proof nose pliers	1 no
17	Wire stripper for wiring related work.	1 no.
18	Analogue Multi-meter for related work.	1 no.
19	Full set of Allen keys for ICV pull box junction box. (1mm to 12 mm)	1 no.
20	Measuring Tape –Steel	01
21	LHB reset key/universal lock key/CBC operating handle Key	01
22	Magnifying glass for checking minor cracks in the components, size- 85mm dia, 11/16	1 no.
23	M.S binding wire	100 gm
24	Teflon Tape	2 no.
25	Portable torch/multi-colour LED torch	1 no.

Suitable Make of tools to be procured for tool kit

10.14.17 Essential Tools & Equipments for Escorting Staff

Tools

1. Multi-meter
2. Adjustable Pipe wrench, 8"/10"/12"/14"
3. Spanner set – 6 mm. to 48 mm.
4. Alien key set – 1.1 to 10 mm. (10 nos. in one set)
5. Star screwdriver – Small / Medium.
6. Hammer 2.5 pound.
7. Chisel, Pin punch.
8. Big & Small size screw driver

9. Player.
10. Wire bound pin punch.
11. Rotary key (One set of 'Solson Tools kit' is required)
12. Reset key
13. Laser Temperature Gun with storage
14. Torque wrench 50 – 250 Nm
15. Torque wrench 10 – 68 Nm

Equipment

1. Extension pipe (26 meter length fitted with B.P & FP Palm)
2. Dummy plug for Main pipe /PEAV for FTRIL, KB – (10mm/20mm/25mm/30mm)
3. Shim of different size to reduce CBC play
4. Flexible Hose connection pipe of O.H. Tank.
5. Clip for above.
6. Vent valve for O.H. Tank.
7. Spare strainer for U/S tank & CDTS filter
8. B.P & F.P Hose as spare.
9. Silicon Silent.
10. Adhesive Tap
11. Door closer – 2 nos.
12. Jession Cock – 2 nos.
13. Elbow, socket, union nut, ferrule, 12mm, 22mm, 28 mm.
14. Bolts, nuts & washers M24, 20,16,12,10,8,6.
15. PEAV plug 25 mm. for FTRIL, 30 mm. for KB.
16. Dummy plug, dummy cap, flexible hose 500 mm.
17. Wooden plug

Urgent Materials

1. Brake pad – 2 nos.
2. Anti Roll Bar with bracket – 1 nos.
3. Roll link (Vertical) – 1 nos.
4. Traction link – 1 nos.
5. B.P. & F.P. converter 2 pairs – 4 nos.
6. Rubber Ring (MU washer, 'O' ring)
7. Angle cock – 2 nos.
8. Installation lever – 1 no.
9. Cable tie – adequate qty

10.14.18 Coach Numbering System _ Type Wise

Previous system:

Coach type	Last three digit
AC first class	**001-025**
Composite 1AC + AC-2T	**026-050**
AC-2T	**051-100**
AC-3T	**101-150**
CC (AC Chair Car)	**151-200**
SL (2nd class sleeper)	**201-400**
GS (General 2nd class)	**401-600**
2S (2nd class sitting / Jan Shatabdi chair cars)	**601-700**
SLR	**701-800**
Pantry car, VPU, RMS mail coach, generator car, etc	**801+**

NB : 1st two digits of coach number denotes " Year of built"
Re-numbering system of Coaches in Indian Railways:

Indian Railways is now following the pattern of re-numbering of coaches through WISE (Workshop Information System) of ROAMS (Rolling Asset Management System) controlled by CRIS (Centre for Railway Information System). The coach number is automatically generated by WISE whenever a coach is turned-out from Production Unit or any POH Workshop. At present it is not possible to determine the coach type by analyzing the coach number, only year built can be ascertained.