Introduction of Air suspension System:
Air suspension, also called pneumatic suspension, uses the properties of air for the cushioning effect (springiness). It is a proven technology on Indian Railways and is being used on EMUs & ICF Bogie for last many years. Now these have been introduced in mainline coaches with FIAT bogies because it is technically superior in many ways;

**Better riding comfort**
Ride index with air springs is 2.72 against 3.37 in steel coil springs (lower the ride index better the ride quality)

- Improved reliability and reduced maintenance
- Capacity to sustain super dense crush load

**Working principle:**
In air suspension system, properties of air are used for cushioning effect. Enclosed pressurized air in a rubber bellow is called Air spring. These are height-controlled load leveling suspension devices for changing loads.

Main equipment of Air suspension system:
1. Air spring - 04 Nos /Coach
2. Levelling valve - 04 Nos /Coach
3. Duplex check valve - 02 Nos /Coach
4. 60 ltrs auxiliary reservoir - 04 Nos /Coach
5. Bogie suspension isolating cock - 02 Nos /Coach
6. Non return valve - 01 No /Coach
7. 150 ltrs MR reservoir - 01 No /Coach
8. Coach suspension isolating cock - 03 No /Coach

**Failure Indication & Brake Application Device (FIBA)**
Air springs used in the secondary suspension of FIAT Bogie coaches tend to fail. Hence , a mechanism is required to inform the failure of the springs to the driver so that the speed can be regulated to a safe speed or auto actuation of braking to a reasonable limit to avoid damage to the coach.

**INSPECTION AND MAINTENANCE SCHEDULE:**
For inspection and maintenance of air suspension system, following checks should be done at maintenance depots:-

- Visually check the condition of air spring rubber bellows for any external damages, air leakage and infringement of any fittings.
Drain the 150 litre air reservoir of air suspension system and check its safety straps for tightness. Check the air leakage from adjoining pipe line.

Check the position of coach and bogie isolating cocks, these should be in open position and bracket for handle should be intact.

Drain the 60 litre air reservoirs of air suspension system and check their safety straps for tightness. Check the air leakage from adjoining pipe line.

Check the installation lever, tightening of installation lever nuts and protection screen nuts.

Technical detail of Air Spring

- Maximum Tare load = 60 KN
- Maximum full load = 120 KN
- Max Vertical Deflection of Spring (dz) = ± 30 mm
- Max Lateral deflection of spring (dy) = ± 80 mm
- Installed Height of spring = 294+0/-5 mm
- Duplex check valve set to act a pressure differential of 1.5 ± 0.12 Kg/Cm²
60LTR - Auxiliary Reservoir of 60 litter capacity, NRV - Non Return valve, 1- Failure indication cum brake application (FIBA) Device.
AS - Air Spring, DCV - Duplex check valve, LV - Leveling valve, • - Indicator on coach body, IC - Isolating valve
ICv - Isolating cock with vent feature.

SCHEMATIC DIAGRAM OF AIR SUSPENSION EQUIPMENT
SAFETY OF OPERATIONS

The C&W staff at nominated point & other train passing staff should vigilantly see that all the bellows are in inflated condition. This can also be checked by seeing that the leveling valve lever is in horizontal position.

In case of heavy leakage or deflated air spring, the defective bogie is to be isolated with the help of isolation valves and Driver should observe a speed restriction of 60 Kmph upto terminal point for maintenance. The air springs have inbuilt emergency rubber springs for safety with which train can work at a maximum speed of 60 Kmph up to a distance of 1000 Kms.

For further details on air spring visit News & Information → Technical Information → Bogie Design on RCF website and refer RDSO document RDSO-2009-CG-CMI-01.pdf.

Disclaimer

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