



Economic Commission for Europe**Inland Transport Committee****Working Party on the Transport of Dangerous Goods****116th session**

Geneva, 5-8 November 2024

Item 4 (a) of the provisional agenda

Proposals for amendments to annexes A and B of ADR:**Construction and approval of vehicles****Report and proposal from the informal working group on the reduction of the risk of a BLEVE****Transmitted by the Government of the United Kingdom of Great Britain and Northern Ireland on behalf of the BLEVE Informal Working Group*****I. Introduction**

1. Under a mandate from the Working Party, the informal working group on the reduction of the risk of a Boiling Liquid Expanding Vapor Explosion (the BLEVE WG) has been developing the technical requirements for “Automatic engine fire suppression systems” (ADR 9.7.9.1) and thermal shields (ADR 9.7.9.2).
2. The fitment of these devices will be mandatory for all new FL and EX/III vehicles from 1 January 2029 (see 1.6.5.23 to 1.6.5.25). There is no mandatory requirement for vehicles entering into service before 1 January 2029 to be retrofitted with such devices.
3. At the time of writing the BLEVE WG has met three times since the 115th session. This paper updates the Working Party on the progress made and makes proposals to amend ADR 9.7.9.2 with technical requirements for thermal shields.

II. Automatic fire suppression systems for engine compartments (ADR 9.7.9.1)

4. As advised in informal document INF.9 submitted to the April 2024 session, a first draft of the document “Automatic fire suppression systems for engine compartments of FL and EX/III vehicles—requirements and test methods” was submitted to the Working Party on General Safety Provisions (GRSG) of the World Forum for Harmonization of Vehicle Regulations (WP.29), for consideration at their 127th session (15 to 19 April 2024).

* A/78/6 (Sect. 20), table 20.5.

5. GRSG agreed¹ to establish a Task Force that would take forward the engine fire suppression system requirements developed by the BLEVE WG. The expectation is for these requirements to be inserted into a UN regulation (R105 or a new regulation) made under the 1958 Agreement.
6. The GRSG delegate of Spain has volunteered to coordinate and chair the Task Force and it is anticipated the meetings will be at times and dates agreed by the those participating.
7. Once the technical requirements have been inserted in a UN regulation made under the 1958 Agreement, it is anticipated the BLEVE WG will propose amendments to ADR that will apply the requirements set out in the regulation.

III. Thermal shields (ADR 9.7.9.2)

8. Given the next steps for introducing the technical requirements for engine fire suppression systems currently rest with GRSG, the BLEVE WG has focussed on the development of the technical requirements for thermal shields.
9. Significant progress has been made, leading to the proposals below. Considerable discussion has taken place in the development of these proposals and therefore, to assist the Working Party, the reasons for including some key aspects of the proposals are set out below.
10. From reports of laboratory tests that determined tyre fire temperatures and duration, the group considered a baseline requirement of steel mudguards between all wheels and the cabin and load to be appropriate. Those within the group representing industry sectors welcomed this solution and considered that there was no cost premium for such mudguards compared to mudguards made of other materials, such as plastics.
11. However, to provide the freedom for alternative materials to be used for mudguards or to allow the development of other designs of thermal shield which may be positioned between the wheels and the load or cabin, the group considered it appropriate for the proposals to also include a performance-based requirement. This allows other types of thermal shield or alternative materials to be used provided they are resistant to a tyre fire reaching 1200 °C for 45 minutes. These values have been derived from the reports of laboratory tests that were considered.
12. The baseline requirement for steel mudguards does however present technical difficulties for wheels that are under the cabin. In most cases there is very limited space between the wheels and the underside of the cabin, particularly when there is a need to permit suspension deflection, allow the wheels to steer and permit movement of the cabin relative to the chassis.
13. In theory at least, it is possible to overcome these technical difficulties but this would probably require a considerable redesign of the cabin and result in a significant cost premium being applied to new dangerous goods vehicles. It was thought this could result in existing vehicles with fewer safety features remaining in service for longer.
14. The group considered the likelihood of front wheel tyre fire to be low but given their position, there would be a high risk of such a fire propagating to the cabin. Therefore, as an alternative to requiring thermal shields for these wheels, consideration was given to electronic systems that could detect an increase in wheel temperature, and alert the driver, before any component failure might lead to a tyre fire.
15. As an alternative therefore, the proposals allow front wheels not positioned under the load to be exempt from the requirement for thermal protection if (1) they have a monitoring system which provides the driver with an audible or visual warning if the temperature or pressure of a wheel or tyre is outside its normal operating range; and (2) the cabin is constructed from steel and has a rear wall without windows or openings.
16. These alternative requirements were considered by industry representatives to add minimal cost increases to new vehicles. This is largely due to tyre pressure monitoring

¹ See GRSG meeting report ECE/TRANS/WP.29/GRSG/106.

systems already being mandatory and cabins either not having rear windows or this already being an optional fitment.

17. Finally, as indicated in paragraph 2, the fitment of thermal shields will be mandatory for new FL and EX/III vehicles from 1 January 2029. Following a request for clarification on the application of these provisions, the group confirmed that 9.7.9.2 does not apply to vehicles carrying tanks for the carriage of refrigerated liquefied gases.

IV. Proposals

18. Proposed amendments to ADR 9.7.9.2 (proposed amendments in BOLD and underlined):

“9.7.9.2 The following vehicles shall be fitted with thermal protection capable of mitigating the propagation of a fire from all the wheels:

- (a) FL vehicles carrying liquefied and compressed flammable gases with a classification code including an F;
- (b) FL vehicles carrying packing group I or packing group II flammable liquids; and
- (c) EX/III vehicles.

NOTE: The aim is to avoid the propagation of the fire to the load, for example with thermal shields or other equivalent systems, either:

- (a) *by direct spread from the wheel to the load; or*
- (b) *by indirect spread from the wheel to the cabin and further to the load.*

This requirement is considered met if vehicles have steel mudguards, with steel mountings, covering the top of each wheel on every vehicle axle. Other types of thermal shield or alternative materials may be used provided they are resistant to a tyre fire reaching at least 1200 °C for 45 minutes.

The front wheels of vehicles that are not positioned under the load may be exempted from the requirement for thermal protection if:

- (a) they are provided with pressure and temperature monitoring systems that warn the driver with an audible or visual warning if the temperature or pressure of a wheel or tyre is outside its normal operating range; and**
- (b) the structure of the cabin is made of steel and has a rear wall that does not have windows or openings.”**

IV. Reasoning

19. The aim of the BLEVE WG is to develop technical requirements for inclusion in ADR which reduce the likelihood of a BLEVE occurring and in this way, contributes to the United Nations Sustainable Development Goal 11, *Sustainable Transport*.

20. The BLEVE WG also contributes to achieving Sustainable Development Goal 3, *Good health and well-being*, as the safety and health of people are fundamental principles of dangerous goods transportation. Requiring an effective engine fire suppression system and thermal shields can help reduce the risk of injury or illness from exposure to hazardous substances.