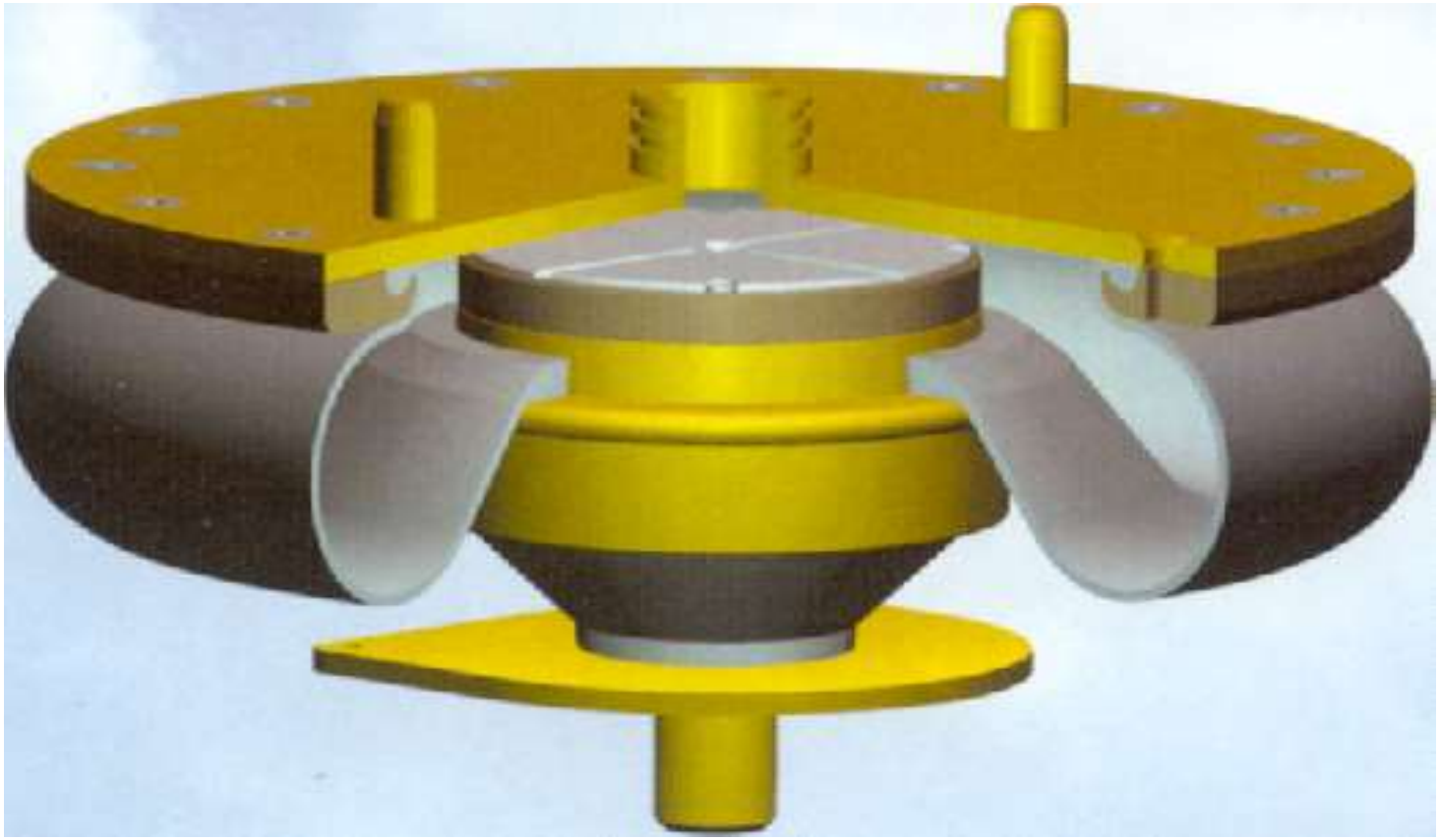


AIR SUSPENSION

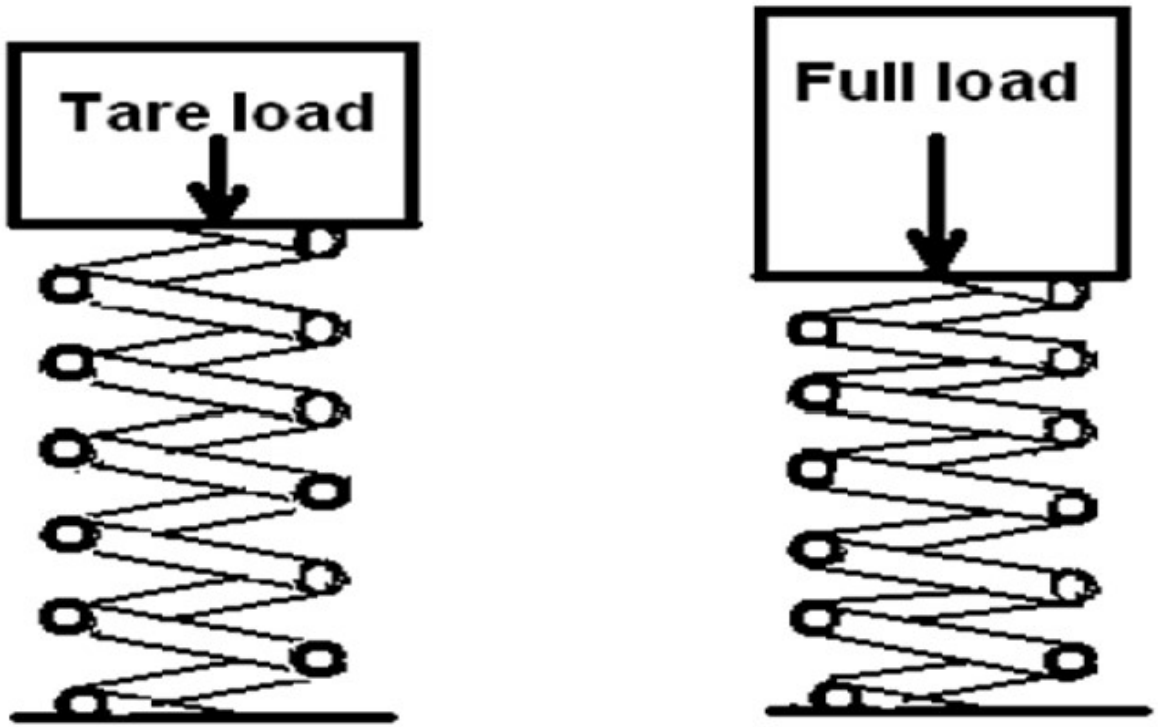
Need for adoption of Air suspension

- Abnormal increase in pay load condition in suburban Railways e.g. EMU during Office hrs.
- Super Dense Crush Load reduces the shock absorbing property of coiled Spring as it gains its solid height resulting in severe hitting.
- Failure of vital components due to hitting.
- Poor riding behavior of coach.
- To maintain proper floor height and to cope up above problems, Air Spring is beneficial.

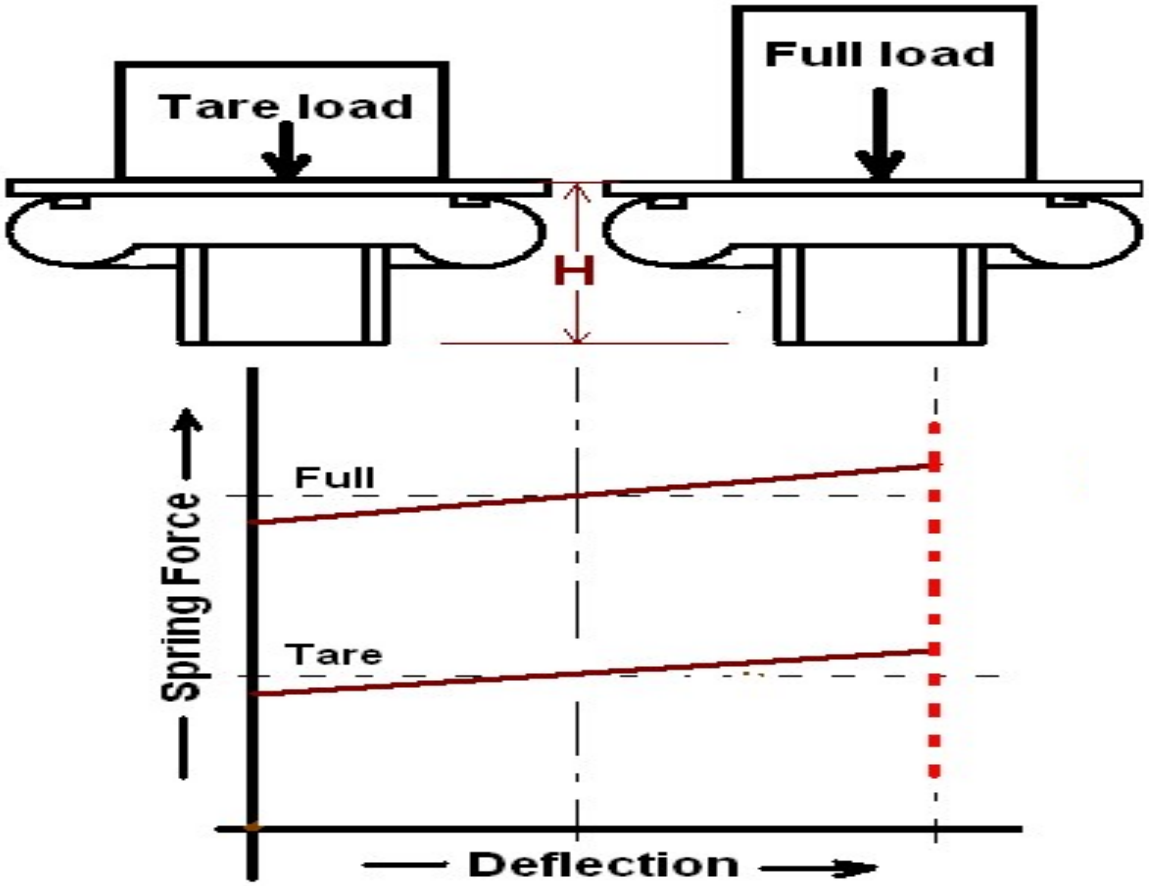
Comparison with existing coil suspension:

- In case of coil spring, deflection is proportionate to the load, therefore, under high payload situation, space constraint becomes critical, leading to the use of stiffer springs resulting in unsatisfactory ride behavior and reduced speed potential.
- Air springs through their control mechanism, offer a load proportionate stiffness, constant floor height and prospects of better ride behavior with higher speed potential.

Height vs Pay load variation in Coiled Spring

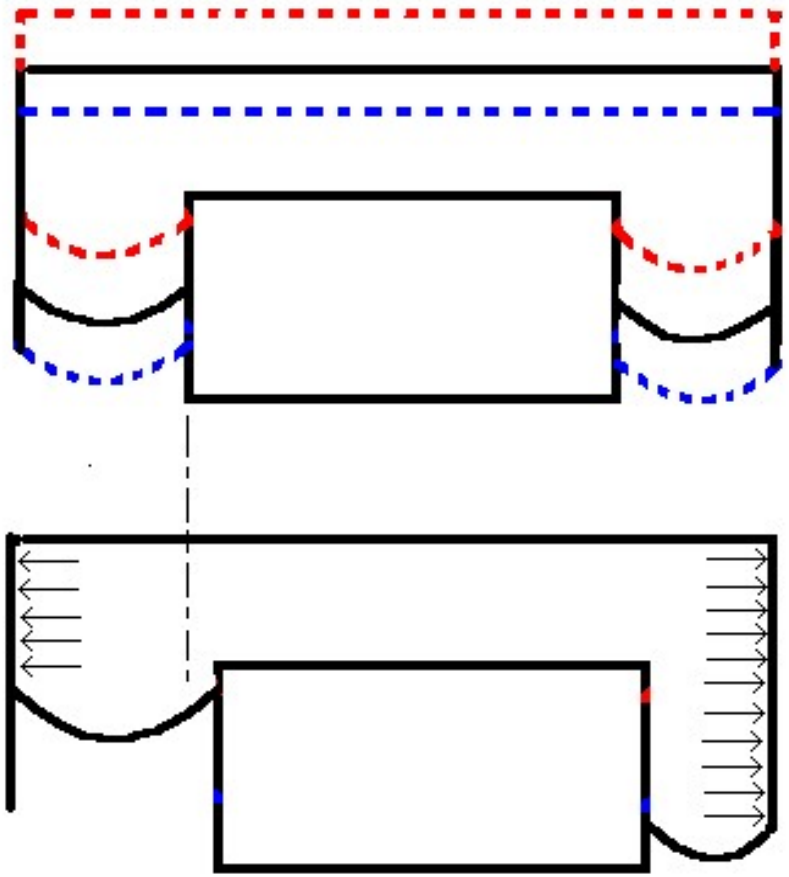


Constant height with variable Pay Load in Air Spring



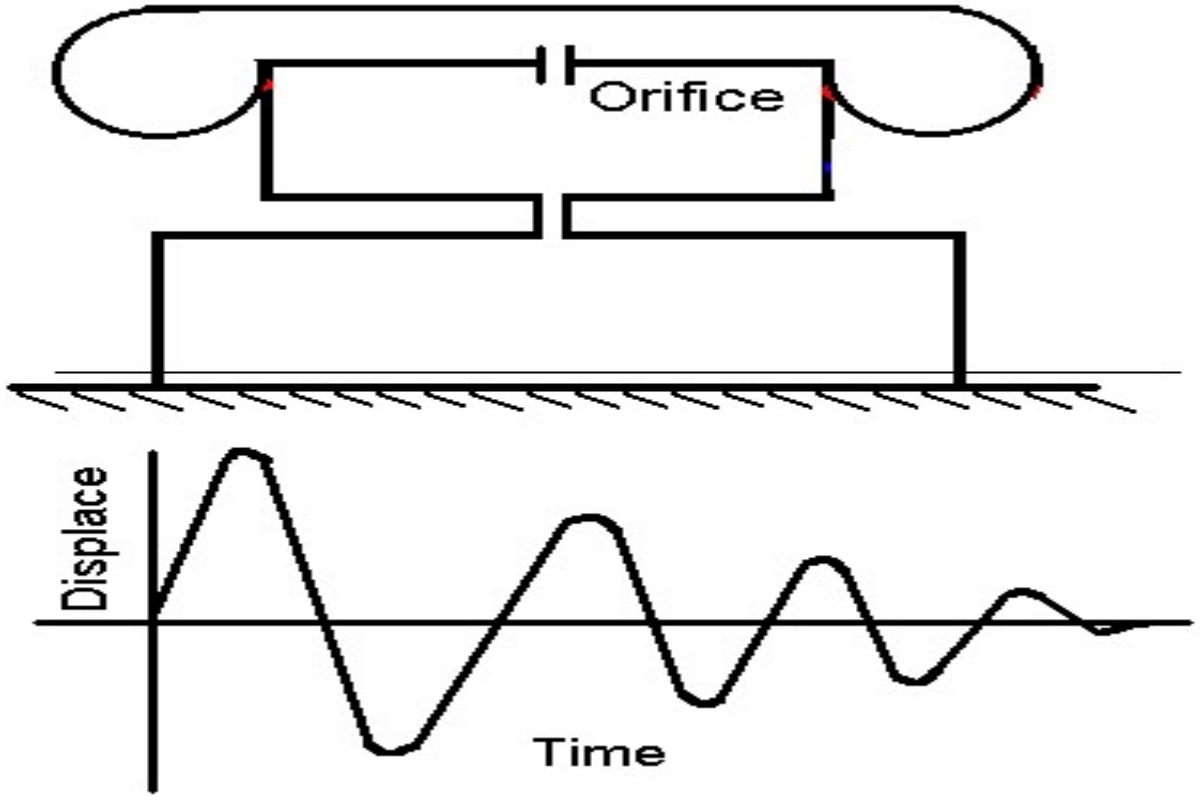
Vertical & Lateral Spring action

Vertical Spring Action

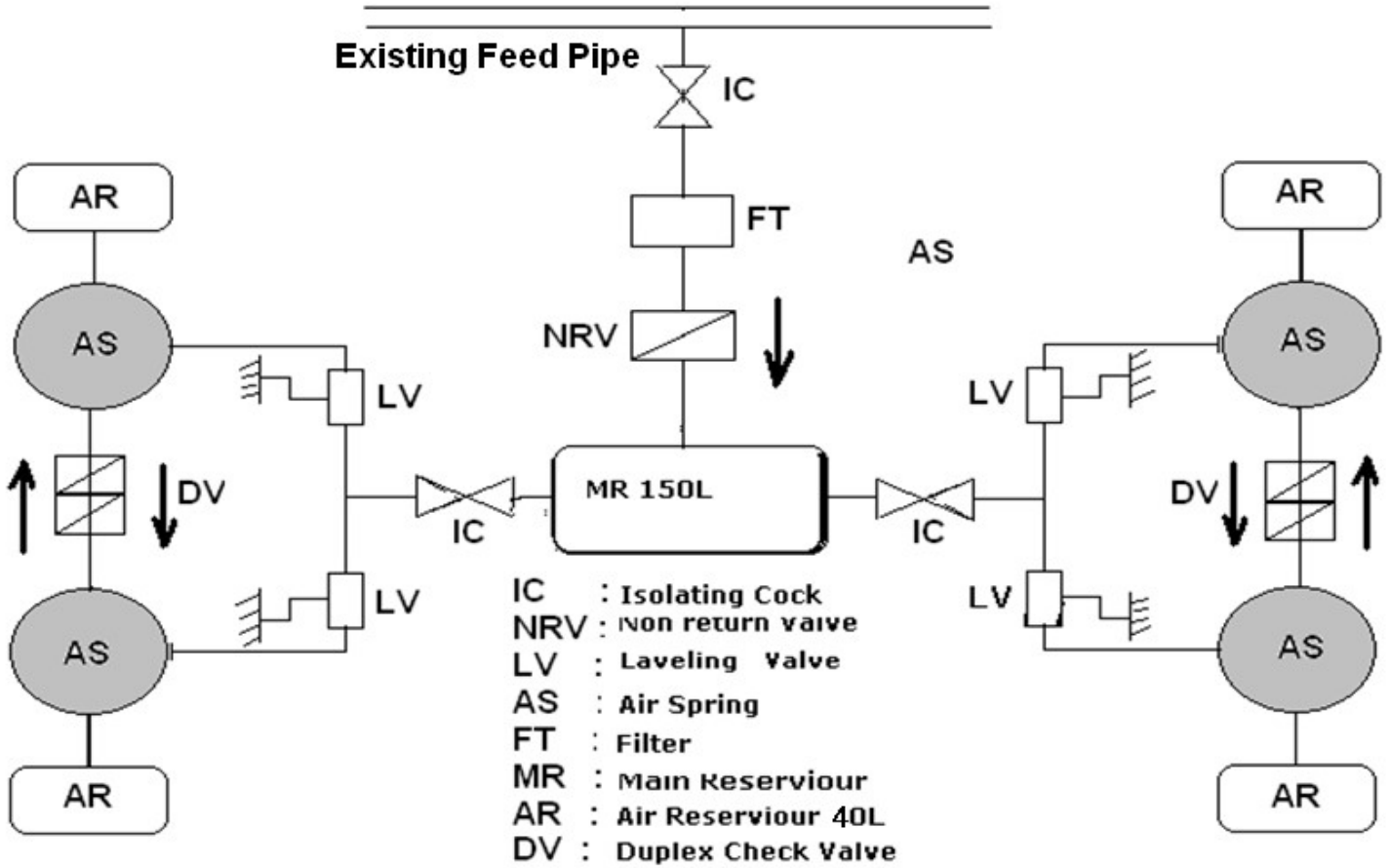


Lateral Spring Action

Self Damping Characteristics



Schematic diagram of Air Suspension



Pipe Line Diagram

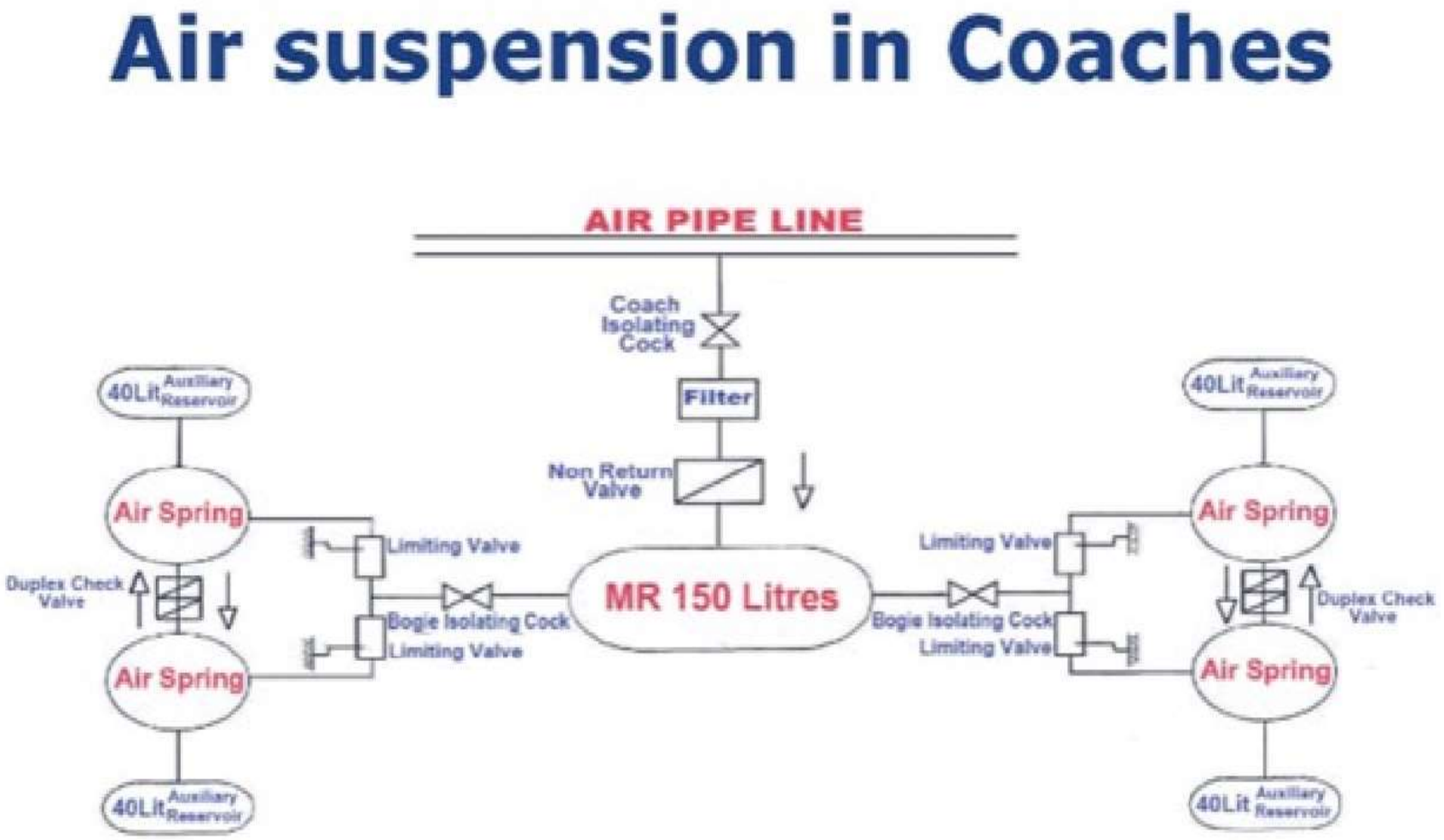
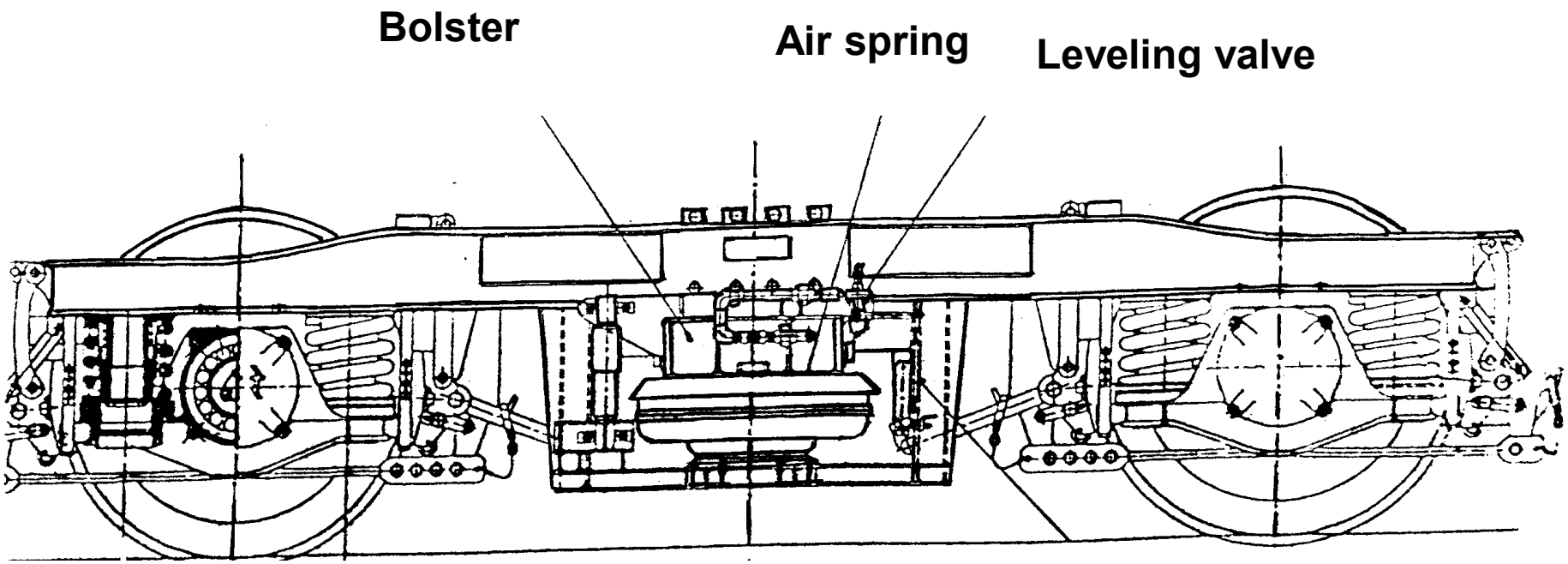
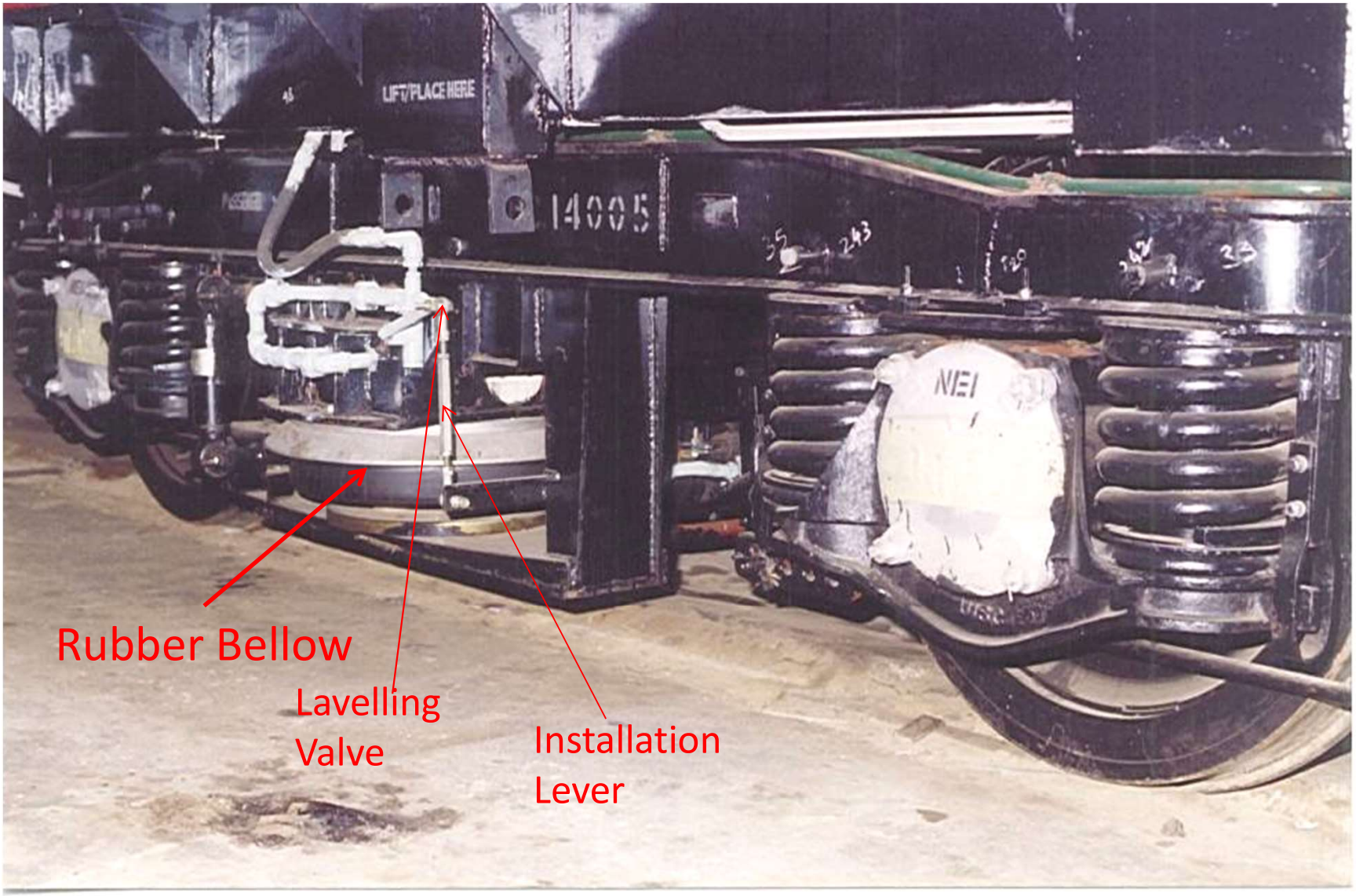


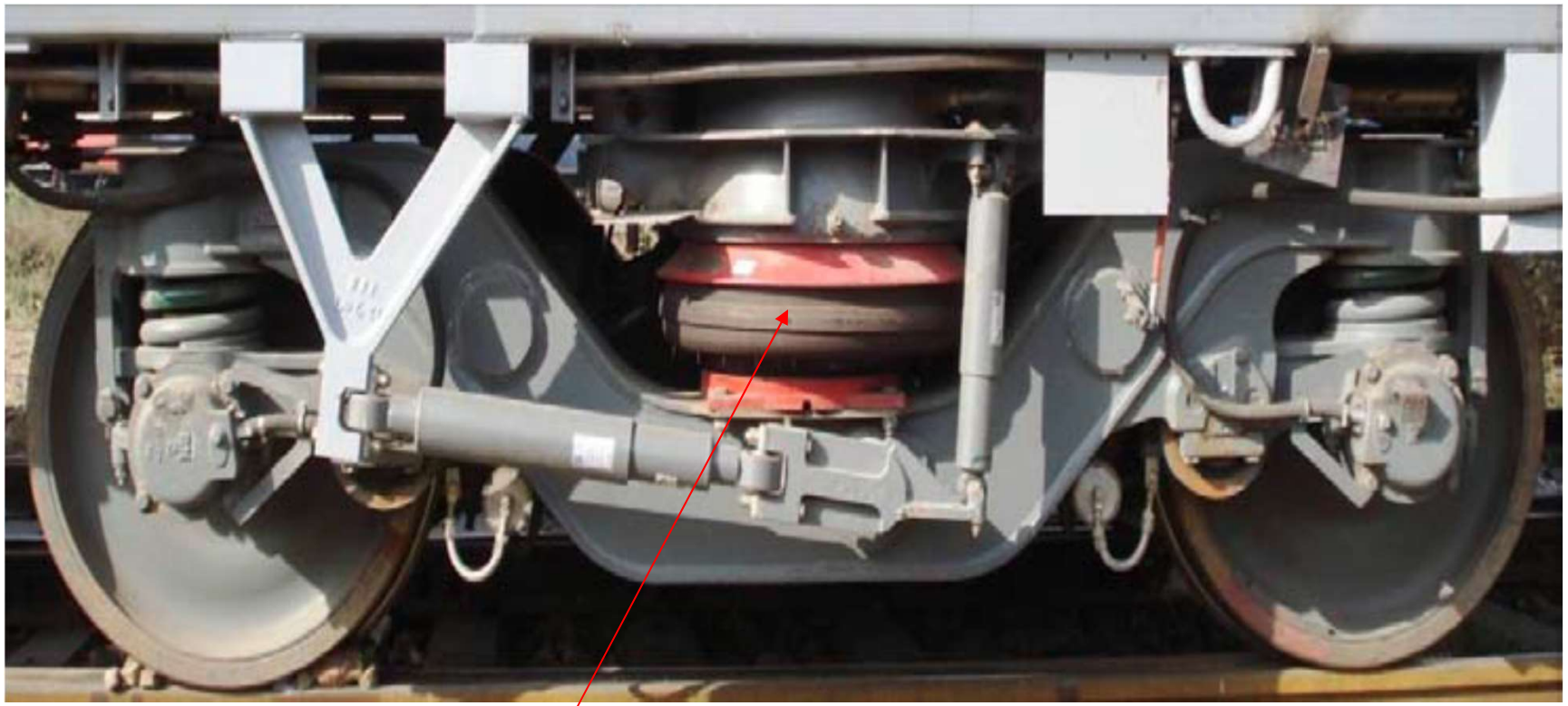
Diagram of ICF Bogie fitted with Air Suspension



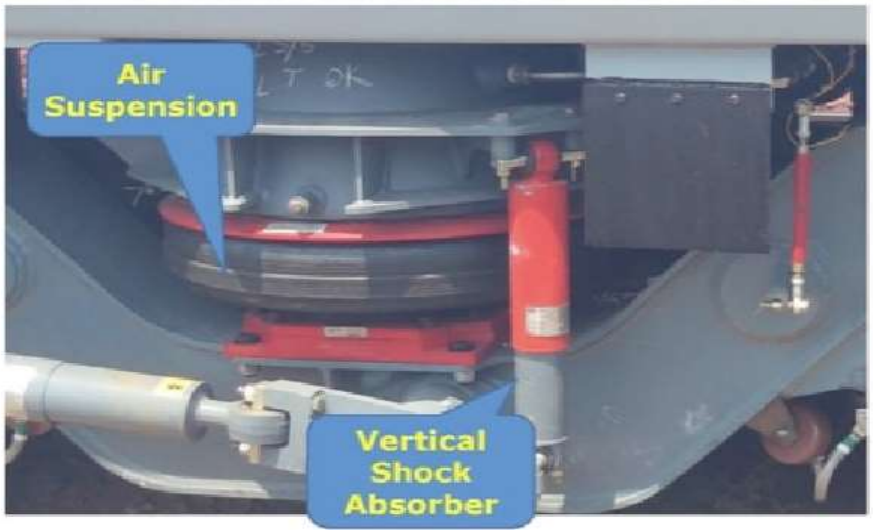
ICF coach with air suspension.

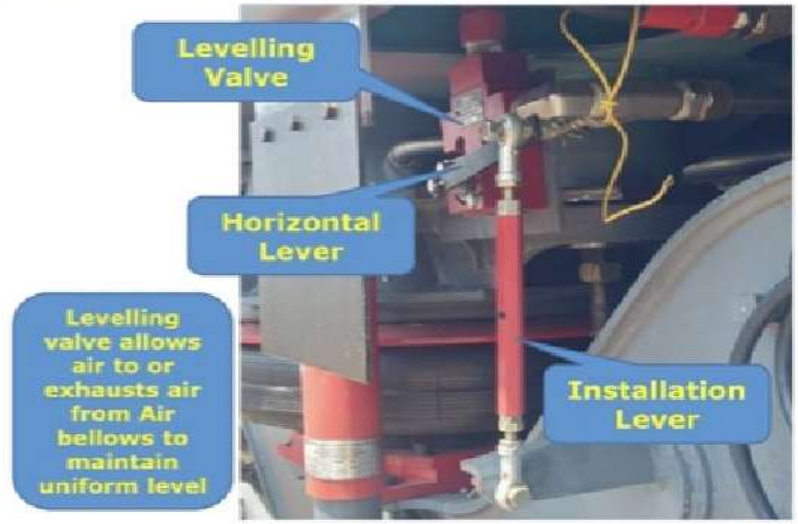


FIAT BOGIE with AIR SPRING



Air Suspension

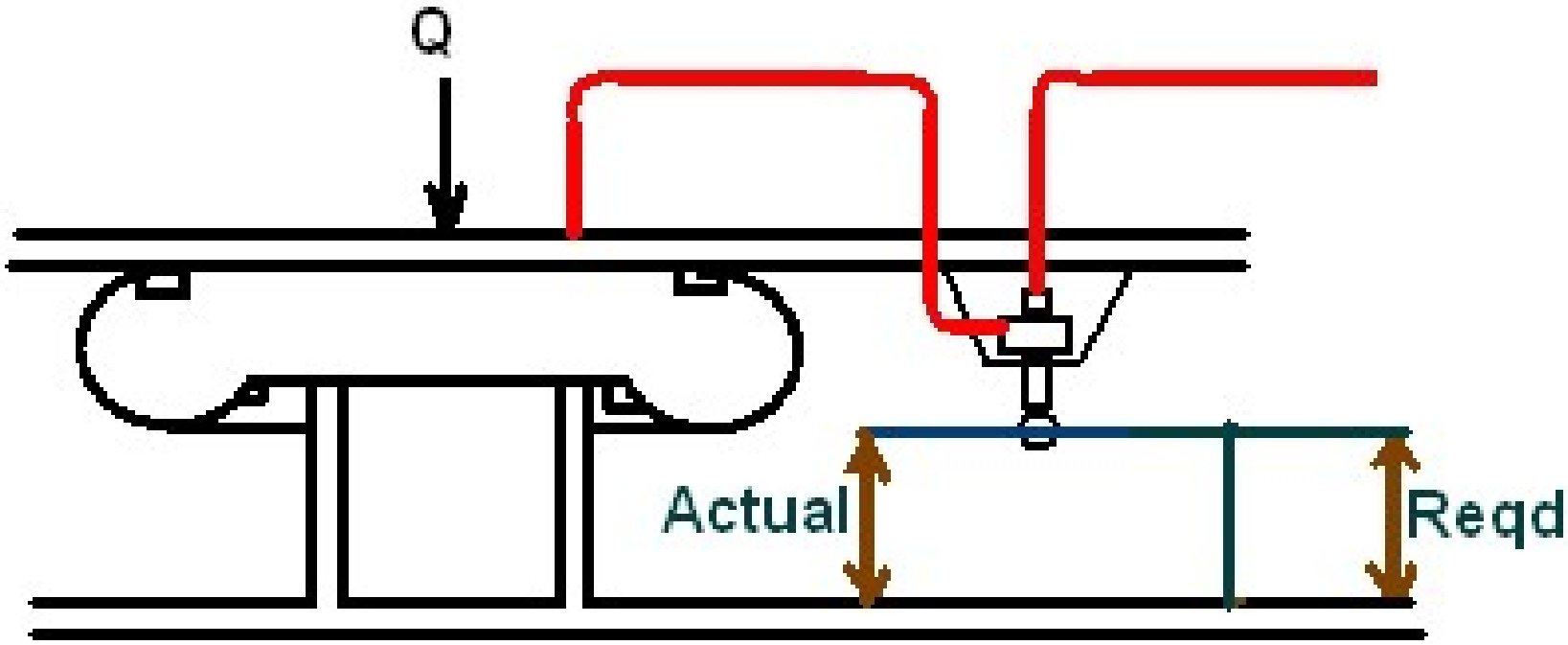




Working Principle

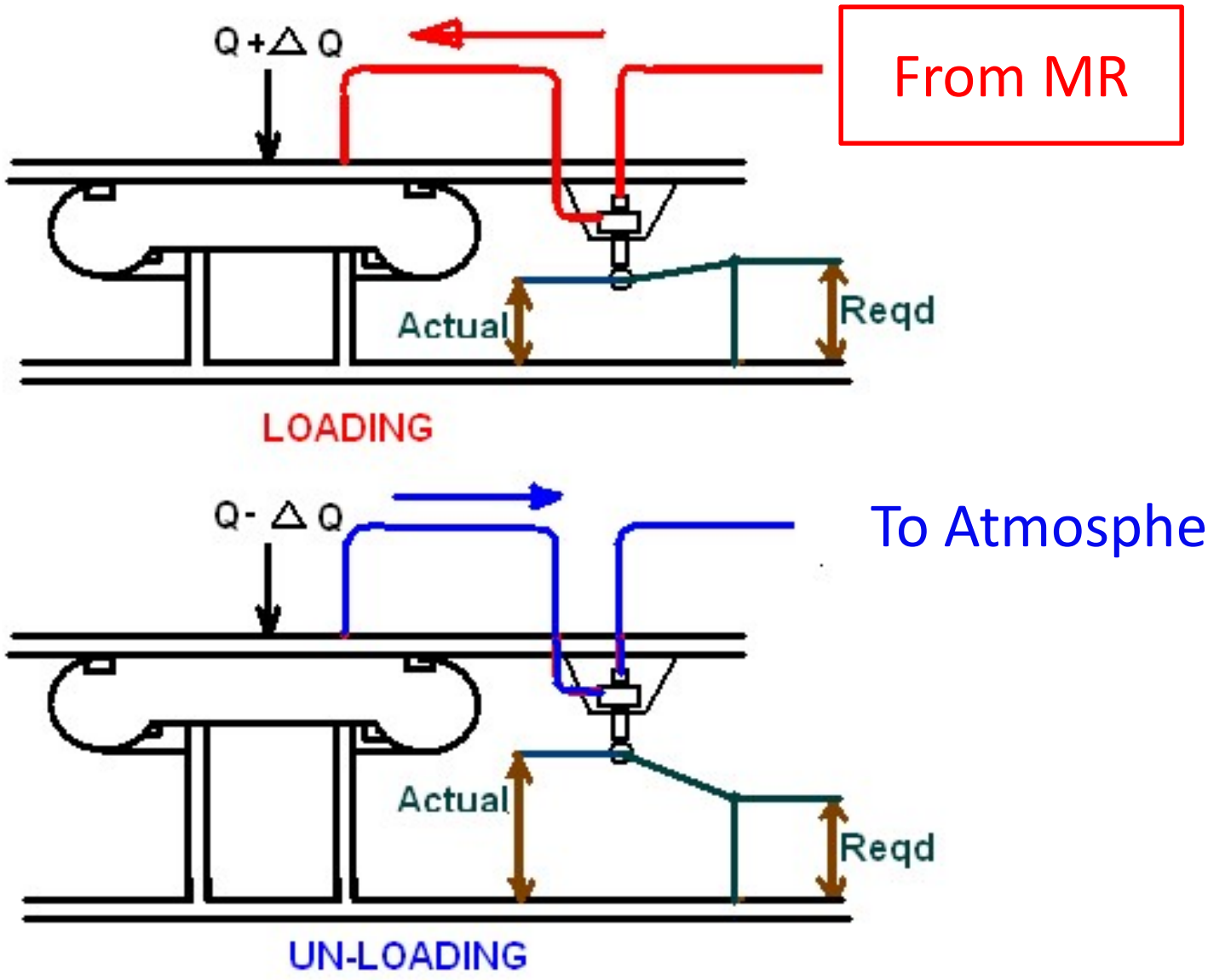
- Rubber bellows containing pressurized air and emergency rubber spring provide various suspension characteristics including damping.
- With changing loads, air spring reacts initially by changing the distance between air-spring support & vehicle body.
- The height monitoring valve (leveling valve) in turn actuates , either getting the compressed air pressure to the air spring or releasing air pressure to atmosphere.
- The process continues until the original height is restored.

Pneumatic Suspension during no variation of Pay Load



EQUALISATION

Air Flow during variation of Pay Load



Duplex Check valves

- Pressure differential on DC valve is set at 1.5Kg/cm^2
- Consists two check valves side by side, so that air can flow in either direction when the air pressure differential exceeds the pre-set value when burst occurs to ensure no severe tilt or twist occurs during movement of the coach .

Duplex Check valves

- In case of burst, air starts leaking to the atmosphere. Due to high pressure differential, air starts moving from the intact air spring to the burst air spring via DC valve. Thus complete coach end will gradually come down and rest on the emergency rubber springs.

- After isolating the bogie ,Speed restriction 60KMPH to be imposed to cover rest journey.

Failure Indication and Brake Application Device

Necessity for FIBA

Supply for air spring is taken from FP

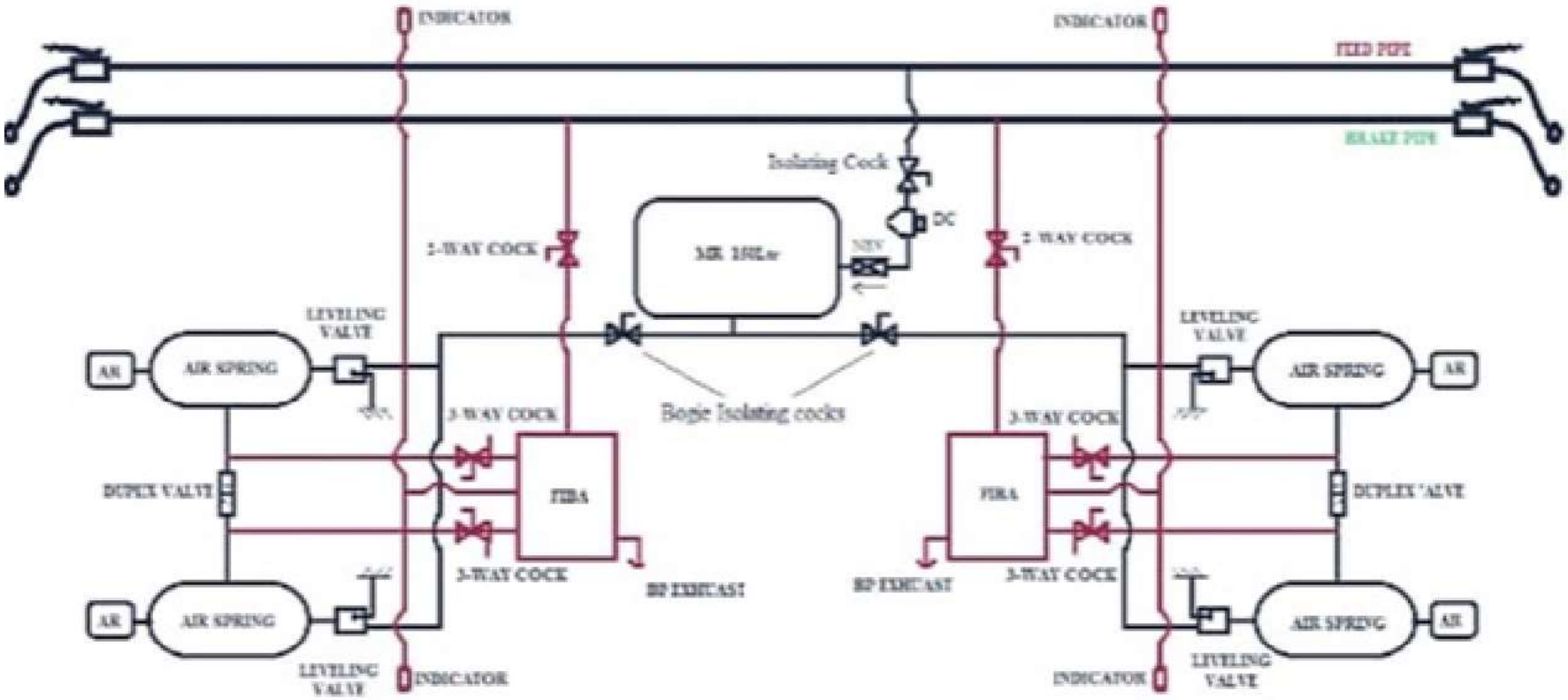
- loss of compressed air from the system not immediately noticed
- Unsafe train operation due to exhaust of compressed air
- Delay in identifying the cause

FIBA is provided in the coach to apply service brake automatically in the event of failure of air spring

Indication of failure by FIBA

- Automatic BP dropping through FIBA unit 8 mm choke exhaust & brake application on the train
- FIBA brake indicator on either side of coach for each bogie
- Audio sound from the FIBA device

FIBA PipeLine diagram

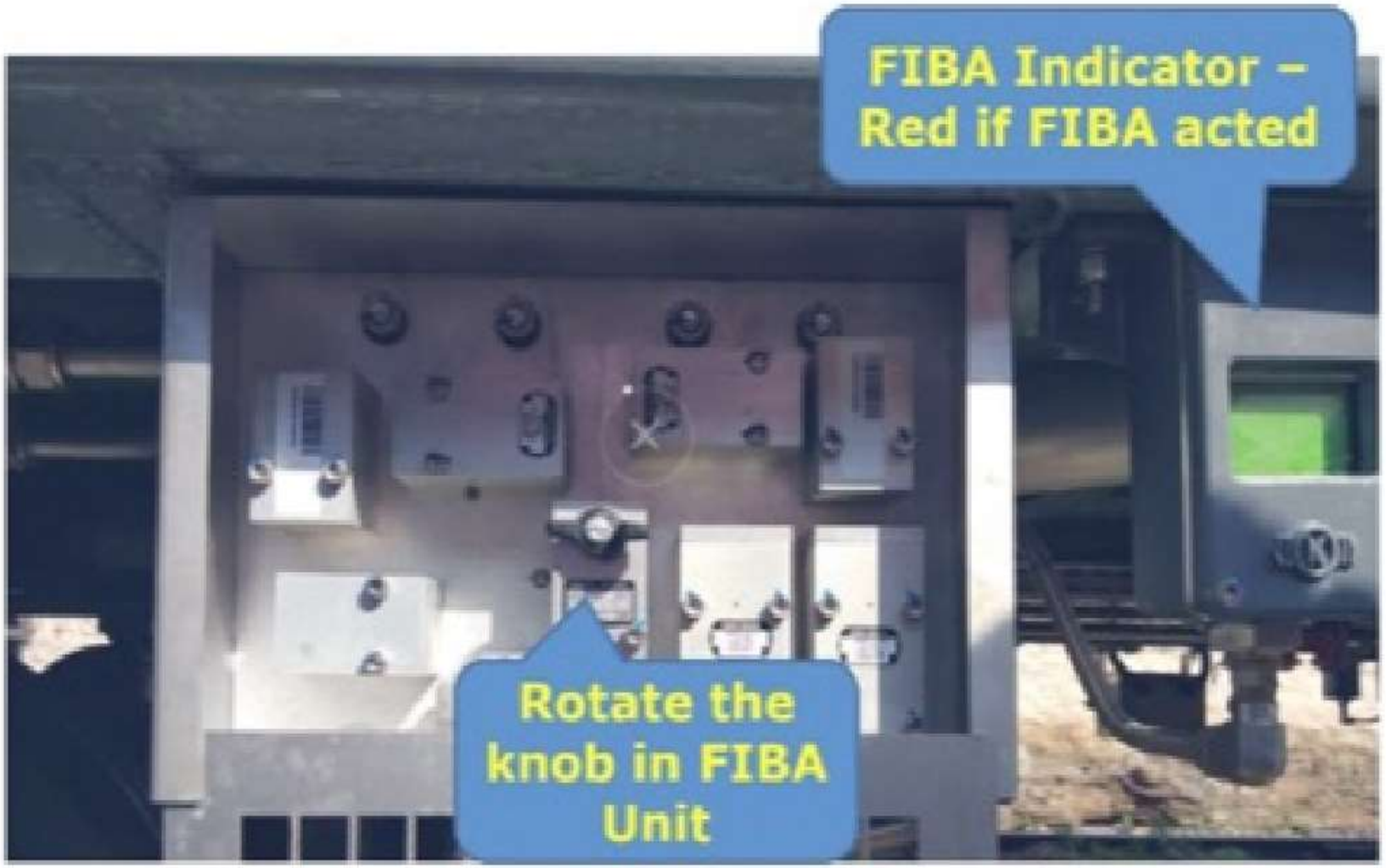


FIBA Isolation

Resetting in this type FIBA

Ensure FIBA indicator turns to green.

Resetting in this type FIBA



Ensure FIBA indicator turns to green.

Procedure for attending

- When the train brake application is identified, Loco pilot should make service application.
- Locate the coach with ruptured bellow through FIBA Indicator and hissing sound.
- Close BP COC on branch pipeline connected to FIBA unit
- Isolate the Bogie isolating cock of the Air spring which is provided between the MR and the Bogie.
- Ensure both springs air is vented and coach is sitting on the emergency springs without any tilt.
- Continue the journey with speed limit of 60 Kmph.
- Inform PRC / Section Control

Thank You