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**ECONOMIC COMMISSION FOR EUROPE**

INLAND TRANSPORT COMMITTEE

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Safety Committee and the  
Working Party on the Transport of Dangerous Goods  
(Bern, 20-24 March 2006)

**TANKS**

**REDUCTION OF THE RISK OF A BLEVE**

Transmitted by the Government of the Netherlands \*/

**SUMMARY**

Executive summary: To take additional measures for tank vehicles and tank wagons, carrying flammable liquefied gases, to prevent a BLEVE.

Action to be taken: Discussion on safety measures to be taken and establishment of a procedure to continue the work.

Related documents: Documents related to the Joint Meeting RID/ADR/ADN of September 2005: TRANS/WP.15/AC.1/2005/43 (Norway), INF.8 (OTIF), INF.42 (Netherlands) and INF.51 (AEGPL), report TRANS/WP.15/AC.1/100, para. 4 and 5, and TRANS/WP.15/AC.1/100/Add.1, para. 21.

**Introduction**

In recent years Netherlands has done research on how to reduce the risk of BLEVE for flammable liquefied gases like LPG. As announced in document INF.42, submitted in the last Joint Meeting, Netherlands gives the results of its study by means of this document.

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\*/ Circulated by the Central Office for International Carriage by Rail (OCTI) under the symbol OCTI/RID/GT-III/2006/8.

In our view there should be a discussion on:

- the goal to be reached (i.e. avoiding a BLEVE/fixing a desirable minimal period of time before a BLEVE would occur during involvement in a fire);
- the different (combinations of) means (safety valves, thermal protection, etc.) for reaching such a goal, with their advantages/disadvantages.

### **Risk assessment**

In the Netherlands risk assessments have shown that due to a Boiling Liquid Expanding Vapour Explosion (BLEVE) of a tank vehicle caused by external fire ("hot" BLEVE) during transport and unloading of the tank vehicle the societal risk guide values are exceeded at 25 % of all Dutch automotive LPG refuelling stations. The risks of a BLEVE during road and rail transport of liquefied flammable gases leads to societal risks above the guide value in a lot of cities in the Netherlands. Apart from the societal risk, which is related to lethality, the BLEVE will also cause serious damage to buildings and infrastructure which will disrupt the society. For all these reasons the Dutch government wishes to reduce the risks of a "hot" BLEVE.

A "hot" BLEVE is mainly caused by the weakening of the tank wall at the top (vapour side above 500 °C by the heat radiation of a fire. The heat radiation and blast of a BLEVE can have very serious consequences for people present within a circle with a radius of 500 m (tank vehicle) or 700 m (tank wagon) around the accident location. Without additional measures a BLEVE occurs within 25 minutes of exposure to the fire. Insulation of the tank or a pressure relief valve do delay the time before a BLEVE would occur, but cannot definitely avoid a BLEVE. Additional cooling of the tank with water and extinguishing the fire by the fire brigade is the only way to definitely avoid a "hot" BLEVE. For effective cooling and extinguishing the fire, the fire fighters have to approach the tank up to 50 m; this is within the 100 % lethality danger zone of the BLEVE.

After the start of the fire, it is assumed that a response time of 75 minutes (in case of a tank vehicle) or 105 minutes (in case of a tank wagon) is needed before an effective cooling and extinguishing of the fire can take place.

This response time is based on the distance between the fire station and the accident location, and the availability of 1 m<sup>3</sup> per minute cooling water for a tank vehicle and 6 m<sup>3</sup> per minute cooling water for a tank wagon.

Due to the rather long response times and rather fast development of a hot BLEVE, additional measures on the tank are required to avoid that the BLEVE will occur.

### **Position**

The position of the Dutch delegation is:

- Tank wagons and tank vehicles containing flammable liquefied gases should withstand a fire during a longer period of time before a BLEVE would occur, so that adequate measures for purposes of fire-fighting or evacuation can be taken.
- A thermal insulation can guarantee these required delays of the time before a BLEVE would occur; only a pressure relieve valve will not delay a BLEVE enough to guarantee safe cooling and extinguishing by the fire brigade.

### **Report**

The technical report of the Netherlands Organisation for Applied Scientific Research TNO gives the background details and motivation for the Dutch position (see informal document INF.3).

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