



Economic Commission for Europe**Inland Transport Committee****Working Party on the Transport of Dangerous Goods**

Joint Meeting of Experts on the Regulations annexed to the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN) (ADN Safety Committee)

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Item 3 (c) of the provisional agenda

Implementation of the European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways (ADN): interpretation of the Regulations annexed to ADN

Non-measurable substances for which a toximeter is required

Transmitted by the European Barge Union (EBU) and the European Skippers Organisation (ESO) *,**

Introduction

1. According to the flowchart in 3.2.3.3 of ADN, a toximeter is required for the following substances:

- all substances of Class 6.1,
- all substances of other classes with T in column (3b),
- CMR substances of Category 1A or 1B according to chapters 3.5, 3.6 and 3.7 of GHS

2. Tables A and C in conjunction with 8.1.5.1 of ADN stipulate the toximeter shall be on board if TOX is indicated in column 9 of Table A or in column 18 of Table C:

TOX: a toximeter appropriate for the current and previous cargo, with the accessories and instructions for its use;

3. 1.2.1 of ADN defines a toximeter as follows:

Toximeter means a (trans)portable device allowing measuring of any significant concentration of toxic gases and vapours;

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4. The device has to comply with standard EN 45544-1:2015, EN 45544-2:2015, EN 45544-3:2015 and EN 45544-4:2016 or with standard ISO 17621:2015.

5. It is known, that not for all products, measurement devices to detect toxic vapours or gases are available, which leads to incompliance. It should be considered if alternative safety measures could be proposed which could guarantee the same safety level as meant in the provisions of the ADN.

Operational safety provisions to use a toximeter

6. Several operational safety provisions in the ADN refer to the use of a toximeter. For example:

- entry into holds 7.1.3.1.4 / 7.1.3.1.5. / 7.1.3.1.6 / 7.1.3.1.7
- ventilation requirements in case of (suspicion of) leakage in holds 7.1.4.12.2.
- 7.1.6.12 special provision VE02: measuring the holds to determine if ventilation is necessary, when holds are not ‘free of toxic gases and vapours’
- 7.1.6.16 special provision IN01: every eight hours measuring of all spaces on board to be used by crew;
- 7.2.3.1.4 / 7.2.3.1.5 / 7.2.3.1.6 entry into cargo tanks
- 7.2.3.7.1.4 degassing towards the atmosphere
- 7.2.3.7.1.5 / 7.2.3.7.2.5 removing the marking (blue cones) after degassing
- 7.2.5.0.1 (de-) marking of blue cones

Substances which cannot be measured with a toximeter

7. In line with INF.2 of the thirty-fifth session of the ADN Safety Committee and the discussion held in general, regarding substances which cannot be detected by a toximeter, EBU/ESO had volunteered to start performing an investigation. This investigation has been executed by members of the Dutch industry associations, in cooperation with experts from Dräger Maritime.

8. Two provisional conclusions of this investigation are:

(a) There are a large number of specific substances for which there are no measuring methodology or suitable measuring equipment at all. A provisional and non-limiting list of examples of substances which are being transported and for which a “TOX” is required which cannot be detected by the toximeter on board, is presented in Annex I.

(b) In practice, the mandatory availability of toximeters is met by the use of a specific toximeter with Short-term tubes or so-called electronical PID* meters or (PID: Photo Ionisation Detector), which is commonly use on board as alternative device. The PID-meter has much a more reliable and accurate outcome data than the toximeter with Short-term tubes but is not mentioned in ADN.

Questions to the ADN Safety Committee

9. EBU/ESO suggest to send this topic to the ADN informal working group on substances, because of their specific technical knowledge of substances properties and safety.

10. Questions to be discussed in the working group of substances could be:

(a) Which substances, for which a toximeter is required, cannot be detected by a toximeter or PID-meter?

(b) How to deal with the current ADN provisions (see paragraph 6) during the transport of these substances? Are there any options for alternative safety precautions, ensuring the same safety level?

(c) Is it relevant to measure among (tank)-containers which are stowed above deck in the open air and wind, similar with the situation in open atmosphere when transported on a truck (ADR) or by rail lorry (RID)?

(d) Should the PID-meter be mentioned specifically in the ADN?

The required standards EN 45544:-2015, as mentioned in the definition of a Toximeter are about “electrical apparatus used for the direct detection and direct concentration measurement of gases and vapours”, which seems to be applicable to PID-meters. The toximeter itself is a manual meter (not electrical), for which ISO 17621:2015 is applicable. Could this be clarified?

11. EBU/ESO would really embrace the support of the Safety Committee as our industry is now aware of this safety gap and not sure how to deal with the transport of the relevant substances, which we, off course, would like to keep transporting. A need for alternative safety measures to protect the crew and to be able to fulfil legislation in a safe way is needed. EBU/ESO is willing to prepare further investigation and would be happy to send further results to the informal working group on substances.

Annex**Provisional list of products which cannot be detected by a toximeter****Examples of substances which cannot be measured with a toximeter - provisionally inventory EBU/ESO-January 2020**

| <i>UN nr.</i> | <i>Product Name or description</i> | <i>Remarks</i> |
|---------------|--|---|
| 1026 | CYANOGEN | |
| 1069 | NITROSYL CHLORIDE | |
| 1381 | PHOSPHORUS, WHITE or YELLOW, UNDER WATER or IN SOLUTION | Substance itself is unmeasurable, but vapours coming from this substance are measurable with short term tubes for phosphorhydrogen |
| 1182 | ETHYL CHLOROFORMATE | |
| 1541 | ACETONE CYANOHYDRIN, STABILIZED | |
| 1664 | NITROTOLUENES, LIQUID | |
| 1750 | CHLOROACETIC ACID SOLUTION | |
| 1790 | HYDROFLUORIC ACID with % (3 positions!) hydrofluoric acid | |
| 1838 | TITANIUM TETRACHLORIDE | |
| 2013 | STRONTIUM PHOSPHIDE | |
| 2205 | ADIPONITRILE | |
| 2078 | TOLUENE DIISOCYANATE (and isomeric mixtures) (2,4- TOLUENE DIISOCYANATE) | |
| 2281 | HEXAMETHYLENE DIISOCYANATE | |
| 2290 | ISOPHORONE DIISOCYANATE | |
| 2295 | METHYL CHLOROACETATE | |
| 2438 | TRIMETHYLACETYLCHLORID | |
| 2748 | 2-ETHYLHEXYL CHLOROFORMATE | |
| 2754 | N-Ethyltoluidinen | |
| 2927 | TOXIC LIQUID, CORROSIVE, ORGANIC, N.O.S. (2 positions) | 4- Chlorobutyryl chloride can be detected with short term tube Phosgen 0.02a Other substances under UN 2927 are not measurable with electronic (PID) meter or short term tubes. |
| 2929 | TOXIC LIQUID, FLAMMABLE, ORGANIC, N.O.S. | |
| 2966 | THIOGLYCOL (mercaptoethanol) | |
| 3276 | NITRILES, LIQUID, TOXIC, N.O.S. (3 positions) | |

| <i>UN nr.</i> | <i>Product Name or description</i> | <i>Remarks</i> |
|---------------|---|--|
| 3302 | 2-DIMETHYLAMINOETHYLACRYLAAT, STABILIZED | |
| 3381 | TOXIC BY INHALATION LIQUID, N.O.S. | |
| 3382 | TOXIC BY INHALATION LIQUID, N.O.S. | |
| 3383 | TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. | |
| 3384 | TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. | |
| 3385 | TOXIC BY INHALATION LIQUID, FLAMMABLE, N.O.S. | |
| 3386 | TOXIC BY INHALATION LIQUID, WATERREACTIVE, N.O.S. | |
| 3387 | TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. | |
| 3388 | TOXIC BY INHALATION LIQUID, OXIDIZING, N.O.S. | |
| 3389 | TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. | |
| 3390 | TOXIC BY INHALATION LIQUID, CORROSIVE, N.O.S. | Diphosgene (under UN 3390) is measurable with tube Chloropircin 0.1a Other substances under UN 3390 are not measurable with an electronic (PID) meter or short term tubes. |
| 3455 | CRESOLS, SOLID, MOLTEN | In tank barge liquid, TOX required, in dry cargo solid; no TOX required |