Air Suspensions System

Presented BY:Prince yadav
Sr. Lecturer STC AJMER

Air Suspensions System

- Air Spring used in Indian Railway as a secondary suspension to provide comfort to the passenger by absorbing shocks and vibrations.
- Air spring is working on totally control by air (pneumatic system).
- In Indian Railway, working of air spring is based on 4-point suspension system.
- 4-point suspension system consist the following part

(A) Air reservoir 180 ltrs	01 no.
(B) Air reservoir 40 ltrs	04 nos
(C) Duplex check valve	02 nos
(D) Levelling valve	04 nos
(E) Adjustable arms	04 nos
(F) COC for bogie	02 nos
(G) COC for coach	01 no.

cont….

Air Suspension

- Presently Indian Railway is using four types of air springs namely

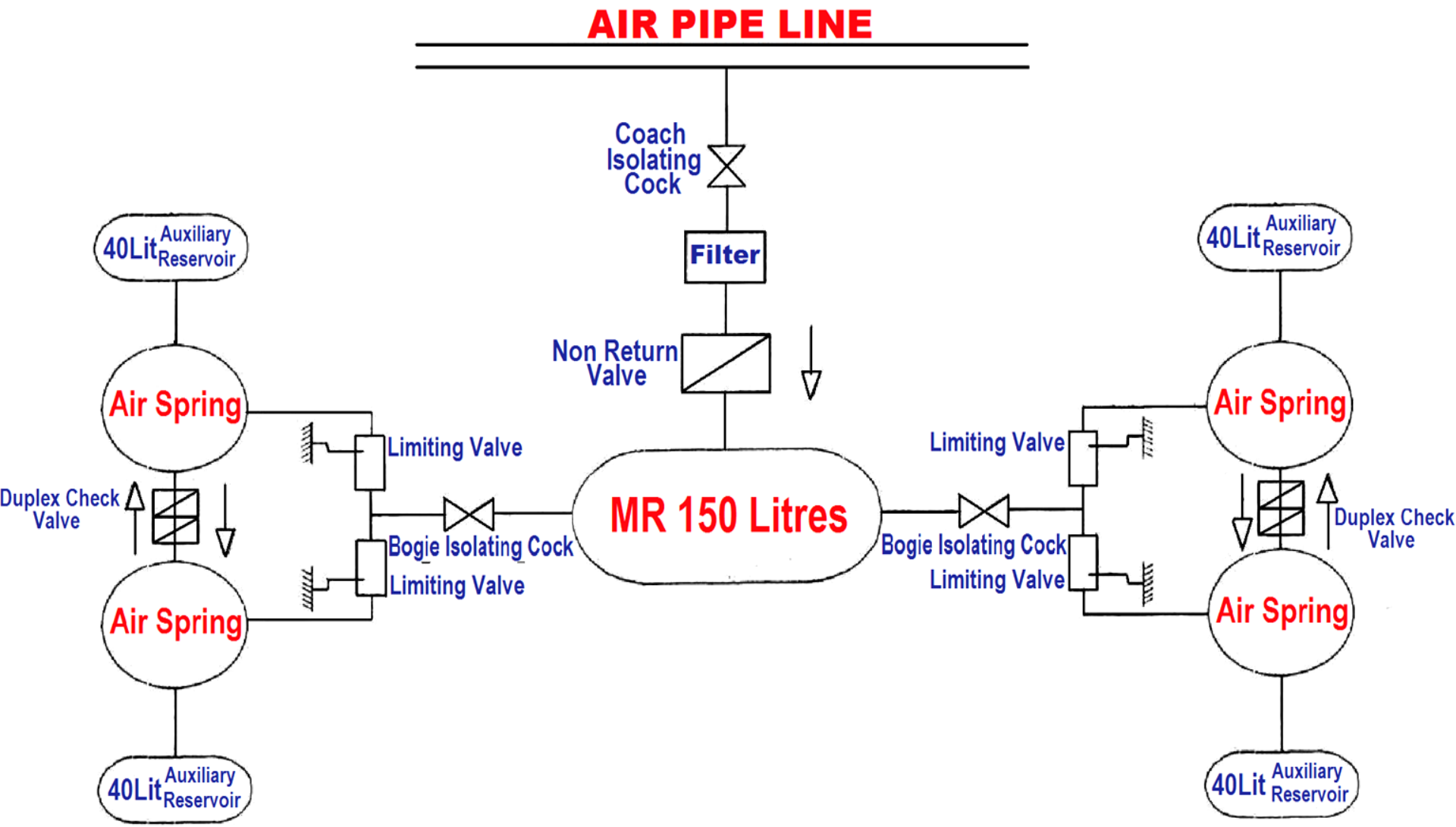
  180 k N - for EMU/DMU/MEMU Motor coach

  150 k N – for EMU/DMU/MEMU Trailer Coach

  140 k N - for Main Line and Rajdhani Coaches

  120 k N – for LHB fiat bogies.

SCHEMATIC LAYOUT



SCHEMATIC DIAGRAM OF AIR SUSPENSION EQUIPMENTS

Air Spring Assembly

Emergency Spring

180 k N Emergency Spring

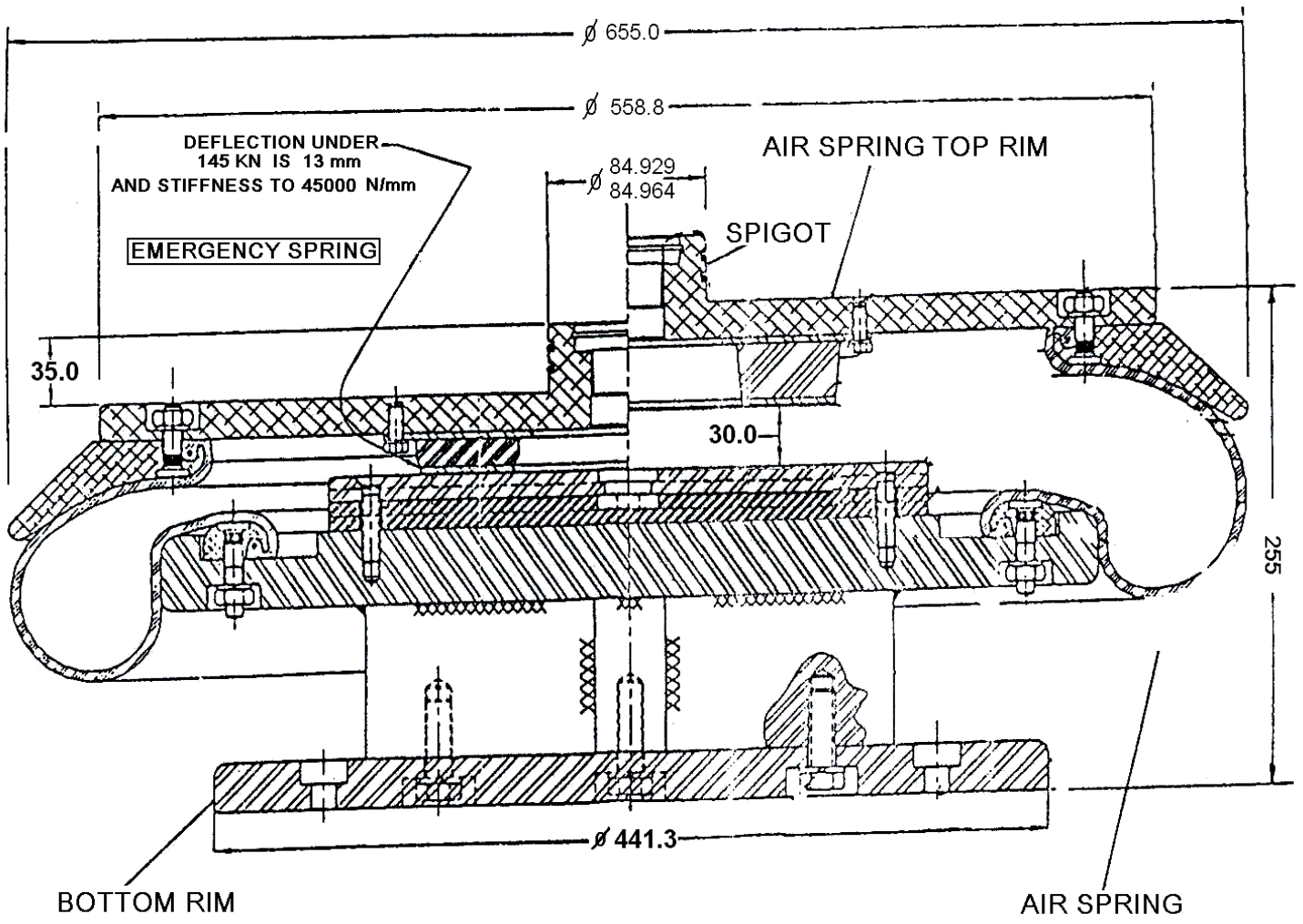
140 k N Emergency Spring

Constructional details of air spring

This Air spring is a cylindrically shaped bellow that rolls over a custom contoured pedestal. The Air spring has nine major parts.

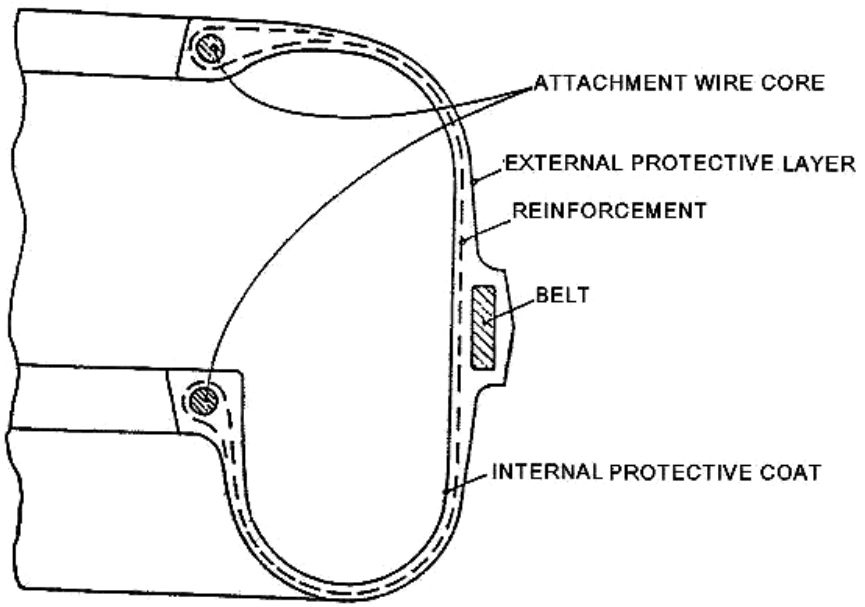
1. Air Spring (or Elastomeric Rubber Bellow)
2. Bead Skirt
3. Upper Mounting Plate
4. Bead Ring
5. Pedestal Assembly (or Piston)
6. Emergency Spring
7. Bumper Support Plate
8. Spacer Plate
9. Base Plate

Constructional details of air spring



Air spring (Elastomeric Rubber Part)

- The Air Spring is a highly engineered pneumatic cylinder.
- It is made of elastomeric material and is nearly cylindrical in shape.
- It contains nylon cords that are laminated with elastomeric rubber and cured together for an airtight seal.
- At each end of the Air Spring there is a bead wire for reinforcement and sealing purposes.



Bead skirt

- The bead skirt is made of aluminum and a bead groove is machined for a precision circumferential fit to assure the bead wire seats properly to seat with the top or upper mounting plate. This aluminum is high grade and more than strong enough to be used in any application, since the air spring carries the load.

Upper mounting plate

- Upper mounting plate is made of steel or aluminum.

- The upper plate is to be placed upon the bead skirt with the elastomeric rubber part bead wire seating in the bead skirt and to be bolted together to form the upper seal. The mounting plate is fitted with an air entrance for inflating the parts to a desired pressure.

- The air passage is designed such that an orifice could be added to attain additional air damping if so desired.

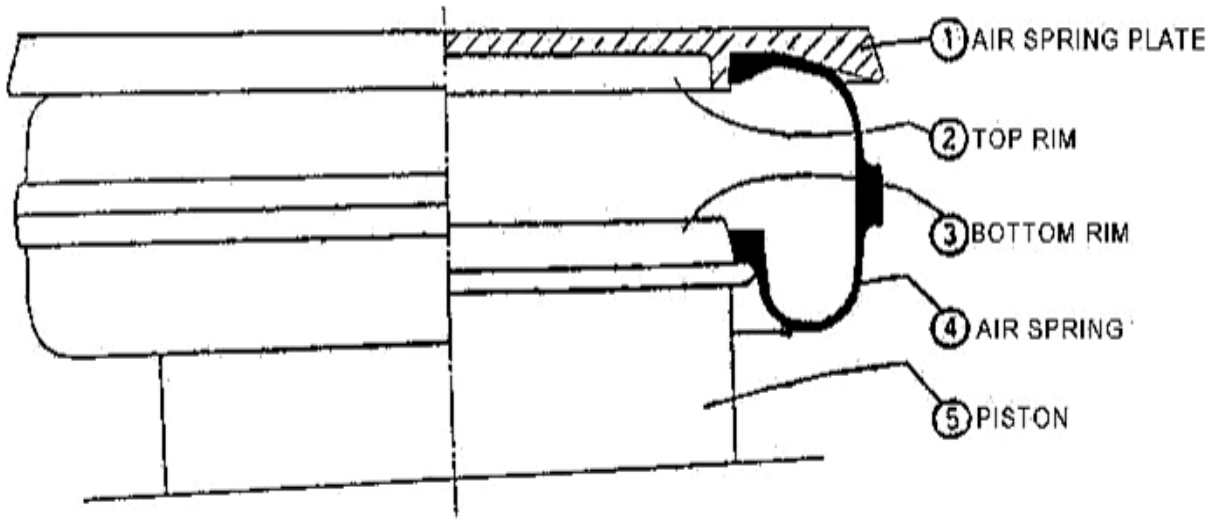
- The upper plate, further more, acts as a shield.
  (to keep foreign material, oil and grease off the rubber part)

Bead ring

- The bead ring is also made of aluminum and is located at the bottom of the assembly and serves the same purposes as a bead skirt, and forms the lower seal. The bead ring is bolted to the pedestal.

Pedestal assembly (or piston)

- The pedestal (or piston) serves the purpose, as a component is the lower sealing procedure and support member.
- This steel part act as a lower mounting surface.
- The pedestal (piston) is tall enough to let the air spring oscillate with the given load conditions placed upon the spring.



Emergency spring

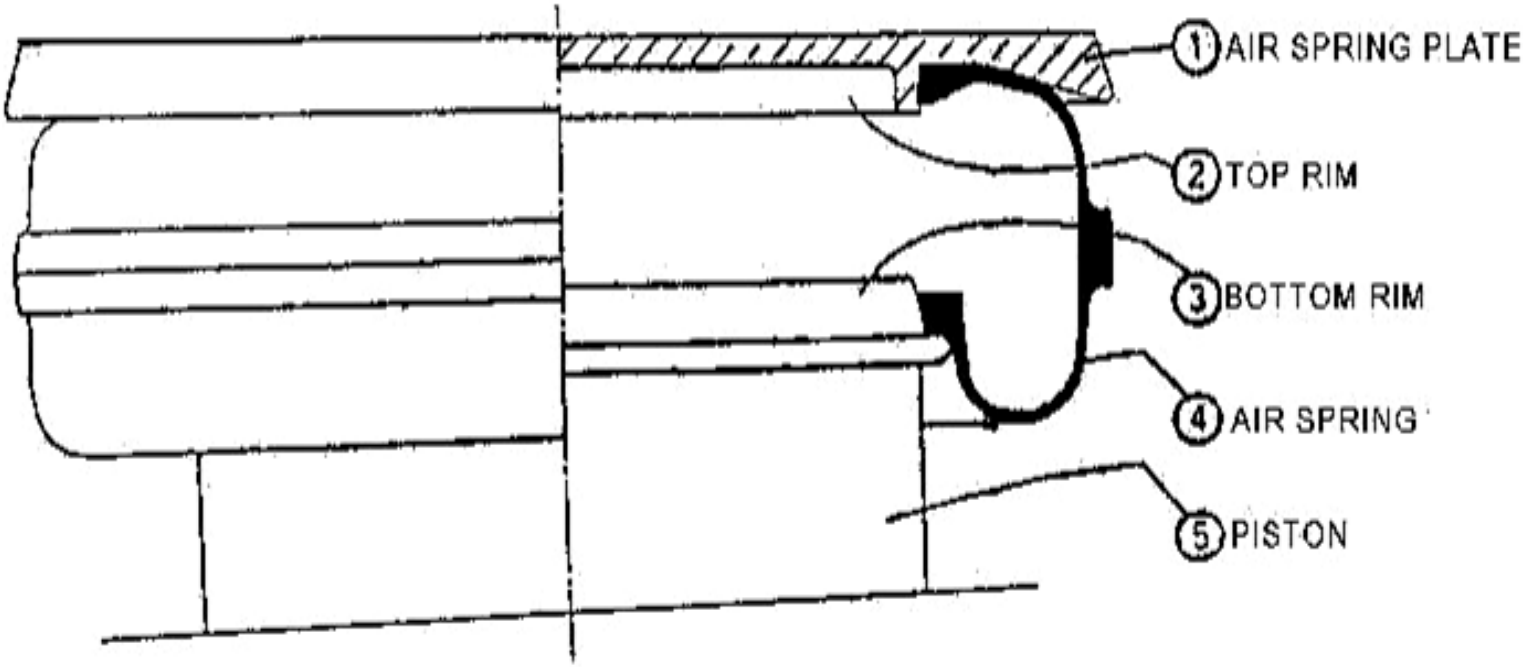
- The emergency spring (on bumper) provides an auxiliary spring system in the event of an air system failure. It is an integral feature of the air spring assembly and is secured to the upper mounting place with four bolts. It also has a rulon pad bounded to its contact surface to help facilitate lateral motion in the zero pressure condition.

Bumper support plate and spacer plate

- The bumper support plate is a steel plate (with two grooves and a hole in the center) which goes on top of the spacer plate (with two grooves and No hole in center).
- These two plates are bolted to the top of the pedestal assembly with four bolts. The bumper support plate is provided smooth surface for the emergency spring with rulon pad to slide on laterally in the zero pressure condition.

Base plate

- The base plate is a steel plate, which is bolted to the bottom of the pedestal assembly with 4 bolts. This plate has three counter bore holes, which allows for the attachment of the assembly



Handling Of Air Springs

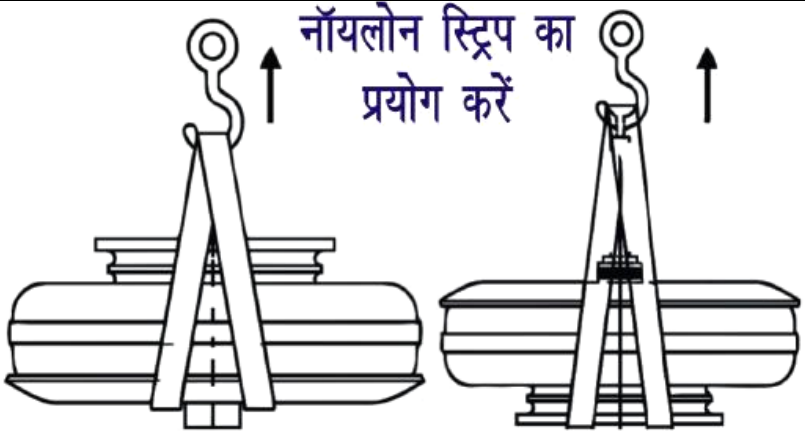
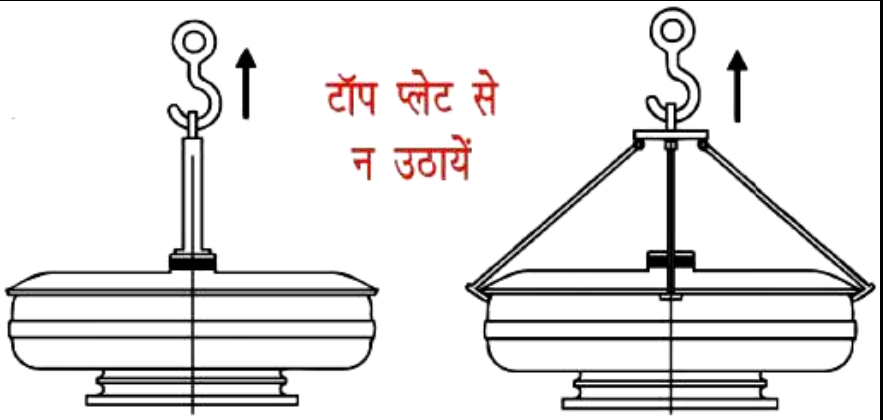
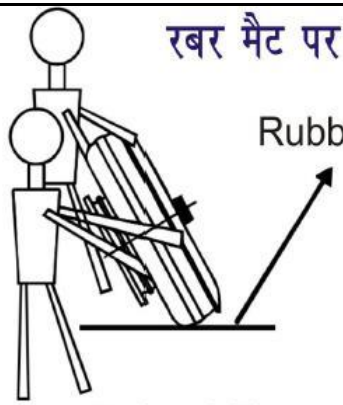
Do

Do not

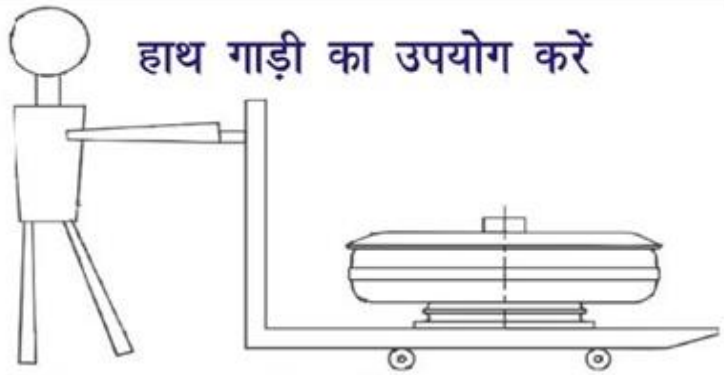
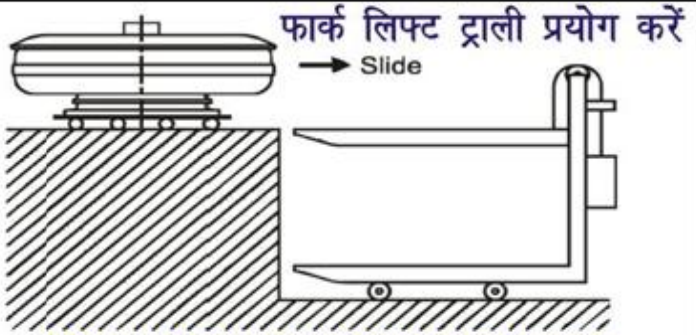
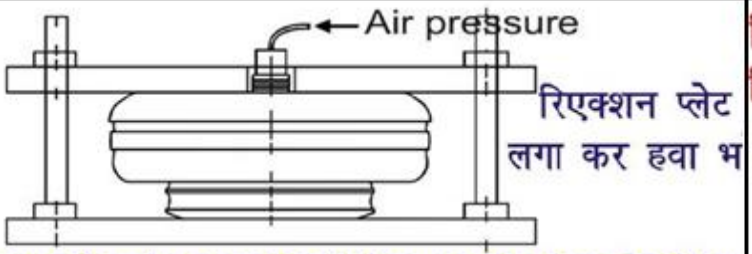
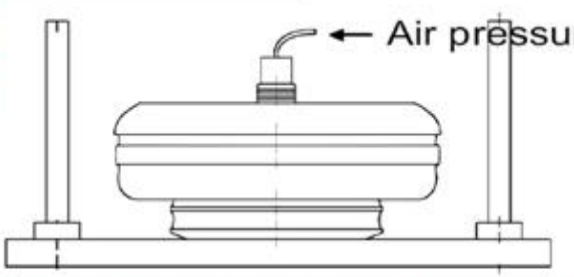
Storage of Air Spring

- Storage of the air springs must be in such manner that we use air spring first which was received first **FIFO**.
- Store atmosphere must be dust free.
- Temperature of the store shall be 0 deg to 25 deg C and humidity should be below 65%.
- Always ensure that there shall be no any solvent , fuels, lubricating agents, chemicals, acids and ozone generating equipment near by rubber below.
- Rubber parts shall be stored at least one mtr away from any heat generating resources.

HANDLING PROCEDURE FOR AIR SPRING

	Right procedure	Wrong procedure
LIFTING	 A nylon fibre strip should be used.	 Don't lift from top plate.
TURNING	 A rubber mat should be used under the air spring and ensure two man handle it.	 Don't drag on the floor

HANDLING PROCEDURE FOR AIR SPRING

TRANSPORTATION	 A hand trolly should be used	 Don't transport by rolling
UNLOADING	 A fork lift trolly should be used	 Don't unload by dropping
TESTING	 A reaction frame should be used when testing.	 Don't test without a reaction frame

Maintenance instructions

Air spring height/coach clearances to be maintained as per Drg. no. CA90001. Tightened the lock nut of installation lever after adjustment spring height/clearances.

- Provide a safety plate for leveling valve to avoid stone hitting etc.
- Ensure that all the fasteners are properly tightened.
- Check the leakage of all air joints and rectify if required.
- Ensure that installation lever is in position and tightened properly.

Maintenance instructions

- Ensure that Air spring height after inflating is 255+0/-5mm.
- Do not hinder with leveling valve and installation lever.
- Check visually the crack, deformation, aging of rubber parts.
- Check the leakage of joint between spring spigot and bolster. Change the o-rings on spigot if leakage is observed.

Thanks