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### 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)

#### Thirty-first session

Geneva, 28-31 August 2017

Item 5 of the provisional agenda

#### Reports of informal working groups

### Report of the informal working group on degassing of cargo tanks

Transmitted by the Government of the Netherlands<sup>\*,\*\*</sup>

<i>Summary</i>	
<b>Executive summary:</b>	The document contains a summary of the fifth meeting of the informal working group on degassing of cargo tanks. The resulting amendments to the Regulations annexed to ADN can be found in the annex. Special attention is drawn to the provisions regarding degassing to reception facilities (section 7.2.3.7.2).
<b>Action to be taken:</b>	The Safety Committee is invited to adopt the amendments which can be found in the annex.
<b>Related documents:</b>	Informal document INF. 25 of the twenty-fifth session ECE/TRANS/WP.15/AC.2/52 (paras. 57-59) Informal document INF. 19 of the twenty-sixth session ECE/TRANS/WP.15/AC.2/54 (para. 62) ECE/TRANS/WP.15/AC.2/2015/29

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\*\* In accordance with the programme of work of the Inland Transport Committee for 2016-2017 (ECE/TRANS/2016/28/Add.1 (9.3.)).

	<p>ECE/TRANS/WP.15/AC.2/56 (paras. 70-74)  ECE/TRANS/WP.15/AC.2/2016/25  ECE/TRANS/WP.15/AC.2/58 (paras. 73-74)  ECE/TRANS/WP.15/AC.2/2016/49  Informal documents INF.8 and INF. 9 of the twenty-ninth session  ECE/TRANS/WP.15/AC.2/60 (paras. 53-61)</p>
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## Introduction

1. On 28-30 March 2017 the fifth meeting of the informal working group on degassing of cargo tanks took place at the Ministry of Infrastructure and the Environment in The Hague, the Netherlands. The meeting was attended by representatives of Belgium, Germany, and the Netherlands, representatives of EBU, ESO and CEFIC and representatives of enforcement bodies in Germany and the Netherlands.
2. During the previous four meetings of the informal working group and in a correspondence round, the participants mainly prepared and discussed amendments to the ADN to improve and clarify the provisions regarding degassing of cargo tanks. These amendments have been discussed in several sessions of the ADN Safety Committee.
3. In the last discussion in August 2016, the Safety Committee invited the informal working group to come up with a revised proposal, which would take account of all the comments made by the Safety Committee. The informal working group was especially invited to specify in the provisions the different types of degassing (to the atmosphere or to reception facilities). Therefore the Dutch delegation took the initiative to discuss this issue intensively, among other topics, during the fifth meeting of the informal working group on degassing of cargo tanks.

### I. Toximeters

4. The first topic on the agenda was the technical requirements of toximeters. A representative of a supplier of these types of devices delivered a short presentation regarding the advantages and disadvantages of the different types of toximeters (toximeters using tubes or photo ionization detection (PID) technology). The toximeters using tubes are suitable for very specific substances and mixtures but for several cargo there are no tubes available. The PID-meter is very suitable for the measurement of pure substances but less suitable for the measurement of mixtures. The informal working group decided to add references to the applicable standards in the definition of toximeters.

### II. Incidents related to improper by degassed cargo tanks

5. The representative of Germany presented two cases in which improper by degassed cargo tanks led to lethal accidents. The informal working group concluded that in one case the accident could have been prevented if the involved persons had fulfilled the legal requirements. Because the investigation in the second case (explosion in Duisburg in March 2016) had not yet been completed by the German authorities, the informal working group could not reflect on the question whether the ADN requirements had been violated in this case. However, the informal working group discussed the suggestion to inert discharged or

emptied cargo tanks before work on a wharf. It was unanimously concluded by the informal working group that inerting cargo tanks before works on the wharf is less safe than making the tanks gas-free before works commence.

6. In relation to the two incidents, the informal working group had a preliminary discussion on the possibility of degassing of empty cargo tanks by washing them. For some substances this might be a suitable option. Furthermore, the working group again raised the question whether there should be a given period of time between the day of the issuance of a gas free certificate and the day at which the works on board commence.

### **III. Degassing to reception facilities**

7. Three representatives of reception facilities presented their technical system as an introduction to the issue of degassing to reception facilities, instead of to the atmosphere. Although the systems had some similarities, it became clear that there is a wide variety of technical solutions to process the gases and vapours of cargo tanks in these reception facilities. It was noted that the three presented technical systems were able to handle a specific, limited range of dangerous goods, mainly hydrocarbons. The informal working group concluded that the ADN is only applicable in relation to the safe interface between the clients of the reception facilities and their connection with the reception facility. Therefore the ADN should not prescribe environmental or ATEX-requirements etc. for these type of facilities.

8. Regarding the gas-free certificate it was re-affirmed that these certificates may only be issued by persons approved by the competent authority, according to 7.2.3.7.6 of ADN. A reception facility might consider applying for this approval.

9. The informal working group concluded that a distinction could be made between degassing to reception facilities in a closed system and degassing to reception facilities while air is sucked in from the outside into the cargo tank. Under all circumstances, an open, unprotected connection between the outside and the cargo tank should be prevented.

10. Therefore the informal working group decided to prescribe during degassing to a reception facility, if an opening is used to bring in air in the system, a permanently installed of a portable spring loaded low-pressure valve at this opening, with a suitable flame-arrester if explosion protection is required. The degassing vessel cannot use the regular vacuum valve for this process since this safety device may not be used during normal operations. If the valve is permanently installed on the vessel it should be closed with a blind flange / plate stack when the vessel is not degassing to a reception facility to avoid that the regular vacuum valve becomes useless.

11. Lastly, the informal working group decided to propose additional and consequential amendments to guarantee the safety during degassing of cargo tanks to reception facilities. Among other amendments, a short checklist for degassing to reception facilities is proposed as well as earthing-requirements and the possibility to interrupt the degassing-process.

### **IV. Conclusion**

12. The ADN Safety Committee is invited to discuss the amendments proposed in the annex and to take action as it deems appropriate.

## Annex

## Proposed amendments to ADN 2017

The deleted text is stricken through; the additional text is given in bold and underlined form

- 1.2.1 Definitions
- 1.2.1 *Cargo tank (gas free)* means a cargo tank which after unloading does not contain any residual cargo or any measurable concentration of dangerous gases **and vapours**.
- 1.2.1 **Degassing means an operation with the aim of lowering the concentration of dangerous gases and vapours in empty or unloaded cargo tanks by emitting them to the atmosphere or to reception facilities.**
- 1.2.1 **Explosion range means the range of the concentration of a flammable substance or mixture of substances in air, within which an explosion can occur, respectively the range of the concentration of a flammable substance or mixture of substances in mixture with air/inert gas, within which an explosion can occur, determined under specified test conditions.**
- 1.2.1 **Lower explosion limit (LEL) means the lowest concentration of the explosion range at which an explosion can occur.**
- 1.2.1 **LEL: see Lower explosion limit**
- 1.2.1 *Toximeter* means a **(trans)portable** device allowing measuring of any significant concentration of toxic gases **and vapours** ~~given off by the cargo.~~ **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.**  
**If this device is used in explosion hazardous areas it shall be in addition suitable to be used in the respective zone and it has to be proven that the applicable requirements are fulfilled (e.g. conformity assessment procedure according to Directive 2014/34/EC<sup>1</sup>, or ECE Trade 391<sup>2</sup> or at least equivalent).**
- This device shall be so designed that such measurements are possible without the necessity of entering the space~~s~~ to be checked.
- 1.2.1 **UEL: see Upper explosion limit**
- 1.2.1 **Upper explosion limit (UEL) means the highest concentration of the explosion range at which an explosion can occur.**
- 1.4 Safety obligations of the participants
- 1.4.2.2.1 (...)

<sup>1</sup> Journal of the European Communities No. L 23 of 26 February 2014, p. 309

<sup>2</sup> A Common Regulatory Framework for Equipment Used in Environments with an Explosive Atmosphere, United Nations 2011.

**(k) Complete his section of the checklist referred to in 7.2.3.7.2.2 prior to the degassing of empty or unloaded cargo tanks and piping for loading and unloading of a tank vessel to a reception facility.**

(...)

**1.4.3.8 Reception facility operator**

**1.4.3.8.1 In the context of 1.4.1, the reception facility operator shall in particular:**

**(a) Complete his section of the checklist referred to in 7.2.3.7.2.2 prior to the degassing of empty or unloaded cargo tanks and piping for loading and unloading of a tank vessel;**

**(b) Ascertain that, when prescribed in 7.2.3.7.2.3, there is a flame arrester in the piping of the reception facility which is connected to the degassing vessel, to protect the vessel against detonations and passage of flames from the side of the reception facility.**

1.8.3 Safety adviser

1.8.3.1 Each undertaking, the activities of which include the carriage, or the related packing, loading, filling or unloading, of dangerous goods by inland waterways shall appoint one or more safety advisers, hereinafter referred to as “advisers”, for the carriage of dangerous goods, responsible for helping to prevent the risks inherent in such activities with regard to persons, property and the environment.

**NOTE: This obligation does not apply to reception facility operators.**

1.8.5 Notifications of occurrences involving dangerous goods

1.8.5.1 If a serious accident or incident takes place during loading, filling, carriage or unloading of dangerous goods, **or during degassing of tank vessels** on the territory of a Contracting Party, the loader, filler, carrier ~~or~~ consignee **or reception facility operator**, respectively, shall ascertain that a report conforming to the model prescribed in 1.8.5.4 is made to the competent authority of the Contracting Party concerned at the latest one month after the occurrence.

7.1.3 General service requirements

*Replace the paragraphs 7.1.3.1.3 – 7.1.3.1.7 by the following text:*

7.1.3.1.3 If the concentration of gases **and vapours given off by the cargo** or the oxygen content of the air in holds, double-wall spaces or double bottoms has to be measured before entry, the results of these measurements shall be recorded in writing. The measurement may only be effected by **an expert referred to in 8.2.1.2**, ~~persons~~ equipped with suitable breathing apparatus for the substance carried.

Entry into the spaces is not permitted for the purpose of measuring.

7.1.3.1.54 **Carriage of cargo in bulk or without packaging**

~~The gas concentration in holds and in adjacent holds containing~~ **If a vessel carries dangerous goods carried in bulk or without packaging in its holds for which EX and/or TOX appears in column (9) of Table A of Chapter 3.2, the concentration of flammable and/or toxic gases and vapours given off by**

the cargo in these holds and adjacent holds shall be measured before any person enters these holds.

7.1.3.1.75 Entry into holds where dangerous goods are carried in bulk or without packaging as well as entry into double-hull spaces and double bottoms is **only permitted if not permitted except where:**

- ~~there is no lack of oxygen and no measurable amount of dangerous substances in a dangerous concentration; or~~ **the concentration of flammable gases and vapours given off by the cargo in the hold, double hull space or double bottom is below 10 % of the LEL, the concentration of toxic gases and vapours given off by the cargo is below national accepted exposure levels, and the percentage of oxygen is between 20 and 23,5 vol %.**

or

- **the concentration of flammable gases and vapours given off by the cargo is below 10% of the LEL, and** the person entering the space wears a self-contained breathing apparatus and other necessary protective and rescue equipment, and is secured by a line. Entry into these spaces is only permitted if this operation is supervised by a second person for whom the same equipment is readily at hand. Another two persons capable of giving assistance in an emergency shall be on the vessel within calling distance.

**In deviation of 1.1.4.6, more stringent national legislation on the entry into holds shall take precedence over the ADN.**

7.1.3.1.46 **Carriage in packages**

In case of suspected damage to packages, the ~~gas~~concentration **of flammable and/or toxic gases and vapours given off by the cargo** in holds containing dangerous goods of Classes 2, 3, **4.3,** 5.2, 6.1 and 8 for which EX and/or TOX appears in column (9) of Table A of Chapter 3.2, shall be measured before any person enters these holds.

7.1.3.1.67 Entry into holds where damage is suspected to packages in which dangerous goods of Classes 2, 3, **4.3,** 5.2, 6.1 and 8 are carried as well as entry into double-hull spaces and double bottoms is **only permitted if not permitted except where:**

- ~~there is no lack of oxygen and no measurable amount of dangerous substances in a dangerous concentration; or~~ **the concentration of flammable gases and vapours given off by the cargo in the hold, double hull space or double bottom is below 10 % of the LEL, the concentration of toxic gases and vapours given off by the cargo is below national accepted exposure levels, and the percentage of oxygen is between 20 and 23,5 vol %.**

or

- **the concentration of flammable gases and vapours given off by the cargo in the hold is below 10 % of the LEL and** the person entering the space wears a self-contained breathing apparatus and other necessary protective and rescue equipment and is secured by a line. Entry into these spaces is only permitted if this operation is supervised by a second person for whom the same equipment is readily at hand. Another two persons capable of giving assistance in an emergency shall be on the vessel within calling distance.

**In deviation of 1.1.4.6, more stringent national legislation on the entry into holds shall take precedence over the ADN.**

**7.X.3.16 All measurements on board the vessel shall be performed by an expert according to 8.2.1.2, unless provided otherwise in the Regulations annexed to ADN. The results of the measurements shall be recorded in writing in the book according to paragraph 8.1.2.1 (g)**

7.X.3.167 to 7.X.3.19 (Reserved)

7.1.4 Additional requirements concerning, loading, carriage, unloading and other handling of the cargo

7.1.4.12.2 On board vessels carrying dangerous goods only in containers placed in open holds, ventilators do not require to be incorporated but must be on board. Where damage of the container or release of content inside the container is suspected, the holds shall be ventilated so as to reduce the concentration of **flammable** gases **and vapours** given off by the cargo to less than 10 % of the ~~lower explosive limit LEL~~ or in the case of toxic gases **and vapours** to below **national accepted exposure levels**.~~any significant concentration.~~

7.1.6 Additional requirements

7.1.6.12 Ventilation

The following additional requirements shall be met when they are indicated in column (10) of Table A of Chapter 3.2:

VE01: Holds containing these substances shall be ventilated with the ventilators operating at full power, where after measurement it has been established that the concentration of **flammable** gases **and vapours** given off by the cargo exceeds 10 % of the ~~lower explosive limit LEL~~. The measurement shall be carried out immediately after loading. ~~A control~~**A control** measurement shall be repeated after one hour ~~for monitoring purposes~~. The results of the measurement shall be recorded in writing.

VE02: Holds containing these substances shall be ventilated with the ventilators operating at full power, where after measurement it has been established that the holds are not free from **toxic** gases **and vapours** given off by the cargo. The measurement shall be carried out immediately after loading. ~~The A control~~**A control** measurement shall be repeated after one hour ~~for monitoring purposes~~. The results of the measurement shall be recorded in writing. Alternatively, on vessels only containing these substances in containers in open holds, the holds containing such containers may be ventilated with the ventilation operating at full power only when it is suspected that the holds are not free of **toxic gases and vapours given off by the cargo**. Prior to unloading, the unloader shall be informed about this suspicion.

VE03: Spaces such as holds, accommodation and engine rooms, adjacent to holds containing these substances shall be ventilated.

After unloading, holds having contained these substances shall undergo forced ventilation.

After ventilation, the gas concentration **of flammable or toxic gases and vapours given off by the cargo** in these holds shall be measured.

The results of the measurement shall be recorded in writing.

VE04: When aerosols are carried for the purpose of reprocessing or disposal under special provision 327 of eChapter 3.3, provisions of VE01 and VE02 are applied.

7.1.6.16 Measures to be taken during loading, carriage, unloading and handling of cargo

The following additional requirements shall be met when they are indicated in column (11) of Table A of Chapter 3.2:

IN01: After loading and unloading of these substances in bulk or unpackaged and before leaving the cargo transfer site, the concentration of **flammable gases and vapours given off by the cargo** in the accommodation, engine rooms and adjacent holds shall be measured by the ~~loader~~ ~~consignor~~ or ~~unloader~~ ~~consignee~~ **or by an expert according to 8.2.1.2** using a ~~flammable~~ gas detector. **The results of the measurement shall be recorded in writing.**

Before any person enters a hold and prior to unloading, the concentration of **flammable gases and vapours given off by the cargo** shall be measured by the ~~unloader~~ ~~consignee~~ of the cargo **or by an expert according to 8.2.1.2.** **The results of the measurement shall be recorded in writing.**

The hold shall not be entered or unloading started until the concentration of **flammable gases and vapours given off by the cargo** in the airspace above the cargo is below 50 % of the ~~lower explosive limit~~ **LEL.**

If ~~the significant~~ concentrations of **flammable gases and vapours given off by the cargo** is **not below 50 % of the LEL** are found in these spaces, the ~~necessary~~ safety measures shall be taken immediately by the ~~loader,~~ ~~consignor~~ or the ~~unloader~~ ~~consignee~~ **or the responsible master.**

IN02: If a hold contains these substances in bulk or unpackaged, the ~~gas~~ concentration **of toxic gases and vapours given off by the cargo** shall be measured in all other spaces of the vessel which are used by the crew at least once every eight hours with a toximeter. The results of the measurements shall be recorded in writing.

(...)

7.2.3 General service requirements

7.2.3.1.4 When the ~~gas~~ concentration **of flammable or toxic gases and vapours given off by the cargo** or ~~the~~ oxygen content has to be measured before entry into cargo tanks, residual cargo tanks, cargo pump-rooms below deck, cofferdams, double-hull spaces, double bottoms or hold spaces, the results of these measurements shall be recorded in writing.

The measurement may only be effected by **an expert referred to in 8.2.1.2** ~~persons~~ equipped with breathing apparatus suited to the substance carried.

Entry into these spaces is not permitted for the purpose of measuring.

7.2.3.1.5 Before any person enters cargo tanks, **the residual cargo tanks,** the cargo pump-rooms below deck, cofferdams, double-hull spaces, double bottoms, ~~or~~ hold spaces **or other confined spaces:**

(a) When dangerous substances of Classes 2, 3, 4.1, 6.1, 8 or 9 for which a ~~flammable~~ gas detector is required in column (18) of Table C of Chapter 3.2 are carried on board the vessel, it shall be established, by means of this device that the ~~gas~~ concentration of **flammable gases and vapours given off**



**by the cargo** in these cargo tanks, **residual cargo tanks**, cargo pump-rooms below deck, cofferdams, double-hull spaces, double bottoms, or hold spaces is not more than 50% of the ~~of the lower explosive limit~~ **LEL** of the cargo. For the cargo pump-rooms below deck this may be determined by means of the permanent gas detection system;

(b) When dangerous substances of Classes 2, 3, 4.1, 6.1, 8 or 9 for which a toximeter is required in column (18) of Table C of Chapter 3.2 are carried on board the vessel, it shall be established, by means of this device that the cargo tanks, **residual cargo tanks**, cargo pump-rooms below deck, cofferdams, double-hull spaces, double bottoms or hold spaces do not contain ~~any significant~~ concentration of toxic gases **and vapours given off by the cargo which exceeds national accepted exposure levels.**

**In deviation of 1.1.4.6, more stringent national legislation on the entry into holds shall take precedence over the ADN.**

7.2.3.1.6 Entry into empty cargo tanks, **the residual cargo tanks**, the cargo pump-rooms below deck, cofferdams, double-hull spaces, double bottoms ~~and~~, hold spaces **or other confined spaces** is **only permitted if** ~~not permitted except:~~

- ~~there is no lack of oxygen and no measurable amount of dangerous substances in dangerous concentrations;~~
- **the concentration of flammable gases and vapours given off by the cargo in the cargo tanks, the residual cargo tanks, the cargo pump-rooms below deck, cofferdams, double-hull spaces, double bottoms, hold spaces or other confined spaces, is below 10 % of the LEL, the concentration of toxic gases and vapours given off by the cargo is below national accepted exposure levels, and the percentage of oxygen is between 20 and 23,5 vol %,**

or

- **the concentration of flammable gases and vapours given off by the cargo in the cargo tanks, the residual cargo tank, the cargo pump-rooms below deck, cofferdams, double-hull spaces, double bottoms, hold spaces or other confined spaces, is below 10 % of the LEL, and** the person entering the spaces wears a self-contained breathing apparatus and other necessary protective and rescue equipment, and is secured by a line. Entry into these spaces is only permitted if this operation is supervised by a second person for whom the same equipment is readily at hand. Another two persons capable of giving assistance in an emergency shall be on the vessel within calling distance. If a rescue winch has been installed, only one other person is sufficient.

**In case of emergency or mechanical problems, it is allowed to enter the tank when the gas concentration given off by cargo is between 10 and 50 % of the LEL. The breathing apparatus (self-contained) in use has to be designed in such a way that the causing of sparks is avoided.**

**In deviation of 1.1.4.6, more stringent national legislation on the entry into cargo tanks shall take precedence over the ADN.**

7.2.3.7 Gas-freeing **Degassing** of empty **or unloaded** cargo tanks **and piping for loading and unloading**

7.2.3.7.0 Gas-freeing **Degassing** of empty or unloaded cargo tanks **and piping for loading and unloading into the atmosphere or to reception facilities** is

permitted under the conditions below but only if **and insofar** it is not prohibited on the basis of **other** international or domestic legal requirements.

**7.2.3.7.1 Degassing of empty or unloaded cargo tanks and piping for loading and unloading into the atmosphere**

7.2.3.7.1.1 Empty or unloaded cargo tanks having previously contained dangerous substances of:

- Class 2 or Class 3, with a classification code including the letter "T" in column (3b) of Table C of Chapter 3.2,

- Class 6.1, or

- packing group I of Class 8,

may only be gas freed **degassed** by ~~either competent persons~~ **an expert** according to sub-section 8.2.1.2 ~~or companies approved by the competent authority for that purpose.~~ **Gas freeing** ~~This~~ may be carried out only at the locations approved by the competent authority.

7.2.3.7.1.23 Where ~~gas freeing~~ **degassing** of cargo tanks having previously contained the dangerous goods referred to in 7.2.3.7.1.1 above is not practicable at the locations ~~designated or~~ approved for this purpose by the competent authority, ~~gas freeing~~ **degassing** may be carried out while the vessel is under way, provided that:

- the requirements of **the first paragraph of 7.2.3.7.1.32** are complied with; the concentration of ~~dangerous substances~~ **flammable gases and vapours given off by the cargo** in the vented mixture at the outlet shall, however, be not more than 10 % of the ~~lower explosive limit~~ **LEL**;

- ~~there is no risk involved for~~ **the crew is not exposed to a concentration of gases and vapours which exceeds national accepted exposure levels**;

(...)

7.2.3.7.1.32 ~~Gas freeing~~ **Degassing** of empty or unloaded cargo tanks having contained dangerous goods other than those referred to under 7.2.3.7.1.1, **when the gas concentration given off by the cargo is 10 % of the LEL or above**, may be carried out while the vessel is underway or at locations approved by the competent authority by means of suitable venting equipment with the tank lids closed and by leading the gas/air mixtures through flame-arresters capable of withstanding steady burning **(Explosion group / subgroup according to column (16) of Table C, Chapter 3.2)**. ~~In normal conditions of operation,~~ ~~†~~ The gas concentration in the vented mixture at the outlet shall be less than 50 % of the **LEL** ~~lower explosive limit~~. The suitable venting equipment may be used for ~~gas freeing~~ **degassing** by extraction only when a flame-arrester is fitted immediately before the ventilation fan on the extraction side **(Explosion group /subgroup according to column (16) of Table C, Chapter 3.2)**. The gas concentration shall be measured once each hour during the two first hours after the beginning of the ~~gas freeing~~ **degassing** operation by forced ventilation or by extraction, by an expert referred to in ~~8.2.1.27-2.3.15~~. The results of these measurements shall be recorded in writing.

~~Gas freeing~~ **Degassing** is, however, prohibited within the area of locks including their lay-bys, **under bridges or within densely populated areas**.

**Degassing of empty or unloaded cargo tanks having contained dangerous goods other than those referred to in 7.2.3.7.1.1, when the concentration of gases and vapours given off by the cargo is below 10 % of the LEL, is allowed, and also additional openings of the cargo tank are allowed to be opened as long as the crew is not exposed to a concentration of gases and vapour which exceeds national accepted exposure levels. Also, there is no obligation to use a flame arrester.**

**It is prohibited within the area of locks, including their lay-bys, under bridges or within densely populated areas.**

7.2.3.7.1.4 ~~Gasfreeing~~ **Degassing** operations shall be interrupted during a thunderstorm or when, due to unfavorable wind conditions, dangerous concentrations of **flammable or toxic** gases **and vapours** are to be expected outside the cargo area in front of ~~the~~ accommodation, the wheelhouse and service spaces. The critical state is reached as soon as concentrations **given off by the cargo of flammable gases and vapours** of more than 20 % of the ~~lower explosive limit~~ **LEL or of toxic gases and vapours exceeding the national accepted exposure levels**, have been detected in those areas by measurements by means of portable **measurement devices** ~~equipment~~.

7.2.3.7.1.5 The marking prescribed in ~~7.2.5.0.1~~ **column (19) of Table C of Chapter 3.2** may be withdrawn by order ~~of~~ the master when, after ~~gasfreeing~~ **degassing** of the cargo tanks, it has been ascertained, using the equipment described in column (18) of Table C of Chapter 3.2, that the cargo tanks no longer contain flammable gases **and vapours** in concentrations of more than 20 % of the ~~the lower explosive limit~~ **LEL** or do not contain ~~a any significant~~ concentration of toxic gases **and vapours which exceeds national accepted exposure levels**. **The result of the measurement shall be recorded in writing.**

7.2.3.7.1.6 Before taking measures which could cause hazards as described in section 8.3.5, **all** cargo tanks and pipes in the cargo area shall be ~~cleaned and~~ **made gas-free** gasfreed. ~~The result of the gas-freeing~~ **This** shall be documented in a gas-free certificate, **valid on the day the works commence**. The condition of being gas-free may only be declared and certified by a person approved by the competent authority.

**7.2.3.7.2 Degassing of empty or unloaded cargo tanks and piping for loading and unloading to reception facilities**

**7.2.3.7.2.1 Empty or unloaded cargo tanks may only be degassed by an expert according to sub-section 8.2.1.2. If required by international or national law, it may only be carried out at the locations approved by the competent authority. Degassing to a mobile reception facility while the vessel is underway, is prohibited. Degassing to a mobile reception facility is prohibited while another vessel degasses to the same facility. Degassing to an on board mobile reception facility is prohibited.**

**7.2.3.7.2.2 Before the degassing operation commences, the degassing vessel shall be earthed. The master of the degassing vessel or an expert according to 8.2.1.2 mandated by him and the operator of the reception facility shall have filled in and signed a checklist confirming with 8.6.4 of ADN.**

**The checklist shall be printed at least in languages understood by the master or the expert and the operator of the reception facility.**

If a positive response to all the questions is not possible, degassing to a reception facility is only permitted with the consent of the competent authority.

7.2.3.7.2.3 Degassing to reception facilities may be carried out by using the piping for loading and unloading or the venting piping to remove the gases and vapours from the cargo tanks while using the other piping respectively to prevent exceedance of the maximum permissible overpressure or vacuum of the cargo tanks.

Piping shall be part of a closed system or, if used to prevent exceedance of the maximum permissible vacuum in the cargo tanks, be equipped with a permanently installed or portable spring-loaded low-pressure valve, with a flame-arrester (Explosion group / subgroup according to 3.2.3.2 Table C, column (16)) if explosion protection is required (3.2.3.2 Table C, column (17)). This low-pressure valve shall be so installed that under normal working conditions the vacuum valve is not activated. A permanently installed valve or the opening to which a portable valve is connected, must remain closed with a blind flange when the vessel is not degassing to a reception facility.

All piping connected between the degassing vessel and the reception facility shall be equipped with an appropriate flame arrester (Explosion group / subgroup according to 3.2.3.2 Table C, column (16)) if explosion protection is required (3.2.3.2 Table C, column (17)).

7.2.3.7.2.4 It shall be possible to interrupt degassing operations by means of switches installed at two locations on the vessel (fore and aft) and at two locations at the reception facility (directly at the access to the vessel and at the location from where the reception facility is operated). Interruption of degassing shall be effected by the means of a quick action stop valve which shall be directly fitted in the connection between the degassing vessel and the reception facility. The system of disconnection shall be designed in accordance with the closed circuit principle and may be integrated in the ESD system of the cargo pumps and overfill protections prescribed in 9.3.X.21.5.

Degassing operations shall be interrupted during a thunderstorm.

7.2.3.7.2.5 The marking prescribed in column (19) of Table C of Chapter 3.2 may be withdrawn by order of the master when, after degassing of the cargo tanks, it has been ascertained, using the equipment described in column (18) of Table C of Chapter 3.2, that the cargo tanks no longer contain flammable gases and vapours in concentrations of more than 20% of the LEL or do not contain a concentration of toxic gases and vapours which exceeds national accepted exposure levels. The result of the measurement shall be recorded in writing.

7.2.3.7.2.6 Before taking measures which could cause hazards as described in section 8.3.5, all cargo tanks and pipes in the cargo area shall be made gas-free. This shall be documented in a gas-free certificate, valid on the day the works commence. The condition of being gas-free may only be declared and certified by a person approved by the competent authority.

7.2.3.12.2 The ventilation of pump rooms shall be in operation:

- At least 30 minutes before entry and during occupation;
- During loading, unloading and gas-freeing ~~degassing~~; and

- After the gas detection system has been activated.
- 7.2.4 Additional requirements concerning loading, carriage, unloading and other handling of cargo
- 7.2.4.2.2 ~~Mooring~~ ~~The landing~~ and reception of oily and greasy wastes may not take place during the loading and unloading of substances for which protection against explosion is required in column (17) of Table C of Chapter 3.2 nor during the ~~gas-freeing~~ **degassing** of tank vessels. This requirement does not apply to oil separator vessels provided that the provisions for protection against explosion applicable to the dangerous substance are complied with.
- 7.2.4.2.3 ~~Mooring Berthing~~ and handing over of products for the operation of vessels shall not take place during the loading or unloading of substances for which protection against explosions is required in column (17) of Table C of Chapter 3.2 nor during the ~~gas-freeing~~ **degassing** of tank vessels. This requirement does not apply to supply vessels provided that the provisions for protection against explosion applicable to the dangerous substance are complied with.
- 7.2.4.7.1 Tank vessels shall be loaded, **or** unloaded ~~or gas-freeed~~ only at the places designated or approved for this purpose by the competent authority.
- 7.2.4.12 (...)
- ~~Gasfreeing~~ **Degassing** of UN No. 1203 petrol: ~~Gasfreeing~~ **Degassing** place and facility or sector, date and time.
- (...)
- 7.2.4.15.3 The ~~gas-freeing~~ **degassing** of cargo tanks and piping for loading and unloading shall be carried out in compliance with the conditions of 7.2.3.7.
- 7.2.4.16.3 The shut-off devices of the loading and unloading piping as well as of the pipes of the stripping systems shall remain closed except during loading, unloading, stripping, cleaning or ~~gas-freeing~~ **degassing** operations.
- 7.2.4.16.7 When a tank vessel conforms to 9.3.2.225.5 (d) or 9.3.3.225.5 (d), the individual cargo tanks shall be closed off during transport and opened during loading, unloading and ~~gas-freeing~~ **degassing**.
- 7.2.4.17.1 During loading, unloading and ~~gas-freeing~~ **degassing** operations, all entrances or openings of spaces which are accessible from the deck and all openings of spaces facing the outside shall remain closed.
- (...)
- 7.2.4.17.2 After the loading, unloading and ~~gas-freeing~~ **degassing** operations, the spaces which are accessible from the deck shall be ventilated.
- 7.2.4.25.3 ~~(Reserved)The shut off devices of the loading and unloading cargo piping shall not be open except as necessary during loading, unloading or gas-freeing operations.~~
- 7.2.5 Additional requirements concerning the operation of vessels
- 7.2.5.0.1 Vessels carrying dangerous goods listed in Table C of Chapter 3.2 shall display the number of blue cones or blue lights indicated in column (19) and in accordance with CEVNI. When because of the cargo carried no marking with blue cones or blue lights is prescribed but the concentration of flammable **or toxic** gases **and vapours** in the cargo tanks, **given off by the**

last cargo for which marking was required, is higher than 20% of the ~~lower explosion limit~~ LEL or exceeds the national accepted exposure levels, the number of blue cones or blue lights to be carried is determined by the last cargo for which this marking was required.

- 8.1.5 Special equipment
- 8.1.5.1 (...)
   
TOX: a toximeter appropriate for the current and previous cargo, with the accessories and instructions for its use;
   
(...)
- 8.1.6 Checking and inspection of equipment
- 8.1.6.4 The measuring instrument prescribed in 8.1.5.1 shall be checked each time before use by the ~~user~~expert in accordance with the instructions for use.
- 8.2.2 Special requirements for the training of experts
- 8.2.2.3.1.3 The “tank vessel” part of the basic training course shall comprise at least the following objectives:
   
(...)
   
Treatment of cargo tanks and adjacent spaces:
  - Degassing into the atmosphere and to reception facilities, cleaning, maintenance,  
(...)
- 8.2.2.3.3.1 The specialization course on gases shall comprise at least the following objectives:
   
(...)
   
Practice:
   
(...)
  - Certificates for ~~degassing~~ the status of being gas free and permitted work.  
(...)
- 8.2.2.3.3.2 The specialization course on chemicals shall comprise at least the following objectives:
   
(...)
   
Practice:
  - Cleaning of cargo tanks, e.g. ~~gas-freeing~~ degassing, washing, residual cargo and receptacles for residual products.  
(...)
  - Certificates for ~~degassing~~ the status of being gas free and permitted work.  
(...)

8.6 Documents

8.6.4 ~~(Deleted)~~ **Checklist degassing to reception facilities**

<b>1</b>				
<b>ADN Checklist</b>				
concerning the observance of safety provisions and the implementation of the necessary measures for degassing to reception facilities				
– <b>Particulars of vessel</b>				
..... (name of vessel)		No. .... (official number)		
..... (vessel type)				
– <b>Particulars of reception facility</b>				
..... (reception facility)		..... (place)		
..... (date)		..... (time)		
Reception facility approved according CDNI		<input type="checkbox"/> Yes <input type="checkbox"/> No		
– <b>Particulars of the cargo to be degassed as indicated in the transport document</b>				
Quantity m <sup>3</sup>	Proper shipping name**	UN Number or Identification number	Dangers*	Packing Group
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....

\* Dangers indicated in column (5) of Table C, as relevant (as mentioned in the transport document in accordance with 5.4.1.1.2 (c)).

\*\* The proper shipping name given in column (2) of Table C of Chapter 3.2, supplemented, when applicable, by the technical name in parenthesis.

<b>2</b>		
<b>Degassing rate</b>		
Proper shipping name**	Cargo tank number	agreed rate of degassing
		rate m <sup>3</sup> /h
.....	.....	.....
.....	.....	.....
.....	.....	.....
<p><b>Questions to the master or the person mandated by him and the person in charge at the reception facility</b></p> <p>Degassing may only be started after all questions on the checklist have been checked off by “X”, i.e. answered with YES and the list has been signed by both persons.</p> <p>Non-applicable questions have to be deleted.</p> <p>If not all questions can be answered with YES, degassing is only allowed with consent of the competent authority.</p>		

\*\* The proper shipping name given in column (2) of Table C of Chapter 3.2, supplemented, when applicable, by the technical name in parenthesis.

		<b>3</b>
	vessel	reception facility
1.	Is the vessel well moored in view of local circumstances?	O –
2.	Are the pipings for degassing between vessel and reception facility in satisfactory condition?	– O
	Are they correctly connected and are appropriate flame arresters fitted in the piping between the vessel and the reception facility?	O O
3.	Are all flanges of the connections of the piping for loading and unloading and of the venting piping not in use, correctly blanked off?	O O
4.	Is continuous and suitable supervision of degassing ensured for the whole period of the operation?	O O
5.	Is communication between vessel and reception facility ensured?	O O
6.1	Is it ensured that the reception facility is such that the pressure at the connecting point cannot exceed the opening pressure of the high-velocity vent valves (pressure at connecting point __ kPa)?	– O*
6.2	Is the air inlet part of a closed system or equipped with a spring-loaded low-pressure valve?	– O**
6.3	When anti-explosion protection is required in Chapter 3.2, Table C, column (17) does the reception facility ensure that its piping is such that the vessel is protected against detonations and passage of flames from the reception facility.	– O
7.	Is it known what actions are to be taken in the event of an “Emergency-stop” and an “Alarm”?	O O

\* Not applicable if vacuum is used to generate air flows.

\*\* Only applicable if vacuum is used to generate air flows.



		vessel	reception facility <sup>4</sup>
8.	Check on the most important operational requirements: <ul style="list-style-type: none"> <li>– Are the required fire extinguishing systems and appliances operational?</li> <li>– Have all valves and other closing devices been checked for correct open or closed position?</li> <li>– Has smoking been generally prohibited?</li> <li>– Are the flame operated heating applications on board turned off?</li> <li>– Is the voltage cut off from the radar installations?</li> <li>– Is all electrical equipment marked red switched off?</li> <li>– Are all windows and doors closed?</li> </ul>	O O O O O O O	O O O – – – –
9.1	Has the starting working pressure of the vessel's piping been adjusted to the permissible working pressure of the reception facility? (agreed pressure ___ kPa)	O	–
9.2	Has the starting working pressure of the reception facility piping been adjusted to the permissible working pressure of the on-board installation? (agreed pressure ___ kPa)	–	O
10.	Are the cargo tank hatches and cargo tank inspection, gauging and sampling openings closed or protected by flame arresters in good condition?	O	–
Checked, filled in and signed for the vessel: ..... (name in capital letters) ..... (signature)		for the reception facility: ..... (name in capital letters) ..... (signature)	

## Explanation

### Question 1

“Well moored” means that the vessel is fastened to the pier or the reception facility in such a way that, without intervention of a third person, movements of the vessel in any direction that could hamper the degassing operation will be prevented. Established or predictable variations of the water-level at that location and special factors have to be taken into account.

### Question 2

A valid inspection certificate for the hose assemblies must be available on board. The material of the piping must be able to withstand the expected rates and be suitable for degassing. The piping between vessel and reception facility must be placed so that it cannot be damaged by ordinary movements of the vessel during the degassing process or by variations of the water.

### Question 4

Degassing must be supervised on board and at the reception facility so that dangers which may occur in the vicinity of the piping between vessel and reception facility can be recognized immediately. When supervision is effected by additional technical means it must be agreed between the reception facility and the vessel how it is to be ensured.

### Question 5

For a safe degassing operation good communications between vessel and shore are required. For this purpose telephone and radio equipment may be used only if of an explosion protected type and located within reach of the supervisor.

### Question 7

Before the start of the degassing operation the representative of the reception facility and the master or the person mandated by him must agree on the applicable procedure. The specific properties of the substances to be degassed have to be taken into account.

9.3 Rules for construction of tank vessels

9.3.X.11.3 (...)

(c) All spaces in the cargo area shall be capable of being ventilated. ~~Means for checking their gas free condition shall be provided.~~ **It has to be possible to check their gas-free condition.**

#### **9.3.X.61 Valve for degassing to reception facilities**

**A permanently installed or portable spring-loaded low-pressure valve used during degassing operations to reception facilities, shall be fitted at the piping used to extract air. If the vessel's substance list, according to 1.16.1.2.5, contains substances for which explosion protection is required**

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**according to 3.2.3.2 Table C, column (17), this valve shall be fitted with a flame arrester capable of withstanding a deflagration. When the vessel is not degassing to a reception facility, the valve shall be closed with a blind flange. The low-pressure valve shall be so installed that under other normal working conditions the vacuum valve is not activated.**

**NOTE: Degassing operations are part of normal working conditions**

9.3.X.6+2 to 9.3.X.70 (Reserved)

9.3.2.42.4 Where the cargo heating system is used during loading, unloading or ~~gas-freeing~~ **degassing with a concentration given off by the cargo of 10 % of the LEL or above**, the service space which contains this system shall fully comply with the requirements of 9.3.2.52.3. This requirement does not apply to the inlets of the ventilation system.

(...)

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(...)

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