



पश्चिम रेल्वे  
WESTERN RAILWAY

प्रधान कार्यालय  
Headquarter Office,  
चर्चगेट  
Churchgate,  
मुंबई ४०००२०  
Mumbai 400 020.  
दिनांक: 25/05/21

M 442/19/4 LHB

**Sr.DMEs-ADI/BCT/BRC/BVP/RJT/RTM**  
**Sr.CDO-BCT,BDTS,BRC, KKF**  
**CDO-ADI/IND DME-ST/GIM,ADME-DADN**

Sub: Maintenance of "Air Suspension System" in LHB coaches.

Ref: Joint Director/Carriage (VDG) SV.EMU RAS Dated 13/05/2021.

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With reference to above, a letter received from RDSO is enclosed herewith for information and necessary action.

Encl: As above

Dy.CME(Chg)  
FOR CRSE(Chg)



**No. SV.EMU RAS**

**Date:13.05.2021**

**Principal Chief Mechanical Engineer**

1. Central Railway, HQ office, CSTM, Mumbai - 400 001
2. Eastern Railway, HQ office, Fairly Place, Kolkata- 700 001
3. Northern Railway, HQ office, Baroda House, New Delhi-110 001
4. Southern Railway, HQ office, Park Town, Chennai - 600 003
5. South Central Railway, HQ office, Secunderabad-500 071
6. South Eastern Railway, HQ office, Garden Reach, Kolkata-700 043
7. North Eastern Railway, Gorakhpur-273 001
8. North East Frontier Railway, HQ office, Maligaon, Guwahati- 781 011
9. Western Railway, HQ office, Churchgate, Mumbai-400020
10. East Central Railway, HQ office, Hazipur-844 101
11. East Coast Railway, Railway Complex, Bhubaneshwar- 751 023
12. North Central Railway, HQ office, Subedarganj, Prayagraj- 211015
13. North Western Railway, HQ office, Jaipur-302 006
14. South Western Railway, HQ office, Hubli- 580023
15. West Central Railway, HQ office, Jabalpur- 482 001
16. South East Central Railway, HQ office, Bilaspur- 495 004
17. Konkan Rly.Corp.Ltd., Corporate office, Belapur Bhawan, Navi Mumbai – 400614
18. Integral Coach Factory, Chennai - 600038
19. Rail Coach Factory, Kapurthala – 144 602
20. Modern Coach Factory, Rae Bareli – 229212

**Sub:** Maintenance of “Air Suspension System” in LHB coaches

- Ref:**
- i) RDSO letter no. SV. EMU.RAS dated 30.08.2019.
  - ii) RDSO letter no. SV. AS.FIBA dated 22.06.2020.
  - iii) RCF letter no. MD 44121 dtd 24.07.2020 for air spring height
  - iv) CAMTECH Maintenance Manual for LHB coaches.
  - v) JUDW letter no. 109-W/14/LHB dated 05.01.2020 & WR's L.no. S.440/2/1/Gr.33(LHB) dated 16.12.2020
  - vi) RCF CAI no. MD21561 dated 17.02.2021 issued vide L. No. MD44121 dtd 17.02.2021
  - vii) RDSO letter nos. SV.EMU.RAS dated 20.12.2019 & 15.12.2020, SV.FIAT dated 22.01.2020.

1. Instructions for maintenance of air suspension system in LHB coaches are already included in CAMTECH Maintenance Manual for LHB coaches. Further, maintenance instructions for Air Suspension System in LHB coaches were issued vide letters under ref i), ii) & vi). Few references regarding maintenance instructions were received from Zonal Railways vide letters under ref. v). It was also observed that leakage test of Air Suspension System in LHB coaches is also not being conducted by PUs as per instructions in CAMTECH Manual in this regard. Further, it was observed that method for leakage test of Air Suspension System in LHB coaches included in CAMTECH Maintenance Manual for LHB coaches also has some issues.

Significant number of failure cases are also being reported in for “Air Suspension System” in LHB coaches.

***In view of above, maintenance instructions for “Air Suspension System” in LHB coaches have been compiled after discussions with PU, Zonal Railways & OEMs and are enclosed herewith as Annexure-1. “Air Suspension System” in LHB coaches is to be maintained as per these instructions in addition to relevant clauses of CAMTECH maintenance manual for LHB coaches. In case of any contradiction of maintenance instructions in Annexure-1 with any instruction issued earlier in this regard, maintenance instructions in Annexure-1 of this letter shall prevail. PUs also to ensure compliance of these instructions, as applicable, particularly to leakage test of “Air Suspension System” in LHB coaches before dispatching to Zonal Railways.***

2. Zonal Railways are reporting failures of “Air Suspension System” in LHB coaches without details of coach type, condition of associated components, make etc, without which failure analysis & root-cause analysis are impossible. Format for reporting failures in “Air Suspension System” in LHB coaches has been circulated vide letters under ref vii). Few Railways only have submitted details of failures & analysis in the format. ***Google sheets for each Zonal Railway have been prepared & are being shared with respective CRSEs & Dy. CME/Coaching for submission of details & analysis of failures in “Air Suspension System” in LHB coaches. It is requested for regular provision of failure details in respective Google Sheet.*** Master data in format should be kept by Zonal Railway in offline mode as well, which can be used in case of any issue with google sheet.
3. In view of failures, training regarding maintenance of “Air Suspension System” in LHB coaches has been planned in coordination with OEMs as per **Annexure-2**. Respective OEMs may be approached for training programme.

This is for your kind information and necessary action please.

**DA: As above.**

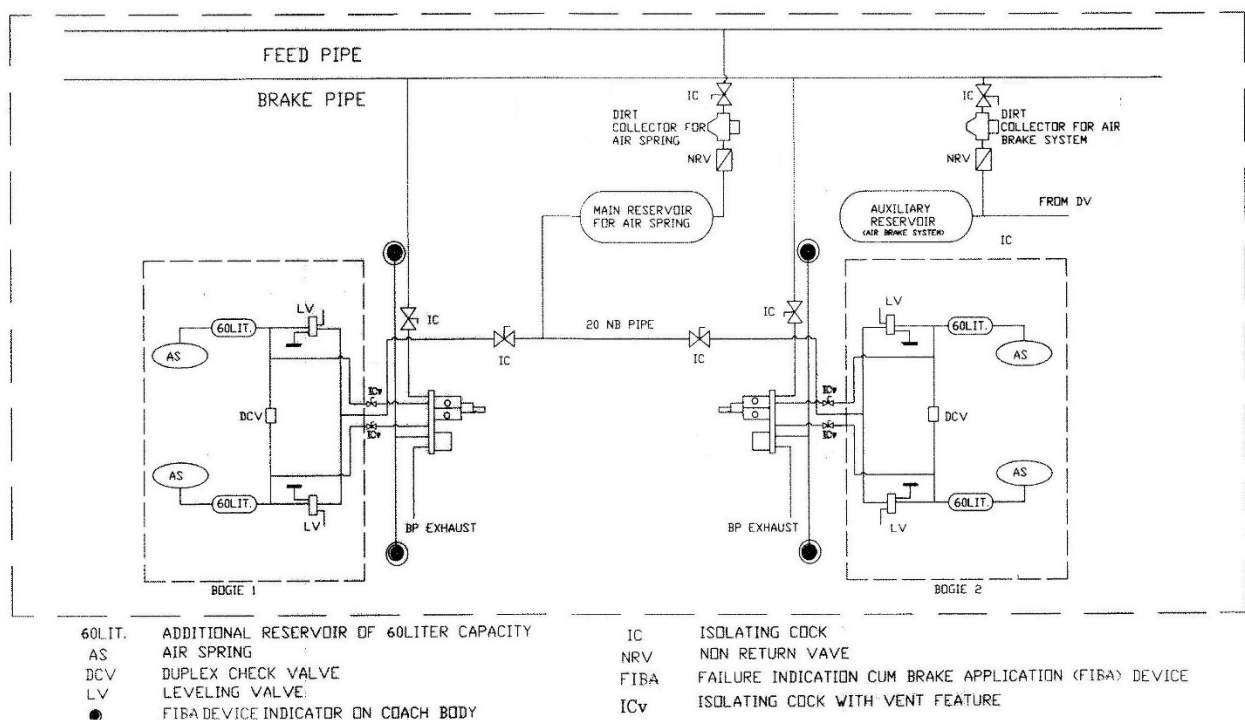
(Shobhit Pratap Singh)  
Joint Director/Carriage (VDG)  
For Director General/ Carriage

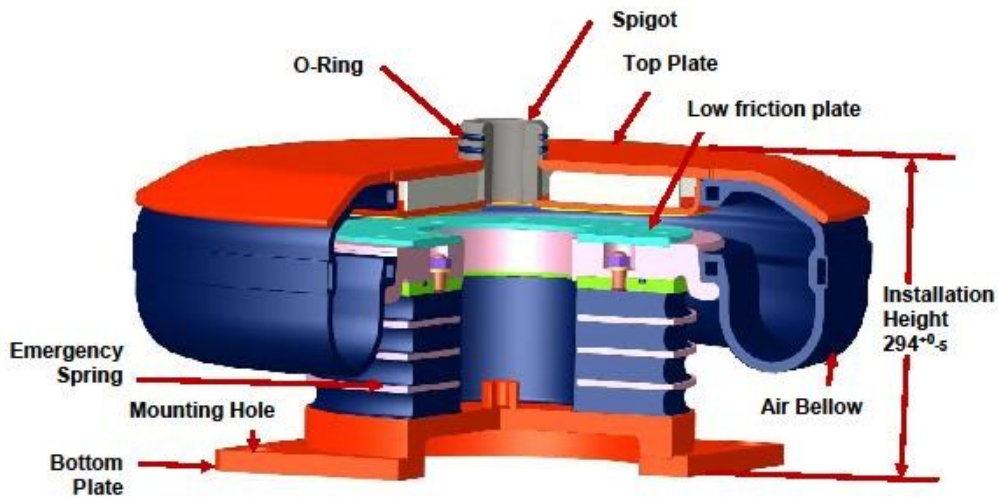
**Copy for kind information:**

1. ED/ CAMTECH- Maharajpur, Gwalior-474020, for kind information and incorporating the instructions in CAMTECH Maintenance manual for LHB coaches
2. DME(Coaching), Railway Board, Rail Bhavan, New Delhi-110 001, for kind information.

**ANNEXURE-1****Maintenance of Air Spring Assembly, Air Spring Control Equipment (ASCE) and Air Spring Failure Indication cum Brake Application (FIBA) device in LHB Coach**

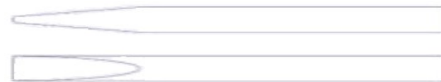
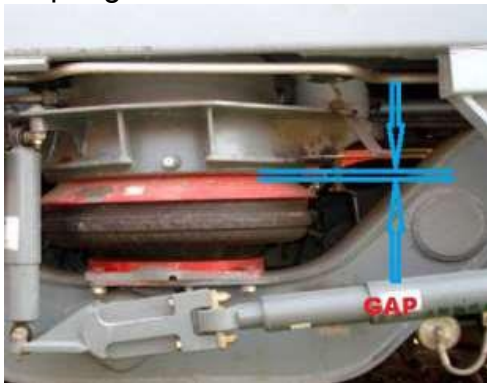
The construction of Air Spring is a robust design which sustains high static and dynamic loads. It consists of a thick flexible rubber bellow which is sandwiched between top plate and Emergency spring. The shape of rubber bellow is suitably designed to provide uniform pressure on supporting surfaces, which in turn gives vertical and lateral stiffness. Emergency spring is provided with the air cushion and housed in series with the rubber bellows. The emergency spring comes into action independently when the air spring gets deflated for some reason. When air spring is installed, the top plate is connected to the bolster whereas the pedestal holds the spring on to the bogie frame through the bracket. An additional air reservoir of 60-liter capacity is connected to the air spring which acts as a buffer for holding the air. Orifice of adequate size is provided between air spring and additional air reservoir which provides self-damping characteristics. Air spring Failure Indication cum Brake Application (FIBA) device has also been provided in air spring fitted LHB coaches to indicate the failure of air spring (internal pressure less than 1.0 Kg/Cm<sup>2</sup>), which apply brake in train, gives hissing sound and red indication in affected bogie.

**COACH****Schematic diagram for pipeline arrangement for air suspension in coaches**



### 1. DISMOUNTING OF AIR SPRING FROM FIAT BOGIE FRAME:

- ❖ Cut the air supply to pneumatic suspension system with the cut of angle cock & isolating cocks provided in FP & BP pipelines. Vent internal air pressure of air spring, 60L reservoir and 150L main reservoir with the help of horizontal lever of levelling valve and drain cocks of reservoirs.
- ❖ Remove all body Bogie connection including duplex check valve.
- ❖ Remove secondary vertical dampers & yaw dampers.
- ❖ Remove connection between arm (horizontal lever) of levelling valve & installation lever.
- ❖ Remove all 4 No. bolts and nut with the help of suitable spanner from bottom plate of air spring & bogie frame.
- ❖ Lift coach body & bolster to clear the spigot of the air spring. Use chiesel / spoon type lever made from wood or nylon to create gap between top plate of air spring and bolster to release the spigot from air pocket.



- ❖ Air springs not to be dropped down on ground or floor directly after dismantling from bogie frame. Air springs should be transported in assembled condition and air spring sub-assemblies e.g. top plate, base plate/ bottom plate & emergency springs etc. need not require dismantling during the warranty period (except failure repair or investigation).
- ❖ Instructions of maintenance manual of respective OEMs to be referred and followed during the maintenance of air spring assemblies.
- ❖ Use nylon strip to tighten and handling of air spring assembly. Lift air spring assembly with the help of Nylon Strip in same position with the help of hook or chain pulley or slide on fork lift arm at same level and transport suitably to proper place for necessary maintenance & testing. The lifting procedure

should be steady, slow and without swag. During the lifting and transportation of air spring, it is to be ensured that nobody is present nearby and under the lifted air spring to avoid any injury.



- ❖ After dismantling the air springs, ports of air spring assemblies to be covered with suitable protection cap (rubber/PU etc) to protect from ingress of the foreign materials.
- ❖ Air spring assemblies to be stored in dry and clean place under covered shed and arranged properly to protect from rubbing and damages.

## 2. Leakage test of Air Spring at leak test bench:

Leak test of individual air springs to be carried out at leak test bench as per following procedure: -

- Install the air spring assembly at design height (289-294 mm).
- Gradually raise the air pressure to 6 kg/cm<sup>2</sup> while maintaining design height and stabilize the pressure for 1-2 minutes.
- Disconnect/ close the air supply in the test bench with the help of isolating cock and check the leakage in air spring assembly with liquid soap solution.
- Air spring assembly shall be checked for pressure drop after 15 minutes.
- After 15 minutes at internal pressure 6.0 kg/cm<sup>2</sup>. No pressure drop is to be targeted. However, pressure drop should not be more than 1% of Test Pressure.
- ***During air spring leak test on bench, leakage test of pneumatic suspension system in coach as detailed below in para 6 & load testing of bogie, height of air spring shall be maintained as 289-294 mm. Height of air spring beyond 294 mm shall not be permitted.***

## 3. Mounting air spring on rectangular platform provided on Y-frame of bogie and bolster:

- Capacity of air spring &/or colour coding shall be matched for type of coach, for which bogie is being assembled.
- New O-Rings to be fitted properly during the fitment of Air spring assembly. Condition of O-ring, spigot and mating surface of bolster with spigot to be checked properly for any damage, crack, cuts, sharp edge, burs etc. during maintenance and fitment of air springs in the bogies. Condition of air spring bellow, emergency spring and top plate also to be checked.
- Spigot cover and other packing materials used for covering and handling/ storage of air springs to be removed suitably before use/ fitment of air springs in the bogie.

- Air spring assembly and mating surfaces of air spring, bogie to be cleaned properly and ports to be ensured for non-ingress of foreign material or any blockage.
- Mount air spring on square platform provided on Y-frame of bogie and match the holes of bottom plate of air spring and holes of square platform provided on Y-frame of bogie.
- Tight all 4 nut-bolts-washers with the help of suitable allen key and suitable spanner. Mounting Fasteners (M20X55) to be tightened at 340 Nm torque value and marked with paint for tightened position. New nylock nuts as per air spring specification are to be provided. Bolts shall be provided as per air spring specification & checked before fitment by GO, No-GO ring gauges.



- ✘ **Wrong handling & fitment practices of air springs strictly to be avoided**  
In above images, torque wrench of having improper height for the purpose is being used

**Note:** *Handelling of air spring assemblies should always be proper and smooth.  
Fasteners to be tightened with proper torque using proper torque wrench.*

- During re-assembling of dismantled air spring due to any reason, all the sub-assemblies e.g. top plate, emergency spring & bellow should be cleaned properly, to be checked for any damage and non-ingress of any foreign material, dust, dirt etc to be ensured. OEM's instructions to be followed and proper tools to be used for the same.
- Place all bolster beam on air spring ensuring no damage to spigot/O-rings of air spring. Ensure that the Air Spring Assembly should not get tilted during placing Spigot in bolster hole. After placing, check Air Spring's Spigot and mounting holes which should be co-centric (aligned).
- Connect levelling valve arm with installation lever.
- Mount vertical and lateral shock absorber.
- Connect all flexible/fixed pipe connections of bogie.
- All the threaded joints of air springs, FIBA & ASCEs to be sealed with thread sealing tape or Loctite 577 and tightened at torque recommended by OEM to avoid air leakage.
- The filter of levelling valve must be cleaned.

**4. Procedure for checking bogie clearance on AC and Non AC coaches fitted with Air Springs:**

- Place the coach at level track.
- Adjust the air spring installation height (289-294 mm) as per suspension diagram with the help of installation lever.

**5. Procedure for adjustment of installation height of Air Springs:**

- Keep the coach on level track.
- Adjust the length of all installation levers as per requirement to connect them to horizontal lever of levelling valve.
- Supply compressed air to the bogie.
- Adjust the installation height of air spring to  $294^{+0}_{-.5}$  mm by gradually increase or decrease the length of installation lever.
- Repeat the same procedure for the other side of air springs of the same bogie.
- Re-check the installation height of all air springs of coach and make minor adjustment if required to maintain the installation height to  $294^{+0}_{-.5}$  mm.
- Tighten the installation lever lock nuts with the horizontal lever of levelling valve properly, so that setting will not be disturbed.
- Repeat the above procedure for the second bogie.

**6. Leakage test of pneumatic suspension system on coach: (To be tested in PUs, Workshops & Sick line after lowering of coach body on bogie & assembly)**

- Release the air completely from air spring & auxiliary/ main reservoirs for pneumatic suspension by drain cocks and dropping the horizontal lever of levelling valve.
- Connect pressure gauges to the drain plug locations of all four 60L reservoirs. Pressure gauge should also be connected in the port of drain cock of 150L pneumatic suspension main reservoir.
- Tighten the Car body/bolster & bogie frame/floor with the help of lashing chain/ suitable fixture to withstand full load of inflated air springs at  $6.0 \text{ Kg/Cm}^2$  at installation height of air spring (289-294 mm). Till the time suitable arrangement is not available, leak test may be done at tare pressure.
- Connect the 150-litre reservoir on the under frame to the compressed air source of pressure  $6.0 \text{ kg/cm}^2$ .
- Allow air into the air springs to a value of  $6.0 \text{ kg/cm}^2$ / tare pressure (as applicable) in the pressure gauge by adjusting the horizontal lever of the levelling valve and hold it in the same position.
- Close the isolating cock connecting FP pipe with 150-litre reservoir for pneumatic suspension.
- Test all pipe joints for leakages with soap solution.
- Check all the pressure gauge readings after 60 minutes (during SS-1, SS-2 & SS-3) or 15 minutes (in case of lifting-lowering except shop schedules). The pressure drop should be within 1% of the test pressure.
- Attend the leakages in entire air suspension system including air spring, ASCE & FIBA device.
- After the leakage test, air from pneumatic system shall be drained. Drain plugs of 60L auxiliary reservoirs in dome of bolsters & drain cock of 150 L pneumatic suspension system main reservoir shall be fitted back & leakage from these points shall be checked after inflating pneumatic suspension system again.
- During pneumatic suspension system leakage test, height of air spring beyond 294 mm should not be permitted.



**7. Checks for proper fitment of Air Spring assembly:**

- Check air spring vertical symmetry.
- No pre twist in the air spring top plate during fitment.
- No push fitting in air spring holdings.
- Levelled top and base plate of air spring.

**8. Problem and their probable reasons:**

S. No.	Nature of problem	Probable reason
1.	Inadequate bogie clearances due to secondary suspension	<ul style="list-style-type: none"> <li>• Improper installation height (Air spring height).</li> <li>• Improper functioning/ malfunctioning of levelling valve.</li> <li>• Non uniform/ excess wear in bogie parts.</li> <li>• Leakage in Air springs, pipeline arrangements, Air suspension control equipments or FIBA devices.</li> </ul>
2.	Non- lifting of Air Springs	<ul style="list-style-type: none"> <li>• Low air pressure.</li> <li>• Heavy air leakage in Air springs, pipeline arrangements, Air suspension control equipments and FIBA devices.</li> <li>• Defective/ choked levelling valve.</li> <li>• Blockage in air supply.</li> </ul>
3.	Delayed lifting of air spring	<ul style="list-style-type: none"> <li>• Perished rubber seat of lower diaphragm in levelling valve.</li> <li>• Partly choked/ malfunctioning levelling valve.</li> <li>• Back lash error in levelling valve rotation or loose fitting of horizontal lever.</li> <li>• Excessive play/ wearing in ball and socket joint of levelling valve or in any other connection/ joint.</li> </ul>

## 9. Periodical inspection of Air suspension system

SCHEDULE	INSPECTION ON AIR SPRING, AIR SUSPENSION CONTROL EQUIPMENT (150L RESERVOIR & DRAIN COCKS, DIRT COLLECTOR, CHECK VALVE/NRV, LEVELLING VALVE, INSTALLATION LEVER, DUPLEX CHECK VALVES, ISOLATING COCKS, HOSES ETC.) & FIBA DEVICE with indicators:
Schedule-D1	<ul style="list-style-type: none"> <li>• <b>Visual check:</b> General conditions of air springs, Air Suspension control equipments, and FIBA devices including FIBA indicators, isolating cocks, flexible hoses, duplex check valve, installation lever, levelling valve, all air reservoirs, air reservoir drain cock, dirt collector, check valve/NRV, mounting arrangement &amp; fasteners. Visually inspect all these items for proper fitment or loosening, leakage or damages and attend suitably, if required.</li> <li>• Complete pipeline arrangements of air suspension system including joints (ferrule joints as well), isolating cocks, flexible pipes and piping fixing arrangement for Air spring, Air Suspension Control Equipments (ASCE) and FIBA devices also to be checked visually for any leakage, damage or loose fittings and to be repaired accordingly.</li> <li>• Draining of 150-liter air reservoir of air spring.</li> <li>• Check the position of isolating cock and drain cock, these should be on and off position respectively.</li> <li>• Visually inspect position of Isolating cocks (Open/close), FIBA resetting knob/button/ring &amp; indicators (Red/Green). It is to be ensured that FIBA device, ASCE &amp; air springs are set for its desired function &amp; are not in isolated condition.</li> <li>• Check functioning of FIBA device as per Annexure 'A'. <b>(at least 01 coach in a rake during primary maintenance and the same coach should not be repeated in next trips until all the coaches in a rake have been attended for functional test).</b> Proper functioning of Indicators to be ensured at the time of functionality test of Indicators and FIBA devices.</li> <li>• Air spring installation height (Air spring height) to be ensured as 289-294 mm. Visually check condition of levelling valve, position of horizontal lever and verify the inflated/ deflated condition of air spring.</li> </ul>
Schedule – D2	<ul style="list-style-type: none"> <li>• As in Schedule –D1</li> <li>• Checking of installation lever with inflated air spring for normal function, tightening of installation lever nuts, checking of protection screen nuts, tightening of bracket of all flexible hoses.</li> <li>• Clean Dirt Collector filter with kerosene &amp; refit.</li> <li>• Keep the window clean for clear indication and visibility of red/ green signal of FIBA indicator. Visually check whether the acrylic glass pane is broken, cracked or having gap, attend accordingly, as water will penetrate the unit and cause damage in such scenario.</li> <li>• Check and adjust air spring installation height (Air spring height) to 289-294 mm. If installation height beyond 289-294 mm is observed, cause for such disturbance to be investigated.</li> </ul>








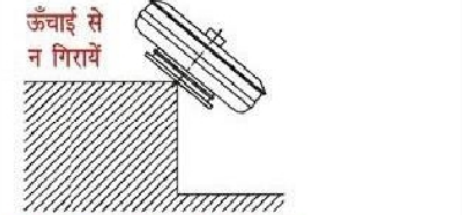
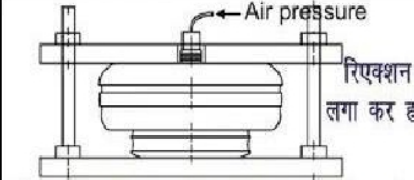
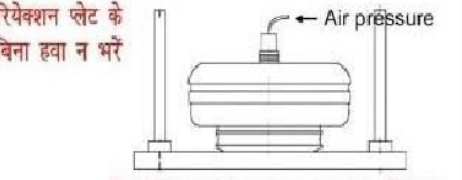
<p><b>Schedule – D3</b></p>	<ul style="list-style-type: none"> <li>• As in Schedule –D2 &amp;</li> <li>• Thorough checking of air spring, bulging of bellow, air leakage.</li> <li>• Removing dust mud &amp; oil deposit if any, on air spring, FIBA and control equipments.</li> <li>• Thorough checking of square platform provided on Y- frame of bogie for any crack and deformation.</li> <li>• Checking of air spring bottom plate bolts and nuts for loosening. Loosened bolts to be checked with gauge and if required, new fasteners as per spec. are to be provided. Whenever fasteners are opened, new nylock nuts as per air spring specification are to be provided.</li> <li>• Measurement of applicable bogie clearances related to air spring.</li> <li>• Check functioning of FIBA device as per Annexure ‘A’.</li> <li>• In case of wrong fitment, backlash error or malfunctioning of levelling valve, suitable action to be taken to rectify the problem.</li> <li>• Checking of fasteners of FIBA device, protection screen of installation lever, indicators, duplex check valve, levelling valve for loosening w.r.t paint marking done by workshop/PU after tightening. If found loosened, bolt is to be checked &amp; new lock nut is to be provided.</li> <li>• Bottom exhaust air filter of levelling valve to be cleaned with kerosene &amp; refitted. For this, levelling valve is not required to be dismantled from coach.</li> <li>• Air suspension pipe leakage check by using soap water particularly at the joints, including ferrule joints.</li> </ul>
<p><b>SS- I</b></p>	<ul style="list-style-type: none"> <li>• As in Schedule – D3 and</li> <li>• Through cleaning &amp; visual check of air spring.</li> <li>• Whenever air springs are dismantled from bogie in workshop as per clause 1, leak test of air springs to be done on test bench as per <u>clause 2</u> mentioned above. Alternatively, similar leakage test at 6 kg/cm<sup>2</sup> on bogie frame with suitable fixture to ensure that height of air spring during test doesn't go beyond 294 mm may be conducted.</li> <li>• Draining of 60-liter reservoir.</li> <li>• Inspect the corrosion on top surface of square platform provided on Y- frame of bogie. Remove the corrosion and paint with primer and suitable paint.</li> <li>• Inspect for any water collection in rubber bellow and air spring.</li> <li>• Inspect air spring fixing holes of square platform provided on Y- Frame of bogie for elongation, if elongated built them to original dia. &amp; PCD.</li> <li>• Air spring bellow should not be painted.</li> <li>• Mounting &amp; assembly of air spring as per clause 3 of this document.</li> <li>• Isolating cocks, NRV, dirt collector, reservoir, drain cock, levelling valve, installation lever, duplex check valve, flexible hoses fitted in air suspension to be cleaned &amp; tested for functioning in bogie &amp; coach.</li> <li>• Checking &amp; securing arrangement of steel pipeline.</li> <li>• Secondary vertical &amp; Lateral damper condition should be tested and replaced with new/tested, if found damaged, defective or leaky.</li> </ul>

	<ul style="list-style-type: none"> <li>• Examine all flexible hoses and replace, if required.</li> <li>• Thorough checking, cleaning and repair, if required, of all reservoirs.</li> <li>• Visually inspect condition of mounting bracket, mounting bolts, fasteners &amp; FIBA device cover.</li> <li>• Installation lever adjustment as per <u>clause 4 &amp; 5</u> mentioned above. Installation height (Air spring height) to be maintained 294<sup>+0</sup>-5 mm.</li> <li>• Air suspension pipe leakage check by using soap water particularly at the joints, including ferrule joints. Leakage test of air springs after mounting on bogie &amp; coach shall be done as per instruction given in <u>clause 6</u> mentioned above.</li> <li>• Perform functional test of FIBA as per Annexure 'B'.</li> <li>• All fasteners will be checked &amp; marked for proper tightening.</li> <li>• Air suspension pipe line modification, if required, shall be done as advised by PUs/RDSO.</li> </ul>
<p><b>SS II / SS III</b></p>	<ul style="list-style-type: none"> <li>• As in Schedule – SS I and</li> <li>• Remove Isolating cocks, NRV, dirt collector, reservoir, drain cock, levelling valve, installation lever, duplex check valve, flexible hoses fitted in air suspension &amp; FIBA device circuit and carry out external cleaning, overhauling and function test as per already issued maintenance instructions for similar Isolating cocks, NRV, dirt collector, reservoir, &amp; drain cock and as given in maintenance manual supplied by respective vendors for levelling valve, installation lever, &amp; duplex check valve. Replace hoses after 36 months of use, otherwise check the condition of hoses, if found ok then test at 06 kg/cm<sup>2</sup> for strength verification and thorough checking of leakage. If found ok, re-use the hoses upto remaining period upto life of 36 months or upto next shop schedule, as per condition.</li> <li>• Isolating cocks with ferrule type fitting are to be tested for proper functioning &amp; maintained as per OEM's guidelines.</li> <li>• Overhaul FIBA device &amp; Indicators as per maintenance manual supplied by respective vendors and perform functional test of FIBA as per Annexure 'B' &amp; indicators as follows: -  <b>Testing of Indicator:</b> <ul style="list-style-type: none"> <li><b>i) Leakage test:</b> Apply a pressure of 06 Kg/Cm<sup>2</sup>. There should not be any leakage if checked with soap water.</li> <li><b>ii) Functionality test:</b> <ul style="list-style-type: none"> <li>a) Apply a pressure of 0.5 to 0.6 Kg/Cm<sup>2</sup>. Red colour should appear in window of Indicator. Movement of piston of indicator shall be smooth and steady.</li> <li>b) Now release the pressure to 0 Kg/Cm<sup>2</sup>. Green colour should appear in window of indicator.</li> <li>c) Piston of indicator should move smoothly and piston should not be sticky. Indicator shall be air tight and water resistant.</li> </ul> </li> </ul> </li> </ul>

	<ul style="list-style-type: none"><li>• All reservoirs, air pipelines and flexible hoses fitted in air suspension &amp; FIBA device pipelines to be tested at 06 kg/cm<sup>2</sup> for strength verification and thorough checking of leakage. Leakage from all joints after assembly in the coach also to be checked thoroughly with liquid soap solution and attended suitably.</li><li>• Maintenance and troubleshooting of FIBA indicators to be done as per Para 3.10.4 of Chapter 3 of CAMTECH "Maintenance Manual for LHB coaches".</li></ul>
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Note: ***Air springs beyond warranty may be disassembled for any issue in its components. For disassembly & assembly of air spring components, respective maintenance manual of OEM's shall be followed. Make wise integrity of air spring components to be ensured.***

10. HANDLING PROCEDURE FOR AIR SPRING ASSEMBLY:

	Right procedure	Wrong procedure
LIFTING	<p>नॉयलोन स्ट्रिप का प्रयोग करें</p>  <p>A nylon fibre strip should be used.</p>	<p>टॉप प्लेट से न उठाये</p>  <p>Don't lift from top plate.</p>
TURNING	<p>रबर मैट पर रख कर खींचें</p> <p>Rubber mat</p>  <p>A rubber mat should be used under the air spring and ensure two man handle it.</p>	<p>खींच कर न ले जाएं</p>  <p>Don't drag on the floor</p>
TRANSPORTATION	<p>हाथ गाड़ी का उपयोग करें</p>  <p>A hand trolley should be used</p>	<p>धुमाते हुए न ले जाएं</p>  <p>Don't transport by rolling</p>
UNLOADING	<p>फॉर्क लिफ्ट ट्राली प्रयोग करें</p> <p>Slide</p>  <p>A fork lift trolley should be used</p>	<p>ऊँचाई से न गिराये</p>  <p>Don't unload by dropping</p>
TESTING	<p>Air pressure</p> <p>रिएक्शन प्लेट लगा कर हवा भरें</p>  <p>A reaction frame should be used when testing.</p>	<p>रिएक्शन प्लेट के बिना हवा न भरें</p> <p>Air pressure</p>  <p>Don't test without a reaction frame</p>

**Note:** If air is filled in individual air spring, on bogie during bogie testing or air spring in bogie under coach & reaction frame/restriction is not available, it will result in height of air spring more than installation height (289-294 mm), which might disturb assembly of top & bottom plates with bellow.

**ANNEXURE-A**

**ON VEHICLE TEST FORMAT FOR FAILURE INDICATION CUM BRAKE APPLICATION (FIBA) DEVICE:**

Depot/Div/Rly/PU.....Date of testing:.....Coach no.....  
 POH/mfg. details (Coach)..... Return date.....Year Built.....

S. No	Test and testing procedure	Standard	Results obtained			
			Bogie no.....		Bogie no.....	
			S. No. of FIBA device: Make: Mfg. date :		S. No. of FIBA device: Make: Mfg. date:	
			Air Spring-1	Air Spring-3	Air Spring-2	Air Spring-4
1.	<b>Initial Charging:</b> i) Ensure that all Isolating cocks and cut of angle cocks for charging of air springs, BP and FP should be in open condition. Other end cut of angle cocks and drain cocks provided in AR, MR and coach should be in closed position. ii) Charge the FP at 6.0 Kg/Cm <sup>2</sup> and BP at 5.0 Kg/Cm <sup>2</sup> . iii) Ensure the charging of air springs with the help of levelling valve lever position.	-----  FP= $6 \pm 0.1$ Kg/Cm <sup>2</sup> BP= $5 \pm 0.1$ Kg/Cm <sup>2</sup>  Levelling valve horizontal lever should be in horizontal position.				
2.	<b>Leak detection:</b> Check for any leakage in entire system. Any leakage found in FIBA device or pipelines should be attended.	No leakage				
3.	<b>Functional Test at tare pressure:</b> Charge the air springs on tare condition of the coach and BP at 5.0 Kg/Cm <sup>2</sup> . Open the ½" drain cock of 60L auxiliary reservoir of respective air spring or air may be vented by detaching and rotating the horizontal lever of levelling valve after opening the nut.	i)FIBA device of relevant bogie should actuate. ii)Brakes should apply in entire coach. iii)Both indicators of same bogie should be red. Indicators of other bogie should show green. iv)Whistling/ Hissing sound should blow.				
4.	<b>Brake Pipe Isolation</b> Close the isolating cock of BP line of actuated FIBA device.	Brake should release in entire coach. Note: Indicators of some make FIBA device may turn to green.				
5.	<b>Suppression of Indicator:</b> Close the both isolating cocks with vent feature provided between air spring & FIBA device and operate resetting mechanism (pull/ push/ rotate the resetting keys/ knob) provided on FIBA device.	Both indicators of same bogie should turn to green from red. Indicators of other bogie should remain show green.				

6.	After functional testing, all air springs & FIBA device of coach shall be set for their desired function & not in isolated condition	To be ensured				
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**Note:** Air will be drained from different air spring of a coach during each functionality test so that in 4 functionality test of FIBA device of a coach, all air springs of the coach are covered.

**Remarks:**

Signature of testing Official



**ANNEXURE-B**

**ON VEHICLE TEST FORMAT FOR FAILURE INDICATION CUM BRAKE APPLICATION (FIBA) DEVICE:**

Depot/Div/Rly.....Date of testing:.....Coach no.....  
POH/mfg. details ..... Return date.....Year Built.....

S. No	Test and testing procedure	Standard	Results obtained			
			Bogie no.....		Bogie no.....	
			S. No. of FIBA device: Make: Mfg. date :	S. No. of FIBA device: Make: Mfg. date:	S. No. of FIBA device: Make: Mfg. date:	S. No. of FIBA device: Make: Mfg. date:
Air spring no. -1	Air spring no. -3	Air spring no. -2	Air spring no. -4			
1.	<b>Initial Charging:</b> i) Charge the FP at 6.0 Kg/Cm <sup>2</sup> and BP at 5.0 Kg/Cm <sup>2</sup> . ii) Ensure the charging of air springs with the help of levelling valve lever position.	FP= 6 ± 0.1 Kg/Cm <sup>2</sup> BP= 5 ± 0.1 Kg/Cm <sup>2</sup>  Levelling valve lever should be in horizontal position.				
2.	<b>Leak detection:</b> Close the air supply & check for any leakage in entire system for 15 minutes. Any leakage found in FIBA device or pipe lines should be attended.	Leakage should not be more than 1%.				
3.	<b>Functional Test:</b> Charge the air springs on tare condition of the coach and BP at 5.0 Kg/Cm <sup>2</sup> . Open the ½" drain cock of 60L auxiliary reservoir of respective air spring or air may be vented by detaching and rotating the horizontal lever of levelling valve after opening the nut.	i) FIBA device of relevant bogie should actuate. ii) Brakes should apply in entire coach. iii) Both indicators of same bogie should be red. Indicators of other bogie should show green. iv) Whistling/ Hissing sound should blow.				
4.	<b>Brake Pipe Isolation</b> Close the isolating cock of BP line of actuated FIBA device.	Brake should release in entire coach. Note: Indicators of some make FIBA device may turn to green.				
5.	<b>Suppression of Indicator:</b> Close the both isolating cocks with vent feature provided between air spring & FIBA device and operate resetting mechanism (pull/ push/ rotate the resetting keys/ knob) provided on FIBA device.	Both indicators of same bogie should turn to green from red. Indicators of other bogie should remain show green.				
6.	Repetition of test for testing of FIBA devices for remaining 03 Air springs of the coach.	Repeat the above procedures for testing of remaining 03 Air springs accordingly and note down the reading in relevant column.				

7.	After functional testing, all air springs & GFIBA device of coach shall be set for their desired function & not in isolated condition	To be ensured				
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**Remarks:**

Signature of testing Official

**ANNEXURE-2****TRAINING FOR PNEUMATIC SUSPENSION WITH FIBA & AIR SUSPENSION CONTROL EQUIPMENTS IN COACHES**

As pneumatic suspension with FIBA device is being proliferated in mainline LHB coaches, training regarding working principle, operation & maintenance of pneumatic suspension system & FIBA is need of the hour. OEMs will impart training in each Zonal Railway & PU. OEM wise allotment of Zonal Railways for the purpose of training is as follows :-

OEM		Zones/ PUs allotted for training
Jointly by	M/s Resistoflex for Air spring.	RCF, SECR,SCR,SR,SWR & ECOR
	M/s Escorts for FIBA & air suspension control equipments	
Jointly by	M/s avadh for Air spring	MCF, NR,WCR,WR,CR & Konkarn Railway & NWR
	M/s knorr for FIBA air suspension control equipments	
Jointly by	M/s Tayal for air springs.	ICF, NCR,NER,ECR,ER,NFR & SER
	M/s Faivley for FIBA & air spring control equipment	

OEMs of Air Spring, FIBA device & Air suspension Control Equipments may jointly conduct the training programmes, as detailed above, for better & holistic understanding of pneumatic suspension system. Railway officials trained by OEMs should conduct training programmes at individual depot/ workshop level as well.

Necessary instruction for coordination with OEMs for the training in Zonal Railways & PUs may be issued accordingly.