United Nations ST/SG/AC.10/C.3/2016/15

Secretariat

Distr.: General
11 April 2016

Original: English

Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

Sub-Committee of Experts on the Transport of Dangerous Goods

Forty-ninth session
Geneva, 27 June – 6 July 2016
Item 7 of the provisional agenda
Global harmonization of transport of dangerous goods regulations with the Model Regulations

Proposals to insert the definitions "Reference steel" and "Mild steel" in section 1.2.1 of the UN Model Regulations

Transmitted by the observer from Romania[1]

Introduction

1. The Romanian observer attending the forty-eighth session of the Sub-Committee of Experts on the Transport of Dangerous Goods of December 2015, proposed in documents ST/SG/AC.10/C.3/2015/44 and -/2015/55 to delete the "Reference steel" and "Mild steel" definitions in Chapter 6.7 and move both definitions in section 1.2.1.

2. The documents were discussed and the Sub-Committee decided (ST/SG/AC.10/C.3/96), as follows:

> *"99. The Sub-Committee noted that in RID and ADR, the definitions of "mild steel" and of "reference steel" were located in section 1.2.1 and in Chapter 6.7, while in the Model Regulations they were located in Chapter 6.7. Some delegations were reluctant to move these definitions to section 1.2.1 because the definition of "reference steel" is not the same when applied to IBCs, and the term "mild steel" is used in other chapters, e.g. Chapter 6.4 and experts for Class 7 should be consulted to check whether the definition in Chapter 6.7 was also appropriate in the context of Chapter 6.4.*

[1] In accordance with the programme of work of the Sub-Committee for 2015–2016 approved by the Committee at its seventh session (see ST/SG/AC.10/C.3/92, paragraph 95 and ST/SG/AC.10/42, para. 15).

100. After discussion it was decided not to proceed with the proposed changes at this stage.".

3. In this situation, The Government of Romania prepared document ECE/TRANS/WP.15/AC.1/2016/10 for the March 2016 session of the RID/ADR/ADN Joint Meeting in order:

- To inform the Joint Meeting about the decision taken by the Sub-Committee;
- To analyse the situation in the Working Group on Tanks; and
- To inform the Joint Meeting as well about our understanding on the consequences of mild steel definition influences in the tests of radioactive material.

4. The Working Group on Tanks met from 14 to 16 March 2016 on the basis of the mandate from the RID/ADR/ADN Joint Meeting and dealt with the aforementioned document. The observer from Romania reproduces hereafter the relevant excerpt from the report of the Working Group on Tanks as reflected in informal document INF.61 (ECE/TRANS/WP.15/AC.1/142/Add.1):

"Item 1: ECE/TRANS/WP.15/AC.1/2016/10 (Romania) – Definitions of reference steel and mild steel.

5. The intention of the document is to study the consequences of the deletion of the definitions of reference steel and mild steel in 6.7 in favour of those already present in 1.2.1 in RID/ADR. As requested by Romania the working group discussed the meaning of the definitions in the context of 2.2.7 in combination with 6.4, 6.5, 6.7 and 1.2.1 in combination with 6.8.

6. The group could agree that the meaning and values of the definitions of mild steel and reference steel in 1.2.1 in combination with 6.8 and 6.7 have the same contents, despite some additional wording in the definition of mild steel in 6.7. On technical grounds there are no severe consequences to be expected by replacing the definitions of 6.7 by the definitions of 1.2.1.

7. However it was questioned if moving the definitions out of a set of approximately 15 other definitions in 6.7.2, 6.7.3 and 6.7.4 would be a worthwhile exercise.

8. Concerning the use of the term "reference steel" in 6.5 for IBCs it was questioned if "mild steel" would have been more appropriate here. Reference steel has theoretical values for calculation purposes only and mild steel to indicate a range of low carbon steels that need no equivalent wall thickness calculation.

The group felt not to be in the position to confirm if the relation of the definition of mild steel in 1.2.1 was in line with the requirements in 2.2.7 and 6.4 or not.

It was suggested that Romania should verify with the experts at the UN level if the definition of reference steel that is currently in 1.2.1 is suitable to 6.5 and the definition mild steel is suitable for 2.2.7/6.4. Depending on the outcome of this verification it should be considered if in the future the definitions need to be limited to tanks only.".

Implications of defining mild steel for the tests of Class 7

9. Another issue considered by the experts was the one of the consequences of the application of the mild steel definition in the Class 7 tests of paragraphs 2.7.2.3.3.5, 6.4.17.2 (twice) and 6.4.20.2 of the UN Model Regulations which correspond to the paragraphs 706, 727 (twice) and 735 of the IAEA Regulations for the Safe Transport of

Radioactive Material (SSR-6), where: the steel plate falling from 9 metres or the probe falling from 3 metres over the specimen and the cylindrical bar which strike the specimen or is drop onto the specimen, are made of mild steel.

10. In our understanding the mild steel tools (plates and bars), used for the tests described in the paragraphs mentioned before must be mainly solid.

We included in the analyses the provisions of the Regulations for the Safe Transport of Radioactive Material - 2012 Edition – SSR-6 supplemented by a hierarchy of Safety Guides, including:

- Advisory Material for the IAEA Regulations for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. TS-G-1.1 (Rev. 1);
- Planning and Preparing for Emergency Response to Transport Accidents Involving Radioactive Material, IAEA Safety Standards Series No. TS-G-1.2 (ST-3);
- Compliance Assurance for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. TS-G-1.5;
- The Management System for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. TS-G-1.4; and
- Radiation Protection Programmes for the Transport of Radioactive Material, IAEA Safety Standards Series No. TS-G-1.3.

Implications of defining mild steel for the tests of the Manual of Tests and Criteria

11. Our study was extended also to the Manual of Tests and Criteria where the term "*mild steel*" is used 23 times, mainly in:

- Part I (Test series 1 to 8, except 4) and
- Part II (Test series A, B, C and F),

but also in:

- Part III (Test O.2: Test for oxidizing liquids - paragraph 34.4.2.2.2) and
- Appendix 7 (HSL flash composition test - paragraph 2.3).

12. The terms: mild steel witness plate, mild steel base plate, mild steel bar, wheel, sheet, mild steel plate, mild steel sheet and outer casing of mild steel, are described in the Sub-sections of *Apparatus and materials* for the respective tests.

13. The most detailed description appears in 13.5.2.2 (Test 3 (b) (ii): Rotary friction test) where "*The bar (A) is made of general purpose mild steel whose surface has been prepared by grit-blasting to a finish of 3.2 µm ± 0.4 µm*.".

14. This is the only place in the Manual of Test and Criteria and in the UN Model Regulations where:

- The finishing of the surface of a mild steel tool is detailed and
- A description of the needed mild steel appears. What represents mild steel? A general purpose steel or a low carbon steel – in other words.

14. Now it should be noted that in the provisions for the tests of Class 7 (mentioned in paragraph 5 of the current document) such details are not present.

16. The Working Group on Explosives could document the decision on this issue within its competence.

Reference steel

17. "*Reference steel*" appears now: 5 times in Chapter 4.2, 4 times in Chapter 6.5 and 25 times in Chapter 6.7 (besides the three identical definitions in 6.7.2, 6.7.3 and 6.7.4).

18. The current definition in Chapter 6.7 is: *Reference steel* means a steel with a tensile strength of 370 N/mm^2 and an elongation at fracture of 27%.

19. For the defined reference steel, the product of the tensile strength (370 N/mm^2) and the elongation at fracture (27%) is equal to 9990 (370 x 27 = 9990) and differ from the 10000 by 0.1%, which falls within the tolerances (limits of deviation) of any steel characteristics. This degree of 0.1% introduces such a small difference in the wall thickness which is determined but cannot be measured by the apparatus in the real life.

20. The same condition appears in 6.5.5.1.5 and 6.5.5.1 6 for metal IBCs, as follows:

> 6.5.5.1.5 Metal IBCs shall be made of metals which meet the following requirements:
>
> (a) <u>for steel</u> the elongation at fracture, in %, shall not be less than $\frac{10000}{Rm}$ with an absolute minimum of 20%; where Rm = guaranteed minimum tensile strength of the steel to be used, in N/mm^2, and
>
> 6.5.5.1.6 *Minimum wall thickness:*
>
> (a) for **<u>a</u>** <u>reference steel</u> having a product of Rm × A_o = 10000, the wall thickness shall not be less than (...); where: A_o = minimum elongation (as a percentage) of the reference steel to be used on fracture under tensile stress (see 6.5.5.1.5);

21. It must be said here also that reference steel as defined now is a particular case of mild steel.

22. Any way, in the light of the recommendations of paragraph 5 of the Report of the Working Group on Tanks, the actual conflict in 6.5.5.1.6 must be solved.

Mild steel

23. "*Mild steel*" appears now: once in the DATA SHEET TO BE SUBMITTED TO THE UNITED NATIONS FOR NEW OR AMENDED CLASSIFICATION OF SUBSTANCES of the Recommendations, once in Chapter 2.7, 3 times in Chapter 6.4, 3 times in Chapter 6.7 (besides the two identical definitions) and 23 times in the Manual of Tests and Criteria.

24. The current definitions in Chapter 6.7 are:

> *6.7.2.1 Definitions*
>
> *Mild steel* means a steel with a <u>guaranteed minimum</u> tensile strength <u>of</u> 360 N/mm^2 to <u>440</u> N/mm^2 and a <u>guaranteed minimum</u> elongation at fracture conforming to 6.7.<u>2</u>.3.3.3;
>
> *6.7.3.1 Definitions*

Mild steel means a steel with a guaranteed minimum tensile strength of 360 N/mm^2 to 440 N/mm^2 and a guaranteed minimum elongation at fracture conforming to 6.7.3.3.3.3;

Where the text of 6.7.2.3.3.3 and 6.7.3.3.3.3 is the same, as follows:

"Steels used in the construction of shells shall have an elongation at fracture, in %, of not less than 10 000/Rm with an absolute minimum of 16% for fine grain steels and 20% for other steels.".

25. The provisions of 6.7.2.3.3.3 and 6.7.3.3.3.3 regarding *the guaranteed minimum elongation at fracture* still apply independently of the mild steel definition in sections 1.2.1 or 6.7.2, and 6.7.3. In this case, the only specialised term used in the definition is *the guaranteed minimum tensile strength*. In Chapter 6.8 of RID/ADR another specialised term is used: *determined tensile strength* (6.8.2.1.12) and there is no conflict with the general definition of mild steel in 1.2.1.

26. We consider there is a need to extend the scope of the definition of mild steel over the text of the Regulations, including the Manual of Tests and Criteria.

27. The only real issue to be dealt with is the analysis of the use of "*mild steel*" instead of "*reference steel*" in sub-section 6.5.5.1 for metal IBCs.

To resume the issue

28. The introduction of both definitions in section 1.2.1 strengthens the Regulations.

29. We propose below a solution for the Sub-section 6.5.5.1.6.

30. Ultimately, the current definitions in 6.7 could be preserved if they differ substantially from the accepted (general) definitions in 1.2.1, but the text of the Regulations must be covered by the steels definitions not only because of the Guiding Principles for Chapter 1.2 – definitions and units of measurements which stipulate: "*Definitions and units of measurements of general applicability used throughout the Model Regulations are listed here.* [...]", but because of the consistency of the provisions.

Proposals

31. Replace the text in 6.5.5.1.6 (a) before the table to read as follows (new text underlined deletions in strike-through):

(a) for a ~~reference steel~~ mild steel ~~having a product of Rm × A_o = 10 000~~ [as defined in 6.5.5.1.5 (a)], the wall thickness shall not be less than:

and delete the text under the table:

~~where: A_o = minimum elongation (as a percentage) of the reference steel to be used on fracture under tensile stress (see 6.5.5.1.5);~~" .

32. Replace "reference steel" by "mild steel" in 6.5.5.1.6 (b) – once, in the body of the text before the formula.

33. Insert the definition "Reference steel" in section 1.2.1:

"*Reference steel* means a steel with a tensile strength of 370 N/mm^2 and an elongation at fracture of 27%;"

34. Delete the definitions of "Reference steel" from 6.7.2.1, 6.7.3.1 and 6.7.4.1.

35. Insert the definition "Mild steel" in section 1.2.1, as follows:

"*Mild steel* means a steel with a [guaranteed] minimum tensile strength of 360 N/mm^2 to 440 N/mm^2";

36. Delete the definitions of “Mild steel” from 6.7.2.1 and 6.7.3.1.

Consequential amendments

37. Delete de following parenthesis (including the text contained) from the paragraphs:

– 6.7.2.4.7 and 6.7.2.4.9: (see 6.7.2.1), and

– 6.7.3.4.6: (see 6.7.3.1).