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Item 5 (b) of the provisional agenda

Proposals for amendments to RID/ADR/ADN: new proposals

Proposal for amendments to special provisions TU21 and TU16 of chapter 4.3 of RID/ADR in order to align them with the requirements of SMGS, Appendix 2

Transmitted by the Government of Ukraine^{1, 2}

Introduction

1. Under chapter 4.3 of RID/ADR on the “Use of fixed tanks (tank-vehicles), demountable tanks, tank-containers and tank swap bodies with shells made of metallic materials, and battery-vehicles and multiple-element gas containers (MEGCs)”, it is stipulated in special provision TU21, with regard to the carriage in tanks of UN No. 1381 phosphorus, white or yellow, dry, or under water or in solution and UN No. 2447 phosphorus, white molten, that if water is used as a protective agent, the loaded substance should be covered by water to a depth of not less than 12 cm:

“TU21: The substance shall, if water is used as a protective agent, be covered with a depth of not less than 12 cm of water at the time of filling; the degree of filling at a temperature of 60°C shall not exceed 98%. If nitrogen is used as a protective agent, the degree of filling at a temperature of 60°C shall not exceed 96%. The remaining space shall be filled with

¹ In accordance with the programme of work of the Inland Transport Committee for 2012–2016 (ECE/TRANS/224, para. 94, and ECE/TRANS/2012/12, programme activity 02.7 (A1c)).

² Circulated by the Intergovernmental Organisation for International Carriage by Rail (OTIF) under the symbol OTIF/RID/RC/2014/3.



nitrogen in such a way that, even after cooling, the pressure at no time falls below atmospheric pressure. The tank shall be closed in such a way that no leakage of gas occurs.”

2. On 16 July 2007, 17 wagons, 15 of which were carrying yellow phosphorus under water (UN No. 1381), were derailed from the Lviv railway line in Ukraine while en route from Kazakhstan to Western Europe. An investigation established that the accident resulted from the derailment of the tenth tank-wagon back from the head of the train. It was found that one reason for the accident lay in a breach of technical standards in force for the transport of phosphorus on 1,520 mm gauge railway lines, specifically the regulations on yellow phosphorus for industrial use and operating instructions for the model 15-1412 tank-wagons used to transport yellow phosphorus.

3. The breach concerned the depth of water used as a protective agent needed to cover phosphorus. The required depth differs between standards:

- Regulations on yellow phosphorus for industrial use – not less than 30 cm;
- Operating instructions for tank-wagons carrying phosphorus – 50–60 cm (when the ambient air temperature is 40°C and above);
- Special provision TU21 of chapter 4.3 of RID/ADR – 12 cm.

4. When the accident occurred the ambient air temperature was 31.1°C. An independent body of experts concluded that the temperature of the metallic shell of the tank exceeded the melting point of phosphorus (44.1°C) and that several tanks contained a protective layer of about 10 cm of water. The load was being carried over a great distance (around 3,560 km) with a high ambient air temperature, during which time the wagon was subjected to acceleration, braking and movement on gradients. As a result, the inadequate protective layer of water in the tank may have allowed contact between the substance and the air, leading to an exothermic reaction.

5. Therefore, in order to prevent accidents resulting from an inadequate depth of water used as a protective agent in the transport of phosphorus over long distances and subject to variable temperatures, the appropriate amendments were made to Appendix 2 of SMGS.

Appendix 2 stipulates that, when water is used as a protective agent in transport on 1,520 mm gauge railway lines, the substance carried shall be covered by water to a depth of no less than 30 cm, or no less than 60 cm if the substance is carried through regions where the ambient air temperature can exceed 40°C. When the ambient air temperature along the transport route is below 0°C, a non-freezing solution such as calcium chloride solution should be used, to a depth of 30 cm, instead of water.

Proposal 1

6. In order to harmonize the conditions for the transport of phosphorus, we propose that special provision TU21 of RID/ADR be reformulated as follows:

Option 1

“TU21: The substance shall, if water is used as a protective agent, be covered with a depth of not less than 30 cm of water; the degree of filling at a temperature of 60°C shall not exceed 98% of tank (shell) capacity. When the ambient air temperature along the transport route is below 0°C, a non-freezing solution such as calcium chloride solution shall be used, to a depth of 30 cm, instead of water. If the substance is transported to regions where the

ambient air temperature can exceed 40°C, the depth of the water shall not be less than 60 cm.

“If nitrogen is used as a protective agent, the degree of filling of the substance at a temperature of 60°C shall not exceed 96% of tank capacity. The remaining space shall be filled with nitrogen in such a way that, even after cooling, the pressure inside the tank does not fall below atmospheric pressure. The tank shall be closed in such a way that no leakage of gas occurs.”

7. Should it be decided at the meeting that in Western Europe the protective layer of 12 cm is sufficient, we propose a second option:

Option 2

“TU21: The substance shall, if water is used as a protective agent, be covered with a depth of not less than 12 cm of water; the degree of filling at a temperature of 60°C shall not exceed 98% of tank capacity.

“Substances carried in tanks on 1,520 mm gauge railway lines shall be covered by water to a depth of no less than 30 cm, or no less than 60 cm if the substance is transported to regions where the ambient air temperature can exceed 40°C. When the ambient air temperature along the transport route is below 0°C, a non-freezing solution such as calcium chloride solution shall be used, to a depth of 30 cm, instead of water.

“If nitrogen is used as a protective agent, the degree of filling at a temperature of 60°C shall not exceed 96% of tank capacity. The remaining space shall be filled with nitrogen in such a way that, even after cooling, the pressure inside the tank does not fall below atmospheric pressure. The tank shall be closed in such a way that no leakage of gas occurs.”

8. Ukraine favours the first option.

9. We also note that special provision TU16 of chapter 4.3 of RID/ADR on the “Use of fixed tanks (tank-vehicles), demountable tanks, tank-containers and tank swap bodies with shells made of metallic materials, and battery-vehicles and multiple-element gas containers (MEGCs)” sets forth requirements with regard to empty tanks used to carry the same loads: UN No. 1381 phosphorus, white or yellow, dry, or under water or in solution, and UN No. 2447 phosphorus, white molten. It provides for the filling of uncleaned empty tanks with nitrogen or water when they are handed over for carriage:

“TU16: Uncleaned empty tanks, shall, when handed over for carriage, either:

- Be filled with nitrogen; or
- Be filled with water to not less than 96% and not more than 98% of their capacity; between 1 October and 31 March, this water shall contain sufficient antifreeze agent to make it impossible for the water to freeze during carriage; the antifreeze agent shall be free from corrosive action and not liable to react with phosphorus.”

10. However, in RID/ADR there is no mention of the name and amount (kg) or pressure (MPa) of the protective agent for inclusion in transport documents with regard to the transport of empty, uncleaned phosphorus tanks. This raises serious concerns on the regulation of braking procedures for trains.

Proposal 2

11. We therefore propose to add the following new paragraph to special provision TU16 of chapter 4.3:

“An additional entry shall be included in the transport document when uncleaned, empty tanks are handed over for carriage:

Tank filled with _____⁽¹⁾ in accordance with special provision TU16.

⁽¹⁾ Indicates the name of the protective agent. Where the tank is filled with a liquid, its mass shall be indicated in kg; in the case of gas, its pressure shall be given in MPa or bar.”

Reasons

12. This amendment will improve transport safety and harmonize requirements for the carriage of UN No. 1381 phosphorus, white or yellow, dry, or under water or in solution, and UN No. 2447 phosphorus, white molten, on railways to which different regulatory systems for the transport of dangerous goods apply.

Implementation

13. Implementation should present no difficulties.
