



Economic Commission for Europe

Inland Transport Committee

Working Party on the Transport of Dangerous Goods

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**Proposals for amendments to the Regulations annexed to ADN:
other proposals**

7.2.4.22 of ADN: Opening of openings

Transmitted by the Government of Germany***

Summary

In order to be able to perform a visual inspection of cargo tanks that are not degassed to prevent contamination of the cargo prior to loading, or after unloading, or to check whether cargo tanks are empty, it is necessary to open the sampling opening of the cargo tank, an equivalent opening or the housing of a flame arrester of a cargo tank prior to loading or after unloading.

This is also necessary in the case of cargo that requires explosion protection in accordance with Table C.

For certain dangerous goods, so-called open-type sampling by means of a sampling opening is permitted. If a closed-type or partly closed-type sampling device is mandatory, it may be necessary in exceptional cases in the event of a technical problem of this device to take the sample via the sampling opening or an equivalent opening.

The regular degassing of cargo tanks, gas measurements, the determination of the filling quantity in the cargo tanks and, in emergencies, the addition of stabilizers during the journey may also require to open openings of cargo tanks that have not been degassed.

Executive Summary:

The performance of these measures as employed in practice is – depending on the interpretation – contrary to the currently applicable provisions of ADN (e.g. in 7.2.4.22.2: “Opening of sampling outlets is only permitted for sampling and control or cleaning of empty cargo tanks”). The amendments proposed below aim to achieving legal certainty. In large parts of the current versions of ADN (both 2021 and 2023), the opening of openings for the above-mentioned purposes is neither strictly prohibited nor explicitly permitted.

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



Action to be taken: The definition of sampling opening in 1.2.1 is extended.

In the provisions on degassing into the atmosphere (7.2.3.7.1.3), the outlets of cargo tanks are defined.

The current 7.2.4.22 is splitted up: 7.2.4.22 contains general requirements for the opening of openings; a new 7.2.4.23 contains additional requirements specifically on visual inspection, open sampling, gas measurements, the determination of the filling quantity in the cargo tanks and the subsequent addition of stabilizer to the cargo. The usable openings are described, and the safety measures are revised and worded more clearly.

Harmonization of the terms used in the English version of ADN.

Introduction

1. In practice, the issue described in the summary leads to discussions between, and different interpretations by, the parties involved.
2. The requirements concerning the opening of openings set out in the current version of ADN no longer reflect the current technical requirements concerning the operational processes during carriage and for quantity control and quality assurance of the cargo:
 - (a) The technical equipment of the vessels has been adapted to the current requirements regarding sampling and quality assurance of the cargo. In accordance with the rules for construction, it is not mandatory for every tank to have a *dedicated* sampling opening as defined in 1.2.1 of ADN, even if such an opening is indicated in column (13) of Table C. This is why it is necessary to extend the term ‘sampling opening’ for practical use for such purposes in such a way that other equivalent openings may be opened for the purposes described if these are appropriate for the mentioned purposes, e.g. with regard to explosion protection, and if the relevant safety precautions are observed;
 - (b) The section “Opening of openings” cannot be considered independently from the degassing provisions in ADN, as contact with the atmosphere is directly linked to the opening of openings and thus to the explosion protection scheme and further safety-related rules and regulations such as operating instructions for the vessel or the cargo transshipment place. So, it is necessary to adapt and clarify the wording of the existing provisions to prevent misunderstandings and erroneous interpretations.
3. In this context, it has to be discussed in particular whether the opening of openings is only permitted in accordance with 7.2.4.22.5. However, if this is the case, it would no longer be possible to perform a visual inspection of the cargo tanks prior to loading or after unloading. As a result, it would no longer be possible to identify and track a contamination of the cargo by contaminated cargo tanks.
4. In the same way, it would be impossible to determine the actual filling quantity in the cargo tanks which, in exceptional cases, must be done using a measuring tape and a thermometer to precisely determine the quantity of the loaded good, where the measuring equipment is not available due to malfunction.
5. Further problems might emerge if the closed-type sampling system cannot be used temporarily. In these exceptional cases in the event of technical problems of the sampling system, it may be necessary to perform open sampling. If the opening for sampling purposes was prohibited in this case also, no samples could be taken prior to unloading and loading. It would thus be impossible to carry out an analysis confirming the purity and integrity of the cargo, and a quality analysis would not be possible. As a result, it would not be possible to unload the vessel.
6. The proposed amendments go beyond the issue described in the summary and take account of all cases in which the opening of openings of cargo tanks of tank vessels may become necessary.
7. More specifically, they include the opening for the following purposes:

- Visual inspection whether the cargo tanks of vessels with empty cargo tanks that have not been degassed are sufficiently clean and/or empty for loading the subsequent cargo.
- Sampling.
- In exceptional cases: determination of the filling quantity in a cargo tank.
- Gas measurement.
- In exceptional cases: subsequent addition of stabilizer during the journey.

I. Proposal

8. Germany would like to ask the Safety Committee to examine and confirm the following proposals for amendment.

9. In 1.2.1 in the definition of “sampling opening”, add the following sentence at the end:

“Other cargo tank openings, except cargo tank hatches, shall be deemed to be equivalent to a sampling opening if they comply with the aforementioned requirements.”

10. After the first sentence of 7.2.3.7.1.3, insert the following sentences:

“The gas/air mixture may be removed from the cargo tanks through the device for the safe depressurization of cargo tanks as referred to in 9.3.2.22.4 (a) and 9.3.2.22.4 (b) or 9.3.3.22.4 (a) and 9.3.3.22.4 (b), through the sampling opening (9.3.2.21.1 (g) or 9.3.3.21.1 (g)) or through the open housing of the flame arrester at the connection of the cargo tank and the venting piping (9.3.2.22.4 (b) or 9.3.3.22.4 (d)).

The gas/air mixture may also be removed through a suitable hose that is connected to the venting piping and equipped with a flame arrester preceding the hose (explosion group/subgroup according to column (16) of Table C of Chapter 3.2).”

11. Amend 7.2.4.22 Opening of openings of cargo tanks to read as follows:

“7.2.4.22 Opening of cargo tank openings (general)

7.2.4.22.1 7.2.4.22 and 7.2.4.23 shall only apply to vessels that have unloaded goods of Classes 3, 4.1, 5.1, 6.1, 8 or 9 or intend to load such goods.

By derogation from 7.2.3.22, the opening of openings is permitted under the following conditions for cleaning and/or replacing the flame arrester plate stack, visual inspection, sampling, gas measurement, determining the filling quantity in the cargo tank in exceptional cases and subsequently adding stabilizer in exceptional cases but only if and insofar it is not prohibited on the basis of other legal requirements.

7.2.4.22.2 Opening of cargo tank openings shall be permitted only after the respective tanks have been relieved of pressure. Depressurization of cargo tanks is permitted only when using the device for the safe depressurization of cargo tanks prescribed in 9.3.2.22.4 (a) and 9.3.2.22.4 (b) or 9.3.3.22.4 (a) and 9.3.3.22.4 (b).

When explosion protection is required under column (17) of Table C of Chapter 3.2, the opening of cargo tank hatches shall be permitted only if the cargo tanks in question are discharged and the concentration of flammable gases in the tank is less than 10% of the lower explosive limit of the cargo/previous cargo. The results of the measurements shall be recorded in writing. Entry into these cargo tanks is not permitted for the purpose of measuring.

7.2.4.22.3 Opening of openings of cargo tanks loaded with substances for which marking with one or two blue cones or one or two blue lights is

prescribed in column (19) of Table C of Chapter 3.2 shall be permitted only when loading has been interrupted for not less than 10 minutes.

7.2.4.22.4 For the replacement of flame arrester plate stacks for the purpose of cleaning or replacement by flame arrester plate stacks of the same design, the following conditions shall be met:

(a) Cleaning and replacing of the flame arrester plate stack shall be carried out only by trained and qualified personnel;

(b) Opening is permitted only when the relevant cargo tanks are discharged and the concentration of flammable gases in the cargo tank is less than 10% of the lower explosive limit of the cargo/previous cargo;

(c) The results of the measurements shall be recorded in writing.

7.2.4.22.5 For repairs on the flame arrester housing, 8.1.7.3 shall apply.

7.2.4.22.6 If the venting piping is equipped with a flame arrester at its connection to the cargo tank in accordance with 9.3.2.22.4 (b)/9.3.3.22.4 (d), this housing may be opened for the purpose of sampling, a visual inspection of the cargo tanks, determining the filling quantity in the cargo tank or the subsequent addition of stabilizer.

The housing of the flame arrester shall only be opened when the requirements set out in 7.2.4.22.2 are met. The valves of the vapour return piping and the piping for loading and unloading between shore facilities and the vessel shall be closed.

7.2.4.22.7 The operations for the opening of openings shall be carried out using only appropriate low-sparking tools.

7.2.4.22.8 The duration of opening shall be limited to the time necessary for the measures described under 7.2.4.22.1. Opening the cargo tanks immediately before and after as well as during a thunderstorm shall be prohibited.

7.2.4.22.9 The working instructions concerning explosion protection in accordance with 1.3.2.5 shall be available and applied on board.

7.2.4.22.10 In the case of a visual inspection, determination of the filling quantity, gas measurement or addition of stabilizer, 7.2.4.16.8 shall apply accordingly.

7.2.4.22.11 When closing the sampling opening or the flame arrester housing, the flame arrester shall be checked for damage, soiling and correct installation and be repaired, where necessary, before the journey is continued.

7.2.4.22.12 The provisions of 7.2.4.22.1 to 7.2.4.22.11 and 7.2.4.23 shall not apply to oil separator or supply vessels.”.

12. Add the following new 7.2.4.23:

“7.2.4.23 Measures on the cargo tank that require opening cargo tanks that have not been degassed

7.2.4.23.1 Visual inspection of discharged and empty cargo tanks

7.2.4.23.1.1 Discharged cargo tanks shall only be opened for visual inspection to verify that the cargo tanks are empty and/or clean when the vessel is not connected to the shore facility.

7.2.4.23.2 Sampling, determination of the filling quantity, addition of stabilizer and gas measurement

- 7.2.4.23.2.1 The sampling receptacles including all accessories such as ropes, etc., shall consist of electrostatically conductive material and shall be electrically connected to the vessel's hull.
- 7.2.4.23.2.2 Sampling shall be permitted only if a device prescribed in column (13) of Table C of Chapter 3.2 or a device ensuring a higher level of safety is used.
- 7.2.4.23.2.3 In exceptional cases in the event of a malfunction of the sampling device that cannot be solved in the short term, sampling via the sampling opening shall be permitted.
- 7.2.4.23.2.4 The opening of cargo tanks for open sampling should only be carried out when the vessel is not connected to the shore facility. First foot samples during loading may also be taken when the vessel is connected to the shore facility provided the shut-off devices on the vessel and at the shore facility are closed.
- 7.2.4.23.2.5 If the quantity of the cargo measured by the filler differs from the quantity determined on board by means of measuring instruments, the filling quantity in the cargo tank may be determined manually via the sampling opening using a measuring tape and a thermometer.
- The measuring instruments used for determining the filling quantity in cargo tanks shall consist of electrostatically conductive material and shall be electrically connected to the vessel's hull during measuring. The measuring instrument shall be suitable for use in zone 0.
- 7.2.4.23.2.6 When adding stabilizer via the sampling opening, static charging shall be prevented.
- 7.2.4.23.2.7 The requirements in accordance with 7.2.3.1.4 shall apply additionally for gas measurement.”
13. In 8.6.4, ‘Checklist degassing to reception facilities’, question no. 10 is amended to read as follows:
- “Are all cargo tank hatches and other cargo tanks openings closed or, if appropriate, protected by flame arresters in good condition?”

II. Justification

14. The amendment of the current wording of ADN solves the existing contradictions between the Regulations annexed to ADN and the requirements resulting from operational practice in detail.
15. When complying with the proposed safety precautions, it is safe to open the openings described above, even if the cargo tanks have not yet been degassed.
16. To make the provisions in Part 7 user-friendly, they shall be divided into three parts:
- Sub-section 7.2.4.22 containing general safety rules that are applicable for any opening of a cargo tank opening.
 - Paragraph 7.2.4.23.1 with additional safety rules that are only applicable and appropriate in the case of a visual inspection.
 - Paragraph 7.2.4.23.2 with additional safety rules that are only applicable and appropriate in the case of open sampling, determination of the filling quantity, addition of stabilizer and gas measurement.

Re 1.2.1, definition of “Sampling opening”

17. In accordance with the rules for construction in 9.3.2.21.1 (g) and 9.3.3.21.1 (g), it is not mandatory for every tank to have a *dedicated* sampling opening as defined in 1.2.1 of

ADN, even if such opening is indicated in column (13) of Table C. The wording “and/or” indicates that it is sufficient if each cargo tank is equipped with a connection for a sampling device. This is to be made clear in the text of the Regulations.

18. In order to make it possible to open openings of vessels without a dedicated sampling opening, the definition of “sampling opening” is to be supplemented with “equivalent openings” in terms of safety. This will make it possible to also use existing openings that comply with the current safety standards for “sampling openings” for taking samples.

Re 7.2.3.7.1.3

19. Many years of operational practice have shown that the openings used on board an inland waterway tank vessel for releasing the gas/air mixture into the atmosphere are not described clearly in this paragraph.

20. The use of a hose to vent the gas/air mixture during degassing is a variant already used today that increases safety for the crew. In this way, the gas/air mixture can be vented in a controlled way in a certain direction (away from the vessel).

Re 7.2.4.22 Opening of cargo tank openings (general)

21. A new paragraph 7.2.4.22.1 clarifies that the opening of openings is only permitted for tank vessels of types C and N. The restriction that the release of gas from the cargo into the atmosphere related to the opening has to be in accordance with other legislation, in particular environmental legislation, is modelled after the introductory provision for degassing in paragraph 7.2.3.7.0.

22. The new paragraph 7.2.4.22.2 is identical to the current paragraph 7.2.4.22.1.

23. The French and English versions have to be amended as follows:

(a) To align the wording of the provisions with the German version, in the second sentence, the words “if the cargo tanks in question have been degassed” are replaced by the words “if the cargo tanks in question are discharged”. See also the definition of “Ladetank (entladen)” or “*Cargo tank (discharged)*” and “Ladetank (gasfrei)” or “*Cargo tank (gas free)*”;

(b) The requirement that cargo tanks have to be “gas free” prior to opening makes short-term action required for operational purposes impossible, as, prior to opening, the lengthy procedure set out in 7.2.3.7 of ADN has to be carried out;

(c) The restriction in the current paragraph 7.2.4.22.2 (“Opening of sampling outlets is only permitted for sampling and control or cleaning of empty cargo tanks”) is deleted;

(d) The first sentence of the current paragraph 7.2.4.22.3 (“Sampling shall be permitted only if a device prescribed in column (13) in Table C of Chapter 3.2 or a device ensuring a higher level of safety is used.”) is moved to the special provisions for the opening for the purpose of sampling and for gas measurement; the second sentence is kept as paragraph 7.2.4.22.3;

(e) The content of the current paragraph 7.2.4.22.4 on sampling receptacles and their accessories is moved to the special provisions for the opening for the purpose of sampling (7.2.4.23.2);

(f) Paragraph 7.2.4.22.5 on the replacement of flame arrester plate stacks for the purpose of cleaning or replacement by flame arrester plate stacks of the same design becomes paragraph 7.2.4.22.4.

24. The English version has to be amended as follows:

(a) To align the wording of the provisions with the French and German versions, in the second sentence the words “cargo tanks are empty” are replaced by the words “cargo tanks are discharged”. See also the definition of “Ladetank (entladen)” or “*Cargo tank*”

(discharged)” and “Ladetank (leer)” or “Cargo tank (empty)”. The requirement that cargo tanks have to be “empty” prior to opening makes short-term action required for operational purposes impossible, as, prior to opening, time-consuming stripping is required;

(b) The new paragraph 7.2.4.22.5 again states expressly that any repairs required may only be carried out by specially qualified personnel;

(c) The new paragraph 7.2.4.22.6 contains a new provision for the case that the open sampling and visual inspection of the cargo tanks may not only be performed via the sampling opening but that the housing of the flame arrester at the connection of the cargo tank and the venting piping may also be opened for this purpose. In exceptional cases, this opening may also be used for determining the filling quantity in the tank and for subsequently adding stabilizer;

(d) In paragraph 7.2.4.22.7 on the use of low-sparking tools, the reference to chromium vanadium steel tools provided as an example is deleted. There is a general requirement to use “appropriate low-sparking tools”; specifying a particular material is not necessary;

(e) The requirement in paragraph 7.2.4.22.8 to limit the duration of opening to the time absolutely necessary is extended to all cases where openings are opened. The prohibition of opening the cargo tanks immediately prior to and after as well as during a thunderstorm is added as an additional safety measure (see similar provision for degassing into the atmosphere in 7.2.3.7.0);

(f) The new paragraph 7.2.4.22.9 highlights the importance and binding nature of the working instructions concerning explosion protection in accordance with 1.3.2.5 of ADN also for the opening of cargo tanks that have not been degassed;

(g) The new paragraph 7.2.4.22.10 establishes a reference to the existing paragraph 7.2.4.16.8. This paragraph prescribes the protective equipment persons have to wear during sampling or when cleaning or replacing a flame arrester plate stack. The hazards emanating from and appropriate protective measures for the other activities are the same;

(h) The new paragraph 7.2.4.22.11 ensures that, after closing, the opening is in a faultless condition from the point of view of safety;

(i) Paragraph 7.2.4.22.12 contains a general exception for supply and oil separator vessels and is identical to the current paragraph 7.2.4.22.8 in terms of content.

Re 7.2.4.23.1 Visual inspection of discharged and empty cargo tanks

25. The opening of openings of cargo tanks that have not been degassed so that the filler can perform a visual inspection to check whether the cargo tanks are clean and/or empty is not described in the current sub-section 7.2.4.22.

26. The check whether the tank is empty and/or clean is necessary for safety reasons to avoid unwanted chemical reactions of the cargo with previous cargoes. Moreover, unwanted contamination by residues of previous cargoes can result in quality issues, which might lead to substantial problems and resulting costs where disposal becomes necessary.

27. These provisions are to apply to the cargo tank designs: cargo tank (discharged) and cargo tank (empty).

28. The vessel should not be connected to the shore facility so that, in the event of an incident, a fire, for example, cannot spread from the vessel to the shore facility and from the shore facility to the vessel.

Re 7.2.4.23.2 Sampling, determination of the filling quantity, addition of stabilizer and gas measurement

29. This paragraph contains the specific provisions applicable to the opening of openings for the purpose of open sampling:

(a) Paragraph 7.2.4.23.2.1 contains the first sentence of the current paragraph 7.2.4.22.3. Due to the amendment of the definition of “Sampling opening” in sub-section 1.2.1, it is clear that not only a dedicated “sampling opening” but also any opening with equivalent protection may be used. This is in particular the opening in accordance with 7.2.4.22.6.;

(b) The new paragraph 7.2.4.23.2.2 creates the possibility of taking a sample via an opening in exceptional cases if the closed-type or partly closed-type sampling system fails and thereby ensures that the unloading of the vessel is not prevented and its operational plan is not significantly disrupted (resulting in economic damage for the carrier) in cases where the damage cannot be repaired in the short term with the vessel’s own resources or by external service providers within possible time buffers;

(c) The provision in the new paragraph 7.2.4.23.2.3 is equivalent to the provision in paragraph 7.2.4.23.1.1 on the opening for the purpose of visual inspections — the justification is the same;

(d) Paragraph 7.2.4.23.2.4 is identical to the current paragraph 7.2.4.22.4.;

(e) The measurement by means of the fixed measurement systems as mentioned in the new paragraph 7.2.4.23.2.5 can occasionally be incorrect. This may be due to air bubbles or drops that confuse radar or sonic measuring systems or due to floaters that are “stuck”. Defective sensors may be another reason. As a result, the quantity indicated by the filler to the carrier during loading or by the carrier at the unloading site may differ from the quantity indicated by the fixed measurement system on the cargo tank. In this case, the precise quantity and value of the cargo can only be determined by means of a measuring tape and a thermometer. The determination of the quantity by means of the calibration marks on the vessel is not as precise as required by the customers of the carrier and the customs authorities in the case of a transport operation from a bonded warehouse;

(f) The requirement in paragraph 7.2.4.23.6 takes up an issue that is already regulated in other places in ADN, e.g. for inerting in 7.2.4.18.4 or for loading in 7.2.4.16.15, to prevent electrostatic charging. For this, the rate of filling has to be kept as low as possible, taking into consideration the conductivity. In practice, the amounts of stabilizer added are relatively small;

(g) The reference to paragraph 7.2.3.1.4 included in 7.2.4.23.2.7 serves as a reminder of the general provisions on entering cargo tanks in the context of the opening of openings. The measurement has to be carried out by an expert (ADN) who is equipped with a breathing apparatus suited to the substance carried and is not allowed to enter the spaces to be examined.

(h) It is possible to safely carry out measurements to check whether the cargo tank is free from gases prior to entering the tank for inspection purposes, prior to removing the blue cones/lights, if the requirements in accordance with 7.2.3.1.4 are complied with in addition to the new provisions in 7.2.4.22 and 7.2.4.23.2.

Re 8.6.4

30. It is proposed that openings are not enumerated to prevent a regulatory gap from arising if there are any further technical amendments in the future.

III. Safety

31. The principle set out in sub-section 7.2.3.22 that cargo tanks and residual cargo tanks must remain closed unless specific exceptions are described in Part 7 will be fully retained. Just as with the degassing of cargo tanks, which also involves the opening of openings, the opening is only permitted if the release of gases and vapours from the cargo tanks is not prohibited by other rules and regulations.

32. The new and unambiguously worded provisions and the resulting uniform interpretation of the provisions by all parties involved in the carriage enhance safety during carriage.

IV. Feasibility

33. No problems are expected with regard to the implementation, as this approach might already have been followed in practice — depending on the interpretation of the existing legal texts.
