



Economic and Social Council

Distr.: General
21 June 2022
English
Original: Russian

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

Geneva, 12–16 September 2022

Item 2 of the provisional agenda:

Tanks

Calculation of the shell thickness for tanks with code P22DH (UN No. 1017 CHLORINE; UN No. 1076 PHOSGENE)

Transmitted by the Government of the Russian Federation*, **

Summary

Executive summary:	The purpose of this document is to clarify the conditions for calculating the shell thickness for tanks with code P22DH (UN No. 1017 CHLORINE; UN No. 1076 PHOSGENE).
Action to be taken:	Three alternatives are proposed to take into account the calculation pressure for the thickness of a tank shell for the transport of Class 2 dangerous goods.
Related documents:	None

Introduction

1. Paragraph 6.8.2.1.17, in the explanation of the formula, refers to paragraph 6.8.2.1.14 for the calculation pressure (the reference is in *italics*):

6.8.2.1.17 The shell thickness shall not be less than the greater of the values determined by the following formulae:

$$e = (P_T \cdot D) / (2\sigma \cdot \lambda);$$

$$e = (P_C \cdot D) / (2\sigma)$$

where

...

* A/76/6 (Sect.20), para. 20.76.

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P_T = test pressure in MPa

P_C = calculation pressure in MPa *as specified in 6.8.2.1.14*

...

2. 6.8.2.1.14 refers to 4.3.4.1 (the reference is in *italics*), which does not apply to Class 2 dangerous goods:

6.8.2.1.14 The calculation pressure is in the second part of the code (*see 4.3.4.1*) according to Column (12) of Table A of Chapter 3.2.

...

3. Three alternatives are proposed for the calculation pressure for the thickness of a tank shell for the transport of Class 2 dangerous goods.

Justification

4. In 6.8.2.1.17, when determining the thickness of the shell, the calculation pressure has to be determined in accordance with the requirements of 6.8.2.1.14.

5. The first paragraph of 6.8.2.1.14 refers to 4.3.4.1 to determine the calculation pressure.

6. Paragraph 4.3.4.1 provides for coding of tanks intended for the transport of dangerous goods of Classes 3–9.

Thus, the current edition of RID/ADR does not clearly refer to a calculation pressure for the calculation of shell thickness for the transport of dangerous goods of Class 2. This means that the shell thickness for Class 2 dangerous goods is determined only when a test pressure is applied.

7. The coding of tanks intended for the transport of dangerous goods of Class 2 is established by paragraph 4.3.3.1.

The second part of the code provides two options for the calculation pressure:

(a) The value of the minimum relevant test pressure according to the table in 4.3.3.2.5. In this case, only the logic is broken when calculating the thickness of the shell according to the requirements of 6.8.2.1.17, but safety is ensured; and only one formula (with a test pressure) can be used;

(b) A calculation pressure of 22 bar. In Table A of Chapter 3.2 we found two substances whose second part of the code indicated a calculation pressure of 22 bar:

UN No. 1017 CHLORINE and UN No. 1076 PHOSGEN. Tank code P22DH. For UN No. 1017 CHLORINE, the test pressure determined by the table in 4.3.3.2.5 is 17 or 19 bar, depending on whether the tank has thermal insulation. For the substance in question, it turns out that the shell thickness must be determined with the test pressure (the lesser value) and must not be determined using the calculation pressure (the higher value). In this case, in addition to having broken logic, safety is not fully ensured.

8. To solve this problem, it's necessary to add a reference to the calculation pressure for Class 2 dangerous goods. It is thus proposed to consider three alternatives:

(1) In the first paragraph of 6.8.2.1.14, include a reference to paragraph 4.3.3.1;

(2) Add a reference to table 4.3.3.1.1 in the explanation of the formula in paragraph 6.8.2.1.17 for P_C ;

(3) Remove the reference to 6.8.2.1.14 from the explanation to the formula in 6.8.2.1.17 for P_C .

All three options will equally restore in full the logic when determining the shell thickness of a tank for the transport of Class 2 dangerous goods and allow for the safe use of tanks when transporting UN No. 1017 CHLORINE.

Proposals

Proposal 1 (new text in *italics* and underlined):

Option 1 (in the first paragraph of 6.8.2.1.14, include a reference to paragraph 4.3.3.1):

6.8.2.1.14 The calculation pressure is indicated in the second part of the code (see 4.3.3.1 or 4.3.4.1) according to Column (12) of Table A of Chapter 3.2.

... .

Option 2 (add a reference to table 4.3.3.1.1 in the explanation to the formula for the calculation pressure in 6.8.2.1.17):

6.8.2.1.17 The shell thickness shall not be less than the greater of the values determined by the following formulae:

$$e = (P_T \cdot D) / (2\sigma \cdot \lambda);$$

$$e = (P_C \cdot D) / (2\sigma)$$

where

...

P_T = test pressure in MPa

P_C = calculation pressure in MPa as specified in 6.8.2.1.14 or in the table of 4.3.3.1.1;

... .

Option 3 (remove the reference to 6.8.2.1.14 in the explanation to the formula in 6.8.2.1.17):

6.8.2.1.17 The shell thickness shall not be less than the greater of the values determined by the following formulae:

$$e = (P_T \cdot D) / (2\sigma \cdot \lambda);$$

$$e = (P_C \cdot D) / (2\sigma)$$

where

...

P_T = test pressure in MPa

P_C = calculation pressure in MPa as specified in 6.8.2.1.14;

... .
