Organisation intergouvernementale pour les transports internationaux ferroviaires
Zwischenstaatliche Organisation für den internationalen Eisenbahnverkehr
Intergovernmental Organisation for International Carriage by Rail

**INF.5**

18 November 2019

(Russian and English only)

**RID:** **11th Session of the RID Committee of Experts' standing working group**
(Vienna, 25 - 29 November 2019)

**Subject:** **Additional information on documents OTIF/RID/CE/GTP/2019/5/Rev.1 and INF.6**

**Proposal transmitted by the Russian Federation**

**Additional information on document OTIF/RID/CE/GTP/2019/5/Rev.1:**

1. During the meeting of the 10th session of the RID Committee of Experts' standing working group, which took place in November 2018, we reported on the decision taken at the OSJD meetings to make a separate chapter of Annex 2 to the SMGS Agreement, which would include requirements for 1520 mm gauge tank-wagons. The number that is currently assigned to this chapter is 6.20.

2. In the course of drafting Chapter 6.20, some requirements caused great discussion at the OSJD venue. In this regard, it was decided to bring these issues up for discussion at the meeting of the 11th session of the RID Committee of Experts' standing working group. We hope that at this meeting we will be able to discuss these requirements in detail and take any necessary decisions on the issues outlined. If the meeting participants consider it necessary, individual requirements may be included in the revised version of RID.

3. To make it more convenient to discuss the issues together, they were divided into 4 groups:

   A. Differences in design and operation requirements;
   B. Additional design requirements;
   C. Clarification of current requirements;
   D. Questions on current requirements.

   We also consider individual issues within each group in more detail.

## A. Differences in design and operation requirements

A.1 Weld strength factor λ (6.8.2.1.23)

4. The main difference from the RID requirements is that, in accordance with the GOST requirements, when determining the strength factor of a weld, it is necessary to take into consideration not only the extent of non-destructive testing, but also the appearance of the weld and the welding method. Having regard to these particularities, the minimum strength factor of the weld can reach 0.65, and for the extent of testing of 100%, the strength factor can be 0.8 (Table 1). This approach shows that the weld type and the welding method are more important parameters than the extent of non-destructive testing.

Table 1:

| Weld type and welding method | Weld strength factor value | |
|---|---|---|
| | The length of the welds being inspected is 100% of the total length. | The length of the welds being inspected is from 10 to 50% of the total length. |
| Butt welds or T-welds with double-sided complete penetration, performed by automatic and semi-automatic welding | 1.0 | 0.9 |
| Butt welds with weld root backing or T-welds with double-sided complete penetration, performed manually | 1.0 | 0.9 |
| Butt welds, accessible to welding only on one side and, in the process of welding, having a metal backing on the side of the weld root, adjacent to the base metal along the entire length of the weld | 0.9 | 0.8 |
| T-welds with structural gaps of welded parts | 0.8 | 0.65 |
| Butt welds performed by automatic and semi-automatic welding on one side, with flux or ceramic backing | 0.9 | 0.8 |
| Butt welds performed manually on one side | 0.9 | 0.65 |

5. Thus, for the factors λ = 0.9 (highlighted in yellow), the maximum possible extent of testing of longitudinal joints complying with the GOST requirements equal to 50% is set out in Chapter 6.20, which is being drafted as part of Annex 2 to the SMGS.

A.2 Conditions for filling tank-wagons with Class 2 goods (6.8.3.4.4)

6. The filling degree has been set by the RID requirements: the maximum allowable mass of the goods per litre of the shell capacity. At the same time, in order to avoid the shell being overfilled with the goods at rapid changes of temperature, for each shell, the capacity shall be determined by weighing or measuring the volume of water filling the shell. Determination of the actual capacity of every shell makes sense only when loading as per the filling degree.

7. In addition to the above-mentioned filling method, the regulatory documents related to the 1520 mm track gauge allow the use of the filling method as per the level. In this case, loading can be carried out at different temperatures of goods, and the mass of liquefied gases will be different at the same filling level. In this case, measuring the capacity of every shell loses its meaning. In order to ensure safety requirements during loading as per the filling level, the temperature of goods during filling shall be limited.

8. Thus, Chapter 6.20 being drafted as part of Annex 2 to the SMGS has been supplemented with the option of filling tank-wagons as per the level, taking into account the limitation of the filling temperature.

A.3 Periodic inspections of tank-wagons (6.8.2.4, 6.8.3.4)

9. The regulatory documents related to the 1520 mm track gauge, applicable to tank-wagons designed for the carriage of liquefied gases, provide for an interval of periodic inspections (examination) at least once every 10 years. This is due to the timing of scheduled types of wagon repair; the above-mentioned frequency of inspections makes it possible to synchronize these processes.

10. The specified situation has existed since USSR times, and experience in operating such tank-wagons shows that the established frequency of inspections provides the necessary level of safety.

11. In this regard, it is proposed that Chapter 6.20 being drafted as part of Annex 2 to the SMGS shall provide for the possibility of setting the frequency of inspections (examination) for tank-wagons designed for liquefied gases at least once every 10 years.

A.4 Criteria for assessing the impact strength of the tank-wagon shell material (6.8.5)

12. The RID requirements establish testing methods and evaluation criteria for the base metal and welded joints. In this case, the minimum temperature specified for this test shall be minus 20 °C.

13. For tank-wagons operating in the 1520 mm track gauge area the minimum temperature is set to be minus 60 °C. For this temperature, the regulatory documents related to the 1520 mm track gauge establish alternative requirements for the inspection procedure (impact strength can be determined on specimens with a U-shaped or V-shaped notch) and criteria for assessing the impact strength of the base metal and welded joints.

14. These changes have been taken into account in the draft of Chapter 6.20 of Annex 2 to the SMGS.

A.5 Electrical conductivity of the structure (6.8.2.1.27)

15. The RID requirements establish the need to have an electrical connection with the chassis only if certain goods are being carried (UN No.1361, flammable gases, liquids having a flash-point of not more than 60 °C). At the same time, the regulatory documents related to the 1520 mm track gauge establish the need to ensure electrical conductivity from the roof to the rails for all tank-wagons. In this case, the established value of electrical resistance between the mentioned components shall not exceed 0.15 ohm. Compliance with this requirement is checked by the testing centre for the certification of tank-wagons.

16. In view of the foregoing, the requirements for electrical conductivity between structural elements of tank-wagons are provided for in the draft of Chapter 6.20 of Annex 2 to the SMGS.

## B. Additional design requirements

B.1 Energy absorption elements for tank-wagons with automatic coupling device (6.8.4 TE 22)

17. The issue of power capacity of energy absorption devices was presented at the meeting of the 10th session of the RID Committee of Experts' standing working group, which was

held in November 2018. This material supplements the existing requirements of Chapter 6.8.

18. According to the regulatory documents related to the 1520 mm track gauge, tank-wagons with automatic couplers intended for the carriage of dangerous goods shall be equipped with absorption devices of a class not lower than T2. At the same time, for particularly dangerous goods (including goods of Class 2 and goods related to special provision TE 22), energy absorption devices of a class not lower than T3 shall be used.

19. The necessary requirements for the nominal power capacity of absorption devices for tank-wagons intended for the carriage of goods of various classes are included in clauses 6.20.2.1, 6.20.3.1 and TE 22 of the draft of Chapter 6.20 of Annex 2 to the SMGS.

## C. Clarification of current requirements

### C.1 Special provision TE 14 (thermal insulation) (6.8.4 TE 14)

20. The current version of special provision TE 14 only provides for the relationship between the temperature of thermal insulation and the temperature of the shell. In the design of some models of tank-wagons operating on the 1520 mm track gauge area (for example, for the transport of molten sulphur (UN 2448) and liquid pitch (UN 2810)), between the shell and thermal insulation, a gap is provided for air circulation during electrical heating-up of goods. In this design, the thermal insulation does not come into contact with the shell of the tank-wagon.

21. In connection with the above, it is proposed to clarify special provision TE 14 with respect to supplementing the relationship between the temperature of thermal insulation and structural elements of the heating-up system.

22. It is proposed to amend the wording of special provision TE 14 as follows:

"**TE 14** Tanks shall be equipped with thermal insulation. The thermal insulation directly in contact with the shell and/or structural elements of the heating-up system shall have an ignition temperature at least 50 °C higher than the maximum temperature for which the shell and/or structural elements of the heating-up system were designed."

## D. Questions on current requirements

### D.1 Heat treatment of material for manufacturing of welded shells (6.8.2.1.10, 6.8.2.1.11, 6.8.2.6.1)

23. The current version of RID sets out some requirements for materials of shells:

– In 6.8.2.1.10, the prohibition to use water-quenched steel for manufacturing welded shells is established;

– In 6.8.2.1.11, the maximum ratio of Re/Rm is established;

– The requirements of 6.8.2.6.1 contain an implicit reference to standard EN 13445-2, according to which rolled steel can be manufactured using three production methods: "normalization", "thermomechanical treatment", "quenching and tempering".

24. The requirements of 6.8.2.1.10 can be interpreted in different ways:

*Variant 1:* The paragraph does not mention the procedure of "tempering" the material, which means that you can use rolled products manufactured using the "quenching and tempering" production method;

*Variant 2:* The paragraph refers to the quenching and tempering method, which means that only rolled products may be used, manufactured using the "normalization" or "thermomechanical treatment" production methods.

25. When using rolled products with sufficiently high mechanical properties (for example, with a yield point of at least 390 MPa), the requirements of 6.8.2.1.11 for the Re/Rm ratio mean that a method such as "thermomechanical treatment" for the production of rolled steel becomes impossible. This is due to the fact that in accordance with this method, the ratio Re/Rm is always above 0.85.

26. At the same time, the regulatory documents related to the 1520 mm track gauge do not establish restrictions on methods for producing rolled steel for welded shells of tank-wagons.

27. In view of the above, it would be desirable to discuss these requirements and understand the following:

a) What method for producing rolled steel can be used for the manufacture of welded shells for tank-wagons?

b) If the restrictions really exist, then what is the background to them?

D.2 Calculation of the minimum thickness of shell walls (6.8.2.1.13, 6.8.2.1.16, 6.8.2.1.17, 6.8.2.4.1)

28. In the process of discussing the issue of calculating the shell wall thickness in accordance with the RID requirements within OSJD, the meeting participants discovered that in the current version, there is inconsistency between some clauses.

29. For example, 6.8.2.1.17 establishes the need to calculate the shell thickness for the calculation pressure and the test pressure. At the same time, 6.8.2.1.16 establishes permissible stresses on the basis of the test pressure.

30. In accordance with the requirements of 6.8.2.1.13, the pressure value used for determining the shell thickness shall not be less than the calculation pressure. However, in accordance with the requirements of 6.8.2.4.1, for the calculation pressure values of 10, 15 and 21 bar, test pressure values that are lower than the calculation pressure are established.

31. In connection with the ambiguous interpretation of these clauses, the question arises: what conditions (pressure, permissible stresses) must be taken as a basis when determining the minimum shell thickness?

32. It is also desirable to discuss the requirements of these clauses and, if necessary, make adjustments to them in order to eliminate ambiguity.

D.3 Material of the shell for the transport of strong nitric acid UN 2031 (with a nitric acid content of more than 70%) (6.8.4 TC 6)

33. This issue is related to the fact that for the transport of concentrated nitric acid (with a nitric acid content of more than 70%), the requirements for the materials of shells of tank-wagons, packagings and portable tanks are different. There are no requirements for the material of portable tanks. Packagings used for the transport of concentrated nitric acid shall be made of aluminium or an aluminium base alloy. It is necessary to use aluminium with a purity of not less than 99.5% as the material of the shell for tank-wagons intended for the transport of the above-mentioned goods. From our perspective, this situation leads to a disadvantageous situation for manufacturers and users of tank-wagons.

34. In order to understand which of the existing requirements are the most correct, an analysis of the existing requirements and recommendations on the use of materials for nitric acid of various concentrations was carried out. Subsequent to the results of the analysis of the national and foreign literature, the following points can be noted:

    a) Aluminium or aluminium alloys, including Al-Mn and Al-Mg alloying systems, can be recommended for highly concentrated nitric acid;

    b) A "satisfactory" corrosion rate (comparable to Al> 99%) can be achieved with an aluminium content of at least 91% in the alloy.

35. In order to validate this information, laboratory studies were carried out to determine the rate of general corrosion of various aluminium alloys in the medium of nitric acid with a concentration of 99%. AD0 grade aluminium (Al content> 99.5%) was used as a reference standard. The test results obtained for aluminium alloys of Al-Mn and Al-Mg alloying systems validated the information provided in national and foreign literature. When the alloy (alloying system) has been chosen correctly, its corrosion rate in highly concentrated nitric acid is comparable to AD0 grade aluminium (Al content> 99.5%).

36. Bearing in mind the work accomplished and the materials presented, we think that the most correct requirements for materials involved in the transport of concentrated nitric acid (with a nitric acid content of more than 70%) are those for packagings.

37. It is proposed to establish similar requirements for the material of shells for tank-wagons and allow the possibility of using aluminium alloys in special provision TC 6.

**Additional information on document INF.6:**

38. At the meeting of the OSJD Commission for Transport Law in the field of provisions for the carriage of dangerous goods (28-31 October 2019, Warsaw), meeting participants considered it necessary to bring up some further subjects for discussion at the RID Committee of Experts' standing working group.

**A. Differences in design and operation requirements**

A.6 The need to equip all openings having diameters more than 1.5 mm with internal shut-off devices (6.8.3.2.4)

39. As mentioned previously (in paragraph A.2), according to the current regulatory documents related to the 1520 mm track gauge track, it is allowed to use the method of filling shells of tank-wagons intended for the carriage of liquefied gases as per the filling level. In order to control the filling level, angle stop-valves with a nominal diameter of 6 mm are used. These valves are not equipped with internal shut-off devices. Operational

experience shows that a decrease in the diameter of the discharge/filling control device leads to termination of the normal operating mode. In this case, it becomes impossible to control the level of the goods during discharge/filling operations, which can lead to a reduction in the existing level of safety.

40. At the same time, it should be noted that tank-wagons intended for the carriage of liquefied gases have protection for operational equipment in the form of safety bars in the upper part of the shell, and this improves the safety of tank-wagons in case of emergency.

41. In view of the foregoing, it is proposed to provide for the possibility of using these control means without internal shut-off devices in the draft of Chapter 6.20 of Annex 2 to the SMGS. The proposed wording of the additional sentence in 6.20.3.2.4 is as follows:

"It is acceptable not to equip discharge/filling control devices with a nominal diameter of not more than 6 mm with internal shut-off devices, provided that the tank-wagon is equipped with the fitting protection equipment."

## D. Questions on current requirements

D.4 The extent of external stresses for the internal stop-valve and its seating (6.8.2.2.2)

42. The requirements of 6.8.2.2.2 stipulate that the internal stop-valve and its seating have to withstand external stresses:

"[…] In order to avoid any loss of contents in the event of damage to the external fittings (pipes, lateral shut-off devices), the internal stop-valve and its seating shall be protected against the danger of being wrenched off by external stresses or shall be so designed as to resist them. […]"

43. It is not clear from this paragraph what kind of stresses are meant, what their extent is and which direction(s) do they come from, and whether there is a standard which specifies these requirements.

44. In this regard, during the meeting which took place, it was proposed to draft this sentence in such a way that the main requirement would be to avoid any loss of contents, without specifying stresses.

45. The following is a possible version of the wording:

"The internal stop-valve and its seating shall be protected or designed so as to avoid any loss of contents in the event of damage to the external fittings (pipes, lateral shut-off devices) when they are externally exposed in case of emergency."