

## Economic Commission for Europe

### Inland Transport Committee

#### Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Committee of Experts and the  
Working Party on the Transport of Dangerous Goods

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Item 2 of the provisional agenda

Tanks

### Vacuum-operated waste tanks: Non-electrical explosion protection

Transmitted by the Government of Germany

#### *Summary*

- Executive summary:** In the opinion of Germany, non-electrical explosion protection for certain vacuum pumps/exhauster units should be regulated too.
- Action to be taken:** Incorporation of requirements concerning non-electrical explosion protection in 6.10.3.8 of RID/ADR
- Related documents:** ECE/TRANS/WP.15/AC.1/160/Add.1 – Report of the Working Group on Tanks of the session of the Joint Meeting in March 2021;  
ECE/TRANS/WP.15/AC.1/2021/6 (Proposal by Germany) – Vacuum-operated waste tanks: Non-electrical explosion protection

### Introduction

1. At the last session of the Joint Meeting (Berne, 15 - 19 March 2021), Germany presented document ECE/TRANS/WP.15/AC.1/2021/6 on the issue of non-electrical explosion protection on vacuum-operated waste tanks. It was proposed that 9.7.8.2 of ADR be amended in such a way that the non-electrical equipment on vacuum-operated waste tanks must meet the general requirements of standard ISO 80079 Explosive atmospheres - Part 36: Non-electrical equipment for explosive atmospheres - Basic method and requirement and Part 37: Non-electrical equipment for explosive atmospheres - Non-electrical type of protection constructional safety “c”, control of ignition sources “b”, liquid immersion “k”.
2. If flammable wastes are carried in the vacuum-operated waste tank, the following non-electrical explosion protection measures apply in accordance with 6.10.3.8 (b) of RID/ADR:
  - (a) the tank has to be explosion pressure shock resistant, or
  - (b) the openings of the vacuum pump/exhauster unit shall be fitted with a device to prevent immediate passage of flame, or
  - (c) vacuum pumps/exhauster units may be used that, because of their design, are not liable to generate sparks (such as liquid ring vacuum pumps).
3. Due to their design, liquid ring vacuum pumps contain a liquid ring which covers potential sparks. However, this protective function only works if the liquid ring can be guaranteed in all operational circumstances. There may be problems e.g. in the start-up phase

of the pump, in which the protective liquid ring first has to be built up, or when the liquid ring is lost during operation.

4. The question arises of how freedom from sparks has to be proven for this type of pump. According to the information available here, there is no internationally agreed approach for that. To ensure uniform proof of freedom from sparks for these specific vacuum pumps/exhauster units (e.g. liquid ring vacuum pumps), the requirements laid down in standard ISO 80079-36/37 should be incorporated into RID/ADR for non-electrical explosion protection. To achieve the protection required in the standard, redundant monitoring of the liquid level in the pump has to take place, for example. Depending on the design of the pump, the pump manufacturer has to equip the pump with certain monitoring functions to ensure spark-free operation.

5. In the opinion of the Working Group on Tanks, 6.10.3.8 of RID/ADR would be a more suitable place for such provisions, as this sub-section contains the relevant provisions concerning the service equipment for vacuum-operated waste tanks. Further, it should be examined whether it would be necessary to incorporate additional equipment requirements for these specific pumps (e.g. sensors to monitor the liquid level) instead of making reference to the standard.

6. Solely prescribing certain monitoring measures on the vacuum pump/exhauster unit (e.g. sensors) could, depending on the design of the pump, result in gaps in non-electrical explosion protection. For an assessment of non-electrical explosion protection, the aforementioned ISO standards are available, which both also exist as harmonized EN standards. Thus, the standards should be applied to ensure a uniform and holistic assessment.

7. A market research found a manufacturer that has certified its liquid ring vacuum pumps for zone 0 in accordance with standard EN ISO 80079-36 and -37 to comply with ATEX Directive 2014/34/EU. Another manufacturer plans to certify its pumps for zone 0 by the end of 2021. According to the manufacturers of liquid ring vacuum pumps, additional costs of 5 to 10 percent are to be expected for the pump itself. However, further additional costs accrue due to the necessary technical ignition protection monitoring measures both on the pump and in the entire pump circuit of the vehicle. Here, the additional costs are estimated at 20 to 50 percent per system.

## Proposal

8. In 6.10.3.8 (b) of RID/ADR, add at the end the following text:

“A vacuum pump/exhauster unit that meets the general requirements of standard ISO 80079 parts 36 and 37 and is suitable for conveying an explosive atmosphere from zone 0 areas shall not be considered a source of ignition. It shall meet the requirements for the non-electrical apparatus of the relevant group and temperature class according to the substances to be conveyed. A liquid ring vacuum pump shall contain a sufficient amount of liquid. The liquid level at standstill as well as the liquid intake during operation shall be subject to redundant monitoring (corresponds to IPL 2 in accordance with standard ISO 80079-1). In the case of an insufficient liquid level or liquid intake, the operation of the pump shall be stopped immediately.”

9. In Chapter 1.6, insert corresponding transitional provisions for existing liquid ring vacuum pumps on vacuum-operated waste tanks as follows:

(ADR:)

“**1.6.3.xx** Vacuum-operated waste tanks (fixed tanks (tank-vehicles) or demountable tanks) constructed before 1 July 2023 in accordance with the requirements in force up to 31 December 2022 but which do not conform to the requirements of 6.10.3.8 (b) concerning non-electrical explosion protection for liquid ring vacuum pumps applicable as from 1 January 2023 may continue to be used.”

(RID/ADR:)

**“1.6.4.xx** Vacuum-operated waste tanks (tank-containers and tank swap bodies) constructed before 1 July 2023 in accordance with the requirements in force up to 31 December 2022 but which do not conform to the requirements of 6.10.3.8 (b) concerning non-electrical explosion protection for liquid ring vacuum pumps applicable as from 1 January 2023 may continue to be used.”

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