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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)

Twenty-seventh session

Geneva, 24-28 August 2015

Agenda item 3 (b)

Implementation of the ADN:

Special authorizations, derogations and equivalents

“Motor tank vessel Argos-GL”

Transmitted by the Government of the Netherlands

I. Introduction

1. During its meeting in January 2015 the ADN Committee discussed the Report of the meeting of the technical expert group on the Argos-GL motor tank vessel (2015/INF.27).

Several delegations had additional questions about the project. The delegation of the Netherlands was requested to put in writing the oral replies and explanations on these questions as provided during the January session in a document. This document can serve as a basis for a decision during the August session (ECE/TRANS/WP.15/AC.2/54).

2. Additional questions about the project involved the next topics:
 - a. the stability of the vessel,
 - b. the consequences of possible interference of LNG and gas oil in case of loss of containment,
 - c. the use of large tanks and the calculations done on them by the class society,
 - d. the integrity of the tank,
 - e. sloshing effects.

II. Further Report

3. In Annex I the “Further Report to the Bunker vessel Argos-GL” is added. This Further Report also contains several appendices. In this Report s the topics as mentioned under (2) are explained in depth. The Appendices provide results of technical research, calculations and tests on the topics as stability, interaction of the bunker fuels, crashworthy structure and sloshing.

III. Further process

4. The revised derogation is attached. The ADN Committee is requested to decide based upon this derogation based on the information provided in 2014/INF.11, 2015/INF.27 and this document.

Annex I

Decision of the ADN Administrative Committee relating to the use of membrane tanks for the carriage of liquefied natural gas (LNG) in the Motor tank vessel “Argos-GL”

Derogation No. xx/2015 of 2015

The competent authority of the Netherlands is authorized to issue a trial certificate of approval to the motor tank vessel Argos-GL, yard number to be determined, type G tanker, as referred to in the ADN, for the use of membrane tanks for the carriage of liquefied natural gas (LNG).

Pursuant to paragraph 1.5.3.2 of the Regulations annexed to ADN, the abovementioned vessel may deviate until 31 August 2020 from the requirements:

1. *Table C, UN 1972 (LNG), Column 7, cargo tank design:* 1 (pressure tank).

Although the membrane tank is a pressurized tank (70 kPa), it does not comply with the definition of a pressure tank according to ADN (400 kPa).

To manage the pressure in the cargo tanks the vapour is condensed with redundant liquefaction units. As a result the pressure inside the tank is kept close to atmospheric pressure (see section 4.6 of GTT Report in Annex II).

2. *Table C, UN 1972 (LNG), Column 8, cargo tank type:* 1 (independent tank). Although the tank is independent from the ship's structure for temperature, it is not independent from a structural point of view.

The membrane tanks are supported by the inner ship structure. The ship has a double bottom, double deck, and a crashworthy double hull. There is no cold transfer from the cargo to the ships' structure. In fact the LNG cargo is protected by four (4) boundaries (outer and inner hull of the ship, and first and secondary membrane) (see General Arrangement of the ship in Annex II).

3. *9.3.1.0.1 Tank materials.* The membrane tanks are made of plywood, polyurethane foam, aluminium foil and stainless steel.

The primary membrane which is in contact with the cryogenic LNG is made of stainless steel. The other materials are for insulation purposes only and are not in contact with the LNG (see section 4.4 of GTT Report in Annex II).

4. *9.3.1.0.2 Use of wood, aluminium and plastics in the cargo zone.* The membrane tanks are made of plywood, polyurethane foam, aluminum foil and stainless steel.

The risk of ignition and fire in the enclosed LNG containment insulation is eliminated due to the inerting of these parts of the tanks using Nitrogen (see section 3.3 of GTT Report in Annex II).

5. 9.3.1.23.1 *Cargo tanks need to comply with the requirements of a classification society for pressure vessels.* As the tanks are not considered as a pressure vessel, these requirements are not applicable. But the membrane tanks are type approved by the classification society which classes the ship (Lloyd's Register) and other recognized classification societies (see section 3 of GTT Report in Annex II).

Apart from the above mentioned issues related to the membrane tanks, the ship may also deviate from the following requirements:

6. 1.2.1 *Tanks installed in type G tanker.* Type G tankers are defined as ships with independent tanks. Apart from the membrane tanks this ship has also 4 tanks for the carriage of oil products. These tanks are integrated in the ships construction and separated from other parts of the ship by transverse cofferdams (see General Arrangement of the ship in Annex II).

Conditions

The Administrative Committee has decided that the use of membrane tanks is sufficiently safe if the following conditions are met at all times:

1. The ship is to operate only in the Amsterdam-Rotterdam-Antwerp area.
2. The LNG cargo tanks of the ship shall only be loaded in the Port of Rotterdam where this is allowed by the port authority. The recognised loading procedures of the International Association of Ports and Harbours (IAPH) shall be used.
3. The ship shall also comply with the Rules and Regulations for the Classification of Inland Waterway Ships of Lloyd's Register.
4. On top of these statutory and class requirements, the ship shall be designed with additional safety features as described in Annex II to this document. These are:
 - a. Cofferdams in between every cargo tank
 - b. The possibility to inert the oil tanks
 - c. All safety devices are redundant
 - d. The pressure relief valves shall be sized based on a fire case in adjacent spaces .
5. The use of the low pressure (70 kPa) containment system implies:
 - a. No possibility of BLEVE (see section 3.2 of the GTT Report in Annex II)
 - b. Limited gas cloud which will be deluted by air quickly to below the lower explosion limit (5%)
6. The vessel shall be certified and classed as a Type G tanker. In the ADN the requirements for Type G tankers assume cylindrical tanks to be used as cargo tanks. Also the stability requirements and calculations involved are based on a ship with cylindrical tanks. This ship however has rectangular cargo tanks, and therefore the calculations of the ADN for Type G tankers can't be used. Due to the tank shape the stability calculations must be made assuming the vessel as being a Type C tanker. As the stability

requirements for Type G tankers are less stringent than for Type C tankers are this assumption doesn't lead to a lower standard on stability.

7. Also the crashworthiness calculations according to ADN 9.3.4 shall be made assuming the ship is a Type C tanker due to the shape of the cargo tanks. This assumption leads to more extensive crash calculations then should be the case calculating the ship as a Type G tanker. (See Annex II to this document: the Damen report).
8. An evaluation report shall be sent to the UNECE-Secretariat each year for information of the Administrative Committee. The evaluation report shall contain at least information on the following:
 - a. Operational data (e.g. temperature and pressure inside the tank)
 - b. Abnormalities, repairs and modifications to the tank
 - c. Inspection report by the classification society which classed the vessel
 - d. The data shall be sent to the competent authority on request.
9. After completion of the ship a final approved stability calculation shall be sent to the UN-ECE secretariat. This shall be confirmed before the vessel comes into service.
10. The vessel substance list according paragraph 1.16.1.2.5. of the ADN of the ship shall be limited to the carriage of LNG (UN 1972) and Gasoil (UN 1202).

Annex II to this document is an integral part of this derogation.

Annex II

<Separate document>
