Safe System of Work No. 3

Vehicles and Trailers with Air Suspension and Air Bellow/Bags

Risk Assessment	A13 - Air suspension bags, vehicles fitted with air suspension and trailer air bags

Date: ~~14.06.2022~~ ~~Date: 08.07.2022~~ Date: 17.02.2025	~~Revision No. 2.0~~ ~~Revision No. 3.0~~ Revision No. 4.0	Remarks: 5.2 Calibration Task added Changes made to section 5.2 calibration-Vehicle lifters deleted. Reviewed – Changed made WIO added, MULTI deleted. Sections 8, 9 and 10 added

MANDATORY

Hazards	Risks
Working under a vehicle without using axle stands and chassis stands. Air bellow/bag exploding or rupturing. Not following safety procedures; and Not following manufacturer's work instructions. **MANDATORY - Always** use a pair of axle stands or chassis stands to support the chassis.	Serious crushing injuries; Head, face and hearing injuries; Upper limb injuries; Psychological stress; and Noise, hearing damage: Death. **Do not** put your head, body and limbs between the wheel and chassis.

1.0 Introduction and Background

1.1 The Health and Safety Executive (HSE) issued a safety alert on *12.05.2020*; Bulletin No. EPD 1 – 2020 - Air suspension systems on vehicles. The information below is taken from this bulletin.

1.2 The HSE have investigated several serious incidents involving air suspension systems on vehicles. The two main causes of such incidents are:

- collapse of inadequately supported vehicles; and
- unintended rupture or release of components from the air suspension system.

Other causes of such incidents have included:

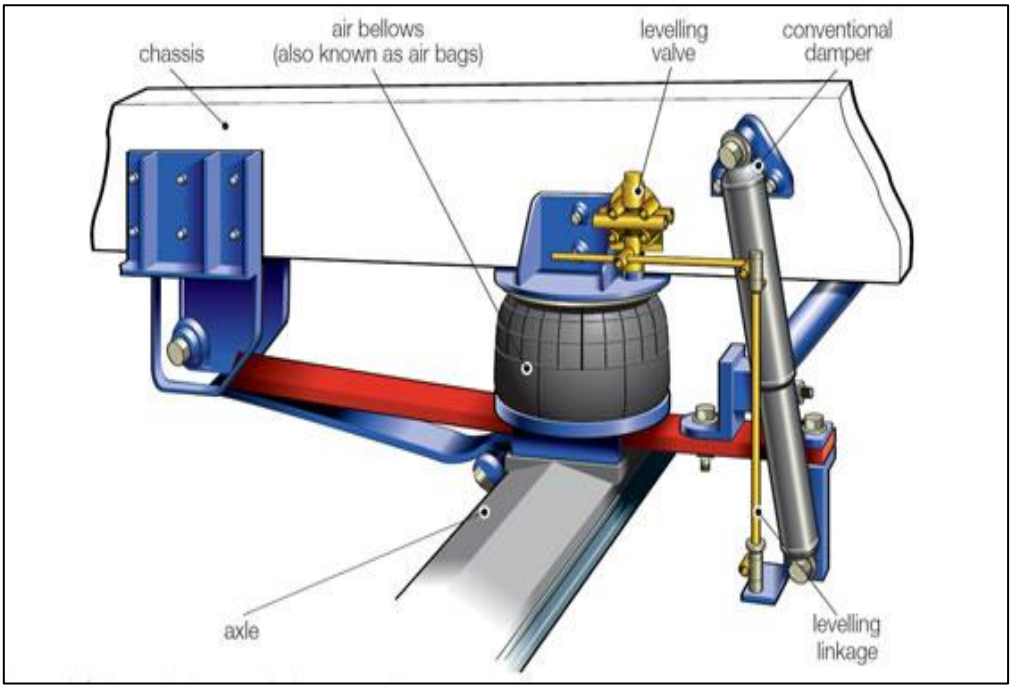
- Work being carried out on vehicles supported by the air suspension system and the airbags have catastrophically failed;
- Work has been carried out on the suspension control system or vehicle sensors and unexpected suspension movement has occurred; and
- Work has been carried out without de-pressurising the air suspension system and the pneumatic air bag or associated components have ejected or ruptured.

1.3 HSE have stated that you should:

- Undertake minimal repair work at the roadside or third-party premises. **The best place to undertake such work is at an adequately equipped vehicle repair facility.**
- Prevent movement of air suspension, either by deflating the system or by using suitably rated props or stands to prevent the chassis lowering. Under no circumstances should air suspension be relied upon to maintain a vehicle's ride height or position whilst people gain access to areas where they may become trapped.
- Exhaust the air from the air suspension system before working on it.
- Isolate the air suspension system by physical disconnection of the air supply before working on it. You should not use clamping of air suspension pipework as a means of temporary isolation as it is not secure.

1.4 Vehicles are commonly fitted with air suspension, including buses and coaches, refuse vehicles, goods vehicles and tankers. On a vehicle with an air suspension system, inflated rubber bellows (also known as airbags) are supplied with air from the vehicle's air compressor via a storage system. These take the place of conventional springs at each wheel or axle and automatically ensure a consistent ride height, regardless of the load being carried. A typical set up is shown in **Figure 1** below.

Figure 1: Schematic Layout of Air Suspension Components



1.4 Whilst these are produced by numerous manufacturers, the hazards are common, including:

- Clearance suddenly and unexpectedly changing due to a drop in air pressure, automatic movements or air bellows rupturing or deflating. This presents a crushing hazard to those working in a position where they may become trapped (e.g. underneath the vehicle or between the wheel and chassis); and
- Work on pressurised systems resulting in violent ejection of parts under pressure and failure of components which may become projectiles.

2.0 Planning the Tasks

2.1 Those who are carrying out, or who are responsible for working on vehicles fitted with air suspension systems must be trained and should ensure tasks are adequately planned. This includes:

- confirming the configuration of the particular suspension system;
- assessing the risks associated with each task;
- explaining each task so it is fully understood by the technician;
- providing the necessary equipment to undertake the job safely and developing safe systems of work;
- taking into account the specific tasks and control measures required;
- supporting your staff if they are being put under pressure by third parties to work in an unsafe manner; and
- undertaking minimal repair work at the roadside or third-party premises. **The best place to undertake such work is at an adequately equipped vehicle repair facility.**
- Under no circumstances should air suspension be relied upon to maintain a vehicle's ride height or position whilst people gain access to areas where they may become trapped in order to carry out the required task.
- Ensure that you have the relevant equipment available to carry out the required task safely. If it is not available, do not proceed any further with the task.
- Repair work required at the roadside needs to be assessed in line with the relevant risk assessments.

2.2 When working on vehicles with air suspension systems:

- Prevent movement of suspension, either by fully deflating the system or by using suitably rated props or pair of axle stands or chassis stands to prevent the chassis lowering. Under no circumstances should air suspension be relied upon to maintain a vehicle's ride height or position whilst people gain access to areas where they may become trapped.
- If you are working near a lifting axle, it should be isolated as it can move without notice.
- Carryout a visual check of the configuration and condition of the air suspension system.

2.3 When working on the air suspension system itself:

- Undertake the actions above for working on vehicles with air suspension systems.
- Exhaust the air from the air suspension system before working on it.
- Isolate the system by physical disconnection of the air supply. The practice of temporary isolation by clamping of air suspension pipework (such as by mole grips) does not provide a secure isolation. In addition, determine whether dissipation of stored air in the suspension system is required.

- For leak testing, visually inspect the empty system, then inflate and raise to full travel, leave a short period of time before inspecting for leaks. Should damage be identified, exhaust the air from the system before carrying out repairs.

3.0 Mandatory Instructions

3.1 Apprentices are **prohibited** from working on air suspension systems, they shall be supervised by a trained technician at all time.

3.2 Technicians shall be trained to work on air suspension systems.

3.3 Technicians shall consult WIO and ensure the work is carried out in accordance with the relevant WIO instructions.

4.0 Equipment Safety

4.1 In order to ensure technician's use equipment safely and are using safe equipment and tools, technicians must:

- Use a pair of correctly rated axle stands or chassis stands which have examined by a competent person. Always use company lifting equipment and never use your personal lifting equipment. (*The Provision and Use of Work Equipment Regulations 1998* (PUWER));
- Use a correctly rated trolley jack, which has had a statutory examination carried out in the last *12 months* by a *competent person* (*Lifting Operations and Lifting Equipment Regulations* 1998 (LOLER));
- Carry out **'pre-use checks'** on equipment to ensure it is in good condition. The purpose of pre-use checks is to look for defects or damage to the equipment.
- Check the inspection label and only use axles stands and equipment which have a valid statutory examination date.
- Do not use any damaged and defective equipment. Report this equipment to your Manager or Supervisor and quarantine the equipment to prevent unauthorised use.

5.0) Task Safety

5.1) To ensure technician's safely carry out any task involving air suspension systems, you must:

- Carry out a 'dynamic risk assessment' to ensure it is safe to work on the air suspension system;
- Undertake minimal repair work at the roadside or third-party premises;
- Carry out air suspension system work in accordance with the WIO instructions;
- Use the correct equipment, axle stands, chassis stands and a trolley jack in accordance with the WIO instructions;
- Ensure pair of axle stands or chassis stands are used correctly to support the chassis from falling; and
- Ensure trolley jack, pair of axle stands and chassis stands are used on firm and level ground.

5.2) Lift axle air bags

- Ensure the lift axle is lowered to the ground before going under the vehicle. Not all lift axles can be lowered depending on the configuration, use stands under the raised axle.
- Make sure you follow the above instruction (changing an airbag) before commencing the repair.
- To change the lift axle air bag the lift axle needs to be jacked up and supported with pair of axle stands and the system need to be depressurised.

5.3) Calibration Tasks

- ALWAYS carry out the calibration process as per the manufacturer's instructions.
- DO NOT crawl under a vehicle when calibrating the air suspension. Always work with the vehicle parked at ground level and when required use the inspection pit in order to work safely under the vehicle.
- Chock the vehicle with blocks in front of and behind the rear wheels before commencing work.
- Release the parking brake to avoid stress during calibration.
- Make sure that there is enough clearance around the vehicle during calibration.
- Plug in and use the diagnostic laptop.
- DO NOT operate the diagnostic laptop from inside a pit while under the vehicle.
- When working on the flat hard ground level, access the front suspension for calibration either by tilting the cab or using a vehicle inspection pit.
- Use the appropriate technical data and special tools for the calibration process.
- Once calibration is in progress the height and lift axles can move autonomously DO NOT put yourself between the chassis and suspension.

6.0) Personal Protective Equipment (PPE)

6.1) Technicians shall wear/use the following PPE:

Safety Glasses/Goggles

Gloves

Ear Defenders

High Visibility Clothing

Safety Shoes/Boots

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7.0) Further Information

7.1) Please see HSE Guidance Note PM85: Safe Recovery (and repair) of buses and coaches fitted with air suspension for further guidance regarding the roadside recovery and repair of public service vehicles (PSVs) (buses and coaches) fitted with air suspension.

8.0) Using welding or cutting equipment near air suspension bag.

Hazards	Risks
Using welding or cutting equipment near air suspension bag. Heat Sparks	The risk is explosion and fire of the air suspension bag.

8.1 DO NOT use welding or cutting equipment near an air suspension bag or on any metal components fitted to the air bag. This is **mandatory.**

8.2 Always remove the air bag or shield it before any welding or cutting is carried out in the area.

9.0) Buses and coaches fitted with automatic air suspension system (Reference: HSE- PM85)

Hazards	Risks
Working on a bus or coach air suspension system	The risk is serious injury or fatality caused by crushing or trapping under a vehicle fitted with air suspension.

9.1 Technician assigned to bus and coach automatic air suspension system work must be trained in these types of vehicles and fitted with air-ride suspension.

9.2 Technician shall take care to ensure that the vehicle cannot suddenly and unexpectedly fall and trap them. The risk of this happening is significantly reduced if two basic principles are adopted:

MANDATORY: Never crawl beneath a vehicle fitted with air suspension unless it is properly supported.

Technician shall:
-Use a suitable long handled lifting equipment or long pole to push the lifting equipment under the vehicle.
-Make sure that the lifting equipment is correctly located under the chassis. Use the long handle to operate the lifting equipment to lift the vehicle.
-Not go under the vehicle to operate the lifting equipment. This is the practice recommended in PM85.
Never tamper with the ride height for the purposes of recovery or repair.

3. Before use, the Technician shall check all lifting equipment to make sure it is safe, correct for the weight to be lifted and has been inspected to comply with Lifting Operations and Lifting Equipment Regulations (LOLER).
-Apprentice shall be supervised.

4. Before going under a vehicle, the Technician shall make sure the lifting equipment is correctly located under the vehicle, the vehicle is lifted and there is sufficient clearance distance between the vehicle chassis and ground.

-A bus and coach shall be lifted using vehicle lifters (e.g. Somers) or parked over vehicle inspection pit. When required use a suitable pit bridge to stand on carryout work.

-Under no circumstances must you crawl under a bus or coach.

5. Technician shall not crawl under a bus or coach which is broken down on the highway, always make sure the vehicle is recovered and taken to a depot.

6. Technician shall make sure the vehicle is parked on flat and firm ground.

7. Technician must be careful as suspension can alter unexpectedly because of air leaks, tampering or component failure.

8. On modern vehicles, many functions are interlocked with the ride height.
For example, simply opening the doors or applying the park brake can cause the ground clearance to reduce suddenly, with the potential to crush people working beneath the vehicle.

9. Brakes

9.1 In some cases, brakes can be released by applying air pressure to the brake chamber, either directly or indirectly via other parts of the air circuit. Where air cannot be applied, winding off the brake springs manually will be the only option.

9.2 Before attempting to release brakes, technician shall ensure that the wheels have been chocked.

9.3 Even if a brake pipe is broken, a temporary repair can sometimes be made, e.g. using an air hose and hose clips to form a continuous pipe again, so that system can be temporarily charged to move the vehicle.

9.4 A brake mechanism can seize, locking the brake shoe onto the brake drum. In these scenarios, the brake cannot be wound off manually and this may require access beneath the vehicle to dismantle components to free the brake. However:

9.5 Under no circumstances should technicians attempt to release the spring entirely from its chamber, as springs can eject at very high speed.

9.6 Technician and apprentice shall wear safety glasses and ear defenders.

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10. Trailer air bags (or air bellows)

Hazards	Risks
Damaged air bag Defective components	The risk is an exploding air suspension bag causing serious injuries by flying fragments to; -eyes, -face, -hands, -body parts. The risk is fatality caused by impact with air suspension bag. The risk is serious injury or fatality caused by crushing or trapping under a trailer. The risk is hearing damage caused by noise generated by exploding air suspension bag.

10.1 Technician shall be familiar with the particular type of air bag system installed to the trailer:

-If you are unsure then stop immediately and see your supervisor.

-Colas valve.

-Manually controller raise and lower valves.

-Mechanically and electronic valves.

2. Technician shall make sure suitable body props/supports, pair of axle stands or chassis stands are used to provide sufficient clearance between chassis and wheels.

3. Technician shall consider and assess the condition and type of load as these will affect the behaviour of the air suspension bag/system.

-If possible, the load must be removed.

-If removing the load is not possible then the technician must report to the Supervisor.

4. MANDATORY: To avoid the risk of crushing or trapping injuries technician shall not place head and body parts between the trailer chassis and tyre.

5. Technician shall wear safety glasses and ear defenders.