

Need for measures to mitigate fire risks of CNG and LNG vehicles: UN Regulation No. 110 (CNG and LNG)

The text reproduced below has been prepared by the expert from the International Road Transport Union (IRU) to mitigate risks of fire on CNG vehicles.

I. Analysis

In October 2012, an incident occurred in the Netherlands with a passenger bus equipped with CNG receptacles on the roof. The driver and passengers were alerted to a problem by smoke and flames at the rear of the bus, but they all managed to leave the bus safely before the flames spread rapidly through the bus ([click on the movie link 1](#)).

The driver attempted to extinguish the fire, with little success, and before long the entire bus was engulfed in flames and heating the CNG receptacles. We know that the cylinders were equipped with relief valves that discharge when pressure becomes too high, but the heat increased so much that the pressure built inside the cylinder causing the main valves to break.

The gas ignited, creating a flamethrower effect until all cylinders were empty, making it impossible for the fire brigade to intervene.

II. Justification

Following this incident and based on the IRU Position on fire mitigation, IRU Members agreed, once again, to support any initiative that can help diminish fire. Indeed,

- The IRU supports any measure that effectively reduces road accidents by targeting their main cause.
- The IRU and its Members are in favour of at source installation of fire detection systems and smoke detection systems in engine compartments and interior compartments respectively.
- Periodical vehicle inspections can mitigate fire risks and mechanical problems and would promote an improved level of safety and compliance in the road transport sector.
- Correct maintenance of all mechanical components of coaches and buses can considerably diminish the risk of fire.
- The pre/post trip inspection list provided by the IRU Checklist Against Fire (see annex) can help prevent coach and bus fires. The checklist should be carefully communicated to all drivers and disseminated to all concerned bodies in the passenger transport sector.

Therefore, the IRU Secretariat General and its Members would like to ask GRSG experts **to conduct a risk assessment on CNG and LNG vehicles versus other fuels**, especially fossil fuels, in order to analyse which measure(s) should be implemented to mitigate the risks of fire in CNG and LNG vehicles.

Checklist Against Fire for Buses/Coaches

In order to prevent fire on vehicles, the IRU has worked out a checklist of recommended periodical inspections to be integrated in the maintenance performance activities of the transport operations.

Vehicle maintenance on a regular basis can ensure early identification of vehicle problems and defects likely to cause a fire.

Driver duties

Before starting a journey



The driver imperatively checks:

- ✓ The tyres' pressure (visual check on a daily basis, test tyres on a weekly basis). In particular dual tyres should not be kissing each other.
- ✓ No liquids are leaking underneath the vehicle (visual check). Ensure that no oil exits from the muffler and that you see no excessive blue smoke (turbocharger oil consumption).
- ✓ The proper functioning of the preheating systems (engine and interior).
- ✓ The exhaust system components are free from debris.

When operating a vehicle



The driver needs imperatively to:

- ✓ Check the coolant temperature gauge.
- ✓ Check fire detection system signal (vehicles must be equipped).
- ✓ Check smoke or heat detection systems for interior compartment (vehicles must be equipped).
- ✓ Check regularly the tyres' pressure monitoring system (if vehicle equipped).
- ✓ Avoid any overheating. Stop the vehicle if the engine, brakes or retarder become overheated/or when sensing unusual odors or smoke, or if noticing smoke visually.
- ✓ Park in a safe area.

- ✓ Avoid overloading because it increases all temperatures!
- ✓ Record in the daily operation report malfunction(s) with mileages and time.
- ✓ Check all warning lights.
- ✓ Check the proper functioning of the retarder (hydraulic or electric).

After completing a journey



The driver needs imperatively to:

- ✓ Inform the technician/next driver of a malfunction.
- ✓ Hand over to the technician or fleet manager the daily operation report (copy).
- ✓ On a daily basis, make a visual check of the engine compartment and surrounding equipments of the vehicle and inform the technician of any problem.
- ✓ On a daily basis, ensure waste and litter is removed from the vehicle.
- ✓ Make sure all external heat sources, e.g. cooking and/or heating equipment is switched off.

When returning a bus/coach



- ✓ Park the vehicle with the main battery switched off (if applicable). This will disconnect the batteries from the alternator, eliminating a risk of fire due to an internal electrical failure.

Vehicle maintenance staff's duties



The technician in charge of vehicle maintenance needs to imperatively check on a regular basis that:

- ✓ All driver's defect reports are correctly actioned, remedial action recorded and filed.
- ✓ The fire detection systems in the engine compartment are connected.
- ✓ The smoke detection systems in the toilets and the driver sleeping compartment are properly connected.
- ✓ The B+ (direct battery feed) cable of the alternator and the B+ cable of the starter are properly connected.
- ✓ There are no loose wires and the cables avoid unwanted contact with the ground.
- ✓ None of the liquids, fuel, power steering fluid, engine oil and hub/gear oil can come in contact with a hot surface.
- ✓ No oil is leaking from the waste gate pivot of the turbocharger.
- ✓ Sensors are not a source of leaking.
- ✓ The levels of coolant and oils are fine (check on a weekly basis).

Vehicle maintenance staff's duties



- ✓ There is no fuel or oil inside the engine compartment on isolation materials.
- ✓ The fuel lines are not leaking.
- ✓ The retarder (gas exhaust, hydraulic or electric) is functioning properly. All environment equipments are without any defects (broken valves, lines, no leaking of fluids).
- ✓ The exhaust system is airtight/isolated.
- ✓ The preheating systems are running correctly (engine and interior).
- ✓ The level of grease in the wheel hubs is sufficient.
- ✓ The status of brakes is in order.
- ✓ The extinguishers are still present in the vehicle and in proper function.
- ✓ The emergency exits function properly.

Actions to be taken in the event of a fire or emergency



- ✓ (Try to) park the vehicle in a safe area.



- ✓ Apply the parking brake.



- ✓ Inform the crew to take a safe distance from the vehicle.



- ✓ Open doors in order to let passengers get out fast.



- ✓ Stop the engine. Isolate the battery by activating the master switch where available. Switch off the air-conditioning/heating.



- ✓ Identify the source of the fire.



- ✓ Inform the appropriate emergency services, giving as much information about the incident or accident and passengers involved as possible.



- ✓ Where appropriate and safe to do so, use the fire extinguishers to put out small initial fires. **DO NOT OPEN THE ENGINE COMPARTMENTS IF FIRE OCCURS.**



- ✓ Put on warning vest and place the self-standing warning signs as appropriate. Secure the incident area.



- ✓ Make sure the crew is at a safe distance from the vehicle.



- ✓ Move away from the vicinity of the accident or emergency, advise other persons to move away and follow the advice of the emergency services.



- ✓ Report to company management about the incident.

This checklist is provided to you by the **IRU Academy**, the training arm of the **International Road Transport Union (IRU)**. See our training programmes on www.iru.org/academy

Checklist Against Fire for Trucks

In order to prevent fire on vehicles, the IRU has worked out a checklist of recommended periodical inspections to be integrated in the maintenance performance activities of the transport operations.

Vehicle maintenance on a regular basis can ensure early identification of vehicle problems and defects likely to cause a fire.

Driver duties

Before starting a journey



The driver imperatively checks:

- ✓ The tyres' pressure (visual check on a daily basis, test tyres on a weekly basis). In particular dual tyres should not be kissing each other.
- ✓ No liquids are leaking underneath the vehicle (visual check). Ensure that no oil exits from the muffler and that you see no excessive blue smoke (turbocharger oil consumption).
- ✓ The proper functioning of the preheating systems (engine and interior).
- ✓ The exhaust system components are free from debris.

When operating a vehicle



The driver needs imperatively to:

- ✓ Check the coolant temperature gauge.
- ✓ Check fire detection system signal (vehicles must be equipped).
- ✓ Check smoke or heat detection systems for interior compartment (vehicles must be equipped).
- ✓ Check regularly the tyres' pressure monitoring system (if vehicle equipped).
- ✓ Avoid any overheating. Stop the vehicle if the engine, brakes or retarder become overheated/or when sensing unusual odors or smoke, or if noticing smoke visually.
- ✓ Park in a safe area.

- ✓ Avoid overloading because it increases all temperatures!
- ✓ Record in the daily operation report malfunction(s) with mileages and time.
- ✓ Check all warning lights.
- ✓ Check the proper functioning of the retarder (hydraulic or electric).

After completing a journey



The driver needs imperatively to:

- ✓ Inform the technician/next driver of a malfunction.
- ✓ Hand over to the technician or fleet manager the daily operation report (copy).
- ✓ On a daily basis, make a visual check of the engine compartment and surrounding equipments of the vehicle and inform the technician of any problem.
- ✓ On a daily basis, ensure waste and litter is removed from the vehicle.
- ✓ Make sure all external heat sources, e.g. cooking and/or heating equipment is switched off.

When returning a truck



- ✓ Park the vehicle with the main battery switched off (if applicable). This will disconnect the batteries from the alternator, eliminating a risk of fire due to an internal electrical failure.

Vehicle maintenance staff's duties



The technician in charge of vehicle maintenance needs to imperatively check on a regular basis that:

- ✓ All driver's defect reports are correctly actioned, remedial action recorded and filed.
- ✓ The fire detection systems in the engine compartment are connected.
- ✓ The B+ (direct battery feed) cable of the alternator and the B+ cable of the starter are properly connected.

- ✓ There are no loose wires and the cables avoid unwanted contact with the ground.
- ✓ None of the liquids, fuel, power steering fluid, engine oil and hub/gear oil can come in contact with a hot surface.
- ✓ No oil is leaking from the waste gate pivot of the turbocharger.
- ✓ Sensors are not a source of leaking.
- ✓ The levels of coolant and oils are fine (check on a weekly basis).
- ✓ There is no fuel or oil inside the engine compartment on isolation materials.

Vehicle maintenance staff's duties



- ✓ The fuel lines are not leaking.
- ✓ The preheating systems are running correctly (engine and interior).
- ✓ The exhaust system is airtight/isolated.
- ✓ The level of grease in the wheel hubs is sufficient.
- ✓ The status of brakes is in order.
- ✓ The extinguishers are still present in the vehicle and in proper function.
- ✓ The retarder (gas exhaust, hydraulic or electric) is functioning properly. All environment equipments are without any defects (broken valves, lines, no leaking of fluids).

Actions to be taken in the event of a fire or emergency



- ✓ (Try to) park the vehicle in a safe area.



- ✓ Apply the parking brake.



- ✓ Inform the crew to take a safe distance from the vehicle.



- ✓ Stop the engine. Isolate the battery by activating the master switch where available. Switch off the air-conditioning/heating.



- ✓ Inform the appropriate emergency services, giving as much information about the incident or accident and passengers involved as possible.



- ✓ Identify the source of the fire. Where appropriate and safe to do so, use the fire extinguishers to put out small initial fires. **DO NOT OPEN THE ENGINE COMPARTMENTS IF FIRE OCCURS.**



- ✓ Put on warning vest and place the self-standing warning signs as appropriate. Secure the incident area.



- ✓ Make sure the crew is at a safe distance from the vehicle.



- ✓ Move away from the vicinity of the accident or emergency, advise other persons to move away and follow the advice of the emergency services.



- ✓ Report to company management about the incident.

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