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

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Item 5 (b) of the provisional agenda

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

Amendment of P200 and P206

Transmitted by the International Organisation for Standardization (ISO)^{1, 2}

Introduction

1. At the forty-eighth session of the Sub-Committee of Experts on the Transport of Dangerous Goods held in December 2015, the Secretariat presented an informal paper INF.52 reporting the request of WP.15 for the Experts to check the use of the terms “liquid phase” and “liquid component” in P200 (3) (e) of the Model Regulations (P200 (5) in RID/ADR/ADN).

2. Following consultation with the industrial gases industries of Europe and North America – EIGA and the Compressed Gases Association (CGA), the delegate from ISO responded to this request by proposing to eliminate the ambiguous phrase “liquid component” from the text. The logic of the proposed amendment is that the pressure receptacle contains two components – the liquefied gas and the compressed gas; the liquid phase consists of the liquefied gas and the compressed gas dissolved into it, and the gaseous phase consists of the compressed gas and the vapour of the liquefied gas. The proposal to amend P200 (3) (e) based on this logic was adopted provisionally by the Sub-Committee.

¹ In accordance with the draft programme of work of the Inland Transport Committee for 2016-2017, (ECE/TRANS/WP.15/2015/19 (9.2)).

² Circulated by the Intergovernmental Organisation for International Carriage by Rail (OTIF) under the symbol OTIF/RID/RC/2016/4.

3. The text as amended is reproduced below. The key words of the existing text are in bold and new words are underlined.

“(e)For liquefied gases charged with compressed gases, **both components** – the ~~liquid phase~~ liquefied gas and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle.

The maximum mass of contents per litre of water capacity shall not exceed 0.95 times the density of the **liquid phase** at 50 °C; in addition, the **liquid phase** shall not completely fill the pressure receptacle at any temperature up to 60 °C.

When filled, the internal pressure at 65 °C shall not exceed the test pressure of the pressure receptacles. The vapour pressures and volumetric expansions of all substances in the pressure receptacles shall be considered. When experimental data is not available, the following steps shall be carried out:

- (i) Calculation of the vapour pressure of the ~~liquid component~~ liquefied gas and of the partial pressure of the compressed gas at 15 °C (filling temperature);
- (ii) Calculation of the volumetric expansion of the **liquid phase** resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the **gaseous phase**;
- (iii) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the **liquid phase**;
NOTE: The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.
- (iv) Calculation of the vapour pressure of the ~~liquid component~~ liquefied gas at 65 °C;
- (v) The total pressure is the sum of the vapour pressure of the ~~liquid component~~ liquefied gas and the partial pressure of the compressed gas at 65 °C;
- (vi) Consideration of the solubility of the compressed gas at 65 °C in the **liquid phase**;

The test pressure of the pressure receptacle shall not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the ~~liquid component~~ phase is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (vi)) into account.”

Proposal 1

4. The Joint Meeting may choose to adopt the same changes in P200 (5) for the 2017 editions of RID and ADR.

Proposal 2

5. Following this adoption of the above text by the Sub-Committee, the representative of OTIF asked if the text of P206 should be amended in a similar way. The Experts agreed that P206 should also be amended, but the Sub Committee’s agenda did not permit consideration of such an amendment.

6. ISO therefore proposes to the Joint Meeting that since the pressure receptacle content is analogous to that in P200, i.e. the liquid phase consists of the liquid with compressed gas dissolved into it and the gaseous phase consists of the compressed gas and the liquid vapour, the same logic should be applied to P206. Therefore, the solution is to take the amended text of P200 (3) (e) and replace “liquefied gas” with “liquid” and keep “liquid phase” wherever it occurs.

7. The application of the above logic gives the following proposal for the amendment P206 with the key words shown bold, new text underlined and deletions struck through.

“For liquids charged with a compressed gas **both components** – the **liquid phase** and the compressed gas – have to be taken into consideration in the calculation of the internal pressure in the pressure receptacle. When experimental data is not available, the following steps shall be carried out:

(a) Calculation of the vapour pressure of the **liquid component** and of the partial pressure of the compressed gas at 15 °C (filling temperature);

(b) Calculation of the volumetric expansion of the **liquid phase** resulting from the heating from 15 °C to 65 °C and calculation of the remaining volume for the **gaseous phase**;

(c) Calculation of the partial pressure of the compressed gas at 65 °C considering the volumetric expansion of the **liquid phase**;

NOTE: The compressibility factor of the compressed gas at 15 °C and 65 °C shall be considered.

(d) Calculation of the vapour pressure of the **liquid component** at 65 °C;

(e) The total pressure is the sum of the vapour pressure of the **liquid component** and the partial pressure of the compressed gas at 65 °C;

(f) Consideration of the solubility of the compressed gas at 65 °C in the **liquid phase**.

The test pressure of the cylinders or pressure drums shall not be less than the calculated total pressure minus 100 kPa (1bar).

If the solubility of the compressed gas in the **liquid component phase** is not known for the calculation, the test pressure can be calculated without taking the gas solubility (sub-paragraph (f)) into account.”