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**Economic Commission for Europe****Inland Transport Committee****Working Party on the Transport of Dangerous Goods****110th session**

Geneva, 8 - 12 November 2021

Item 5 (a) of the provisional agenda

**Proposals for amendments to annexes A and B of ADR:  
construction and approval of vehicles****Engine fire suppression systems and tyre fire protection systems to reduce the likelihood of a boiling liquid expanding vapor explosion (BLEVE) or other catastrophic failure of the tank due to a fire****Transmitted by the Government of Spain on behalf of the BLEVE informal working group of the Joint meeting\****Executive summary*

<b>Executive summary:</b>	Proposals to include into ADR provisions for an engine fire suppression system and a thermal shield to prevent risk of BLEVE or other catastrophic failure of the tank due to a fire.
<b>Action to be taken:</b>	Consider amendments proposed for ADR 9.7.9.
<b>Related documents:</b>	ECE/TRANS/WP.15/AC.1/2020/42, informal document INF.7 and Add.1 to Add.7 of the Autumn 2020 session of the Joint Meeting) and informal document INF.7 of the 109 <sup>th</sup> session of the Working Party (May 2021).

**Introduction**

1. The BLEVE informal working group, working according to terms of reference from the Joint Meeting, has been looking at measures that will prevent a BLEVE or other catastrophic failure of the tank occurring in the event of a fire when flammable liquids and flammable gases are transported.

\* A/75/6 (Sect.20), para 20.51.



2. Measures that might reduce the risk of a BLEVE occurring have been within the scope of the BLEVE informal working group since 2006. It should be noted however that the mandate for the group was expanded by the Joint Meeting in 2014 to include the consideration of protective measures that would reduce the risk of other catastrophic tank failures in the event of a fire (see ECE/TRANS/WP.15/AC.1/136).

3. At the Joint Meeting held in September 2020, documents ECE/TRANS/WP.15/AC.1/2020/42, informal document INF.7 and Add.1 to Add.7 and informal document INF.20 were presented, and after its discussion, the following decisions were taken (see report in ECE/TRANS/WP.15/AC.1/158):

### **“Report of BLEVE Working Group meeting held on 22-24 October 2019 in Madrid**

*Document:* ECE/TRANS/WP.15/AC.1/2020/42 (Spain)

*Informal documents:* INF.7, INF.7/Add.1 to Add.7 (Spain)  
INF.20 (United Kingdom)

34. The Joint Meeting welcomed the report on the meeting of the BLEVE Working Group held in October 2019 included in document ECE/TRANS/WP.15/AC.1/2020/42 and in informal document INF.7 and its addenda. The representative of Spain sought guidance on the six recommended measures to prevent in future boiling liquid expanding vapor explosions (BLEVE): (a) installation of metallic mudguards), (b) installation of engine fire suppression systems, (c) installation of a safety valve, (d) introduction of technical devices for general traffic safety, (e) heat resistant screen between cabin and tank, and (f) use of expanded aluminium alloys (EAA).

35. The Joint Meeting agreed to prioritize measures (a), (b) and (c) in an individual or combined manner. Considering informal document INF.20 on the mandatory application dates of safety provisions for new goods vehicles, delegates felt that the measures under (d) were already addressed by the World Forum for Harmonization of Vehicle Regulations (WP.29). The Joint Meeting also agreed to further assess measure (e). Some delegates recommended to further investigate on thermal coating in the case new elements appear. Measures under (f) were not considered as relevant due to the uncertainty with respect to the efficiency, the impact on maintenance or inspections and the costs resulting from the use of EEA.”

4. Background information about the BLEVE informal working group and the discussions can be found in informal documents INF.8 and INF.23 from the March 2019 session of the Joint Meeting. Full information about the documents and discussions submitted by the BLEVE informal working group, mainly to the Joint Meeting, can be found in the annex to this document.

5. The measures related to equipping vehicles with engine fire suppression systems and tyre fire protection only relate to road transport. The BLEVE informal working group therefore submitted informal document INF.7 to the Working Party at its 109<sup>th</sup> session (May 2021), to share the initial proposals on this subject, as a basis for this formal document.

6. Both measures, the installation of metallic mudguards and the installation of an engine fire suppression system, are complementary, and, together with a mandatory requirement for safety valves to be fitted to certain tanks, can be effective in preventing a BLEVE according to the research that has been done by the French National Institute for Industrial Environment and Risks (Ineris) for the Government of France (see informal documents INF.8 and INF.23 from the March 2019 session of the Joint Meeting).

7. Different alternative proposals were included in informal document INF.7, both for engine compartment fire suppression systems and for tyre fire protection. The Working Party was kindly asked to give an initial view on these in order to provide an indication to the BLEVE informal working group of the direction in which the proposals should be developed.

8. For both the engine compartment fire suppression systems and tyre fire protection proposals, transitional measures were proposed that would not require such systems to be retrofitted to vehicles that are currently in service.

9. The report of the May session of WP.15 (see report in ECE/TRANS/WP.15/253) states:

**“Engine fire suppression systems and tyre fire protection systems to reduce the likelihood of a BLEVE**

Informal documents: INF.7 (Spain), INF.19 (OICA)

26. The representative of Spain presented to the Working Party the proposals of the BLEVE working group of the Joint Meeting to equip vehicles with engine fire suppression and tyre fire protection systems.

27. The representative of Spain took note of the comments made during the session and the preferences regarding the different options proposed. There were mixed views on the best option.

28. The representative of Spain invited those delegations that wished to do so to study the various options and to send her their comments, if possible before the next meeting of the informal group scheduled for 27 May 2021. She also invited delegations interested in participating in this informal group to contact her.

29. The Working Party noted that the BLEVE working group would submit an official document concerning the fitting of vehicles with engine fire suppression and tyre fire protection systems at the next session. The Working Party also noted that proposals on safety valves would be presented separately to the Joint Meeting, as they were applicable to all land transport modes.”

10. After the May 2021 session of the Working Party, the BLEVE informal working group has welcomed new members from the Working Party, and has continued the development of proposals (a), (b) and (c), meeting on 27 May, 16 June and 12 July 2021, finishing both the present proposal and proposals concerning safety valves that have been submitted to the Joint Meeting separately, as they may concern different modes (see documents ECE/TRANS/WP.15/AC.1/2021/35 and ECE/TRANS/WP.15/AC.1/2021/36).

## Proposal

11. Amend the text in 9.7.9 to read as follows:

**“9.7.9 Additional safety requirements concerning FL and EX/III vehicles**

9.7.9.1 The following vehicles shall be equipped with an automatic fire suppression system for the compartment where the internal combustion engine propelling the vehicle is located:

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

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

- FL vehicles carrying liquefied [and compressed] flammable gases with a classification code including an F;
- FL vehicles carrying packing group I or packing group II liquids; and
- 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:

- by direct spread from the wheel to the load; or
- by indirect spread from the wheel to the cabin and further to the load; or

- *by indirect spread from the wheel to the fuel tank and further to the load.*”

12. Additionally, the following transitional measures are needed:

“1.6.5.xx EX III vehicles first registered or entering into service before 1 January 2027, in compliance with the requirements of 9.7.9.2 applicable until 31. December 2022, but not in compliance with the requirements of 9.7.9.2 applicable as from 1 January 2023, may continue to be used.”

“1.6.5.xx FL vehicles first registered or entering into service before 1 January 2027, not in compliance with the requirements of 9.7.9.1 applicable as from 1 January 2023, may continue to be used.”

“1.6.5.xx FL vehicles first registered or entering into service before 1 January 2027, not in compliance with the requirements of 9.7.9.2 applicable as from 1 January 2023, may continue to be used.”

## **Justification**

13. The proposed text covers liquefied gases, liquids of packing groups I and II as well as compressed gases. Nevertheless, compressed gases are included in square brackets, as they may not directly cause a BLEVE, but may cause explosions and or catastrophic failure of the load compartment, that may endanger those around the transported compressed gases.

14. For all proposals transitional measures are proposed that would not require these systems to be retrofitted to vehicles that are currently in service.

15. Informal document INF.4 provides links to all the documents the BLEVE informal working group has submitted to the Joint Meeting and to the Working Party since 2014. Extracts from the reports of these meetings have also been included to provide further background information on the subject.

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