
Economic Commission for Europe**Inland Transport Committee**

17 January 2020

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)****Thirty-sixth session**

Geneva, 27-31 January 2020

Item 4 (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 EBU/ESO****I. Introduction**

1. According to the systematic of the ADN (3.2.3.3) the 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

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

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

ADN 1.2.1 defines the toximeter as follows:

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

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.

2. It is known, that not for all products, measurement devices to detect toxic vapours or gases are available, which leads to non-compliance. 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.

II. Operational safety provisions to use the toximeter

3. Several operational safety provisions in the ADN refer to the use of the 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

III. Substances which cannot be measured with a toximeter

4. In line with INF.2 of the 35th 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.

5. Two **provisionally conclusions** of this investigation are:

(a) There are a large number of specific substances for which is no measuring methodology or suitable measuring equipment at all. A provisionally 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 attached as Annex I.

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

IV. Questions to the ADN Safety Committee

6. EBU/ESO suggest to address this topic to the ADN informal working group of substances, because of their specific technic knowledge of substances properties and safety.

Questions which could be discussed in the working group of substances could be:

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

(b) How to deal with the current ADN-provisions meant under sub **II.**, 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?

(e) The required standards EN 45544-:2015 (-sub 1 until 4), 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?

7. 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 introduce further results in the IWG of substances.

Appendix I: 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-jan/2020

UN nr.	Product Name or description	Remarks
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	
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- Chlorobutryl 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)	
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