SAFETY BULLETIN 27/21

Vehicle Specification and Maintenance

ASIA INDUSTRIAL GASES ASSOCIATION
No 2 Venture Drive, # 22-28 Vision Exchange, Singapore 608526
Tel: +65 67055642 Fax: +65 68633307
Internet: http://www.asiaiga.org LinkedIn profile: https://www.linkedin.com/company/asiaigaorg

Based on EIGA Safety Info TS 09/19 – Vehicle Specification and Maintenance

Vehicle Specification and Maintenance

Introduction

Commercial vehicle transport is one of the highest risk activities in the industry. The main cause for incidents during transport operations is human behavior (e.g. poor driving, poor management, see AIGA SB 11, *Human behavior within Transport Operations* [1]). However, sub-standard, unsafe or defective transport equipment can also result in or increase the risk of incidents. When deciding on the specification of transport equipment, specifically vehicles, it is important to be aware that there are elements of vehicle design that are mandatory, and those that are not.

Each Gas Company and/or its nominated contractor should have suitable engineering standards/specifications in place as reference documents when ordering transport equipment. Additional safety equipment over and above mandatory requirements fitted by the original equipment manufacturer should also be considered.

Vehicles that do not meet the mandatory requirements shall be considered for upgrade or removal from service.

In addition to the periodic inspections required by the legislation, a proper preventive maintenance plan shall be in place to keep all transport equipment in a safe and road worthy condition.

Scope

This publication gives an overview on the most commonly available vehicle related safety equipment. The aim of this publication is to inform the reader on pieces of equipment that can either be mandatory due to legislation or can be considered to improve the safety performance although not mandated.

Since opinions differ on the effectiveness and necessity of certain elements/systems this publication does not give recommendations on which non-mandatory elements/systems should be used.

Outside of the scope are equipment and systems related to activities other than “driving” in the broader sense (e.g. transfilling, loading).

Furthermore, this publication gives advice on how to manage the maintenance of transport equipment.

Outside of the scope are mandatory checks (e.g. periodic inspections of transport tanks and vehicles), but also maintenance of transfilling equipment (e.g. hoses, couplings, pumps).

Definitions

- TSI – Transport Safety Information.
- Contractor is used to denote contractor, sub-contractor, carrier or haulier.
- Commercial vehicle – Any vehicle that transports product for commercial gain.
- Transport equipment – Prime movers or motive units, rigid tankers, tank-semitrailers, battery-vehicles, ISO containers and multi element gas containers (MEGC).
- “Managers”, “drivers” and “employees” refer to Gases Company employees and employees of contractors.

Learning more about vehicle data management

1. Are you aware which transport safety equipment / systems are mandatory?
2. Do you have a specification defining which transport safety equipment / systems shall be installed in your transport equipment?
3. Is there a process in place to check that all new vehicles are equipped with the specified elements/systems?
4. Do you have a maintenance plan for transport equipment in place?

If the answer to any of the questions above is “no”, then you should consider taking action!

THIS TRANSPORT SAFETY INFORMATION GIVES GUIDANCE ON VEHICLE DATA MANAGEMENT WHICH WILL HELP TO IMPROVE SAFETY IN ROAD TRANSPORT.

General

All new purchased vehicles and equipment used for the transport of dangerous goods shall meet the latest version of locally applicable laws & regulations.
The following list is a summary of safety equipment / systems that are either legally required, or should be considered, when purchasing new vehicles or upgrading / refurbishing existing equipment. Due to the fact that transport safety equipment and systems are continually developing, this list is not exhaustive.

Transport safety equipment and systems

Item	Description/Comments
3-point seat belt	Ensures protection during deceleration or in case of accidents.
Air bags	Can reduce the risk and level of injury in the event of a collision.
Adjustable seat / steering wheel	Vehicles must have adjustment for driver's height and reach. Improved ergonomics promote non-constraining driving positions.
Acoustic warning device (“horn”)	Enables the driver to warn his surrounding of danger.
Radio with AM/FM/CD	Receives traffic/weather bulletins and company safety messages. *Note: Can cause distraction and should be used with care.*
Heating (incl. night heaters) / cooling	Helps keep the cabin in suitable condition concerning temperature.
Mirrors	Mirrors help the driver improve his all-round view. *Note: Mirrors are mandated by legislation. Additional non-mandatory mirrors can further improve safety.*
Battery isolator switch for vehicles transporting hazardous goods	Vehicle safety and security for transporting dangerous and/or hazardous goods as classified by UN Model Regulations or local regulations
Securely fitted fire extinguisher	To extinguish minor fires.
Rear under-run protection	Prevention of smaller vehicles travelling beneath the vehicle during rear end collision.
Side under-run protection	Prevention of cyclists and smaller vehicles travelling beneath the vehicle during side collision *Note: Only relevant for medium and heavy duty vehicles.*
Lifting axle	Actuates on the air bellows of the axles to redistribute load to other axles in order to improve maneuverability of the vehicle.
King pin safety devices	Warning devices that can assist the driver in the correct coupling procedures.
Lighting system	All necessary lighting (according to legislation) helps the driver see his surrounding and improves the visibility of the vehicle. Note: Additional non-mandatory lighting (e.g. xenon lights) can further improve safety.
High visibility (conspicuity) markings	All necessary high visibility or conspicuity markings improve the visibility of the vehicle.
Audible reversing/turning warning	Alerts pedestrians or cyclists to reversing/turning vehicle.
Proximity sensors or cameras	Indicated distances to objects/obstructions. Aids maneuvering in congested high-risk environments where vehicles operate in close proximity to other vehicles and people.
Engine or exhaust brake / retarder	Supplementary, wear free braking assistance device.
Automated transmission	Provides flexibility between automatic or manual gear changing which can reduce distraction for driver in heavy traffic and dynamic road conditions.
Power steering	Assists maneuverability at slow road speeds.
Tachograph	Records driving and resting hours to control driver fatigue.
Speed limiter	Prevents excessive road speeds. Note: This is the speed limiter installed by the vehicle manufacturer according to national legislation and not the limiter which can be activated by the driver.

Item	Description/Comments
Adaptive (Active) cruise control	Keeps the vehicle at a constant speed when activated and adjusts the speed depending on the proximity as the vehicle comes closer to slower moving vehicles ahead of it. In some companies, it is forbidden to be used.
Lane guard / lane departure warning system	Can emit an acoustic signal or vibration within the steering wheel that warns the driver when he unintentionally leaves a lane or leaves a lane without indicating.
Non-slip throttle, brake and clutch pedals	Assists vehicle control – especially in wet conditions.
Collision avoidance warning system	Can emit an acoustic signal or vibration within the steering wheel that warns the driver when the vehicle is too close to the vehicle ahead **(automatic brake ...)**
ABS	Anti-lock Braking System (ABS) prevents the wheels from locking if the brakes are applied with too much force or the road conditions provide too little traction.
ESC (also ESP or VSP)	Electronic stability control (ESC) helps control the traction of the vehicles by automatically adjusting the individual wheel's speed.
EBS	Electronic Braking Systems (EBS) is the later generation of braking to the older ABS systems.
RSS	Roll stability support (RSS) works on the trailer's air suspension, regulating the pressure in the suspension such that the vehicle leans less to the side when driving through corners.
Emergency brake assist (full brake detected)	Electronically increases braking pressure when the driver executes a full brake.
Active brake assist (obstacle detected)	Starts to activate the brake on behalf of the driver when vehicle system detects close proximity to obstacles.
Emergency Brake Alert	Emergency Brake Alert will automatically flash the trailer's hazard warning lights during hard braking to warn trailing drivers in order to reduce the risk of rear-end collisions.
Electronic Park Brake	To prevent moving trailer without powering of EBS module and anti-tow-away.
Anti-tow away	System that avoids movement of the trailer when a loading or unloading procedure is taking place. [2]
Rain sensor	Automatically activates the wind shield wipers when it starts to rain.
Daylight sensor	Automatically activates the low beam light when the surrounding is not light enough.
Blind spot sensor	Blind spot sensor systems alert the driver to obstacles in his blind spots.
Tyre pressure monitoring system (TPMS)	System to inform when the tyres are on low pressure.
Vehicle Telematics (On-board computer)	Records driving hours, road speed, harsh braking, etc. Can help analyze and improve driving behavior.
On-board video event recording cameras	Permanent or event triggered video recording equipment that saves events and actions of the driver and 3rd parties outside the cab. These systems can include an in-cab camera facing the driver to record driver actions, a forward-facing camera, rear-facing camera(s) to record 3rd party actions, an in-cab microphone for audio recording and are usually triggered by an accelerometer. Note: These systems are not always allowed according to national legislation.
Rear axle steering	Improves the maneuverability of the trailer at customer sites or when driving through narrow or winding streets.

Maintenance of Commercial Vehicles & Equipment

Background

The continued serviceability of a commercial goods vehicle and its associated equipment is critical to ensure vehicles are safe and of a roadworthy condition. This provides the foundation for the safety of drivers and general members of the public.

Adherence to regulatory and legislative requirements

Vehicles and equipment must always be controlled in accordance with local regulatory and legislative requirements. These requirements provide guidance ensuring the serviceability of the equipment and its product related elements.

Economic and Safety benefits

The correct maintenance of commercial vehicles and equipment does not only improve safety due to the continued function of all relevant parts but also reduces costs in the long term.

It is more cost effective to maintain equipment via a planned maintenance regime than requiring workshop visits due to equipment failure resulting in unplanned maintenance, damage or breakdown. Unplanned maintenance can result in for example additional material costs, downtime of the equipment, recovery costs and customer dissatisfaction.

Also, depending on the transported product (e.g. oxygen, hydrogen, LNG), it may be necessary to purge the transport vessel(s) with inert gas to avoid risk of fire in the workshop, further reducing efficiency in case of unplanned works. A risk assessment should be carried out.

Responsible Competent Person

Before defining when and how to maintain which types of equipment, it is important to define who is responsible for which kind of maintenance works. The responsibilities may vary depending on the capabilities and qualifications of the business unit.

Some work may be outsourced to contractors (e.g. carriers, workshops) while other works may remain in-house. If maintenance work is subcontracted it is important to check the qualifications of the subcontracted carriers and workshops (for example via auditing) and hold periodic review of performance (for example by checking Key Performance Indicators (KPIs)).

Workshops are often specialized in specific areas making it necessary to find workshops for all required types of works. The following list shows examples of specific fields of maintenance work which may need to be handled separately.

- Works on the prime mover, e.g. motor, electrics, brakes, suspension, axles, tyres, king pin plate, safety systems.
- Work on the chassis, e.g. brakes, suspension, lighting, axles, tyres, landing legs, king pin, underrun protection.
- Painting.
- Refurbishment.
- PTO (Power Take Offs).
- Pressure vessel testing.
- Pump system maintenance
- Vacuum check and re-evacuation.
- Valve maintenance and pressure test.

Note: For logistical reasons it is better to have qualified workshops close to where the fleet is stationed.

These workshops should be audited on a regular basis. Workshops shall comply with gas company procedures and specifications.

Maintenance planning and execution

Effective **maintenance planning** and a proper damage/deficiency inspection and reporting system identify damages and deficiencies at an early stage.

These can then usually be remedied before the transport equipment fails. The responsibilities for inspecting the transport equipment shall be defined.

The **pre and post trip** driver checks form an essential part of maintenance management as they provide a daily check in between the vehicle's **planned** workshop inspections. However, since the driver is usually not a technical expert, an in-depth check shall be carried out on a regular basis by qualified personnel (for example the fleet manager, workshop technician or technical expert of the carrier).

The intervals of checks will vary depending on the type of equipment and can either be based on distances travelled, time elapsed since the last inspection or depending on the rate of deterioration of the condition of the transport equipment. Each Gases Company should define the intervals as best practice according to their experience and local regulations.

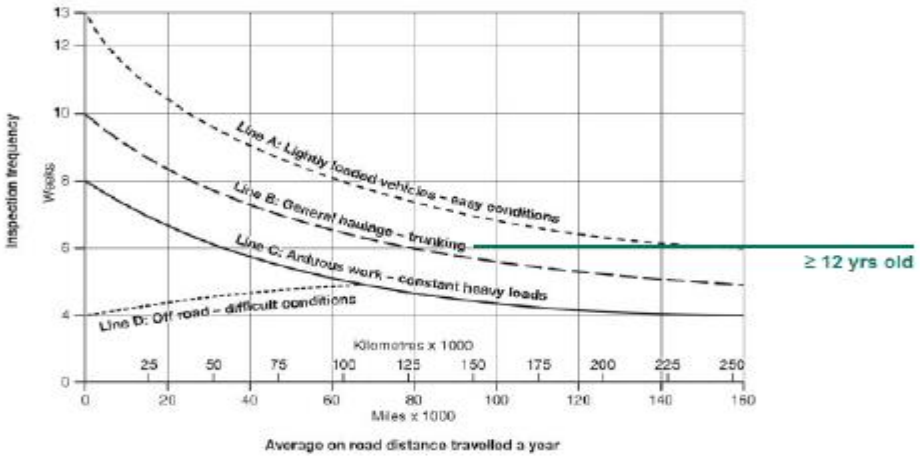

Figure 1: Example of guide to safety inspection intervals (United Kingdom Driver Vehicle Standards Agency) [3].

Maintenance works shall be well documented and analyzed. This helps to:

- identify systematic problems with the equipment (improper materials, elements prone to certain failures, etc.) – this can be used to improve the vehicle design to be considered when purchasing new equipment;
- gain information on how the equipment is treated by the employees, maybe indicating when re-training may be necessary;
- identify which spare parts may be needed on stock to shorten downtimes;
- identify the maintenance performance and improve the maintenance plan if necessary;
- identify the related costs;
- identify at which age of equipment a new investment should be looked at (as maintenance costs will increase with increased equipment age).

Conclusions

When purchasing transport equipment, it is important to specify a design that fulfils all regulatory requirements. Additionally, it should be analyzed which transport safety equipment and systems can further increase transport safety under given circumstances.

Daily checks by the driver are important to quickly detect vehicle defects and shall be mandatory

After purchasing transport equipment according to these criteria, it shall be kept in good condition. This shall be done by generating and following a maintenance plan that not only includes the mandatory checks but also defines responsibilities and a best practice for further checks. Proper documentation of the maintenance works helps analyze if the vehicle design is sufficient and which elements may be prone to damage.

References

[1] AIGA SB 11, *Human behavior within Transport Operations*. www.asiaiga.org

[2] AIGA 092, *Prevention of Tow-Away Incidents*. www.asiaiga.org

[3] EIGA Safety Newsletter NL 89 T*ypical cylinder bundle/pallet tow-away incidents*. www.eiga.eu

[3] *Guide to maintaining roadworthiness, Commercial goods and passenger carrying vehicles (Revised 2014)*. DVSA/2567/ENF/APRIL 14. Driver and Vehicle Standards Agency. United Kingdom. www.gov.uk/dvsa

Resource: EIGA Safety Info TS 09/19 *Vehicle Specification and Maintenance* www.eiga.eu