
Economic Commission for Europe

22 July 2014

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-fifth session

Geneva, 25 - 29 August 2014

Item 3 (b) of the provisional agenda

Implementation of ADN:

Special authorizations, derogations and equivalents

Application for a recommendation on the use of membrane tanks for transport of liquefied natural gas on the tank vessel *Argos-GL*

Transmitted by the Government of the Netherlands

I. Introduction

1. Several vessels are now - on a trial basis - using LNG as fuel, and it is expected that more will follow in the future. Also the development of bunkering facilities along inland waterways is making progress.
2. To support these developments the Dutch delegation has proposed to include LNG (UN No. 1972) in Table C of ADN, and developed additional regulations for the carriage of liquefied gases. These proposals have been adopted and are expected to enter into force on 1 January 2015.

II. Membrane tanks

3. Large seagoing vessels carrying LNG are usually equipped with membrane tanks. These tanks have been in use since 1965 with an excellent safety track record. It would therefore be preferable to (also) allow this type of tank for inland vessels.
4. Membrane tanks are constructed of highly insulation materials fixed against the hull structure. These materials insulate the cargo and also prevent cold transfer to the hull. A refrigeration system is installed for cooling down the vapours, so the pressure in the tanks does not exceed 70 kPa.

In the legislation from the IMO (IGC Code, Chapter 4.2.2) membrane tanks are defined as follows: “*Membrane tanks are non-self- supporting tanks which consist of a thin layer (membrane) supported through insulation by the adjacent hull structure. The membrane is designed in such a way that thermal and other expansion or contraction is compensated for without undue stressing of the membrane. The design vapour pressure P_o should normally not exceed 0.25 bar. If, however, the hull scantlings are increased accordingly and consideration is given, where appropriate, to the strength of the supporting insulation, P_o may be increased to a higher value but less than 0.7 bar. The definition of membrane tanks does not exclude designs such as those in which non-metallic membranes are used or in which membranes are*

included or incorporated in insulation. Such designs require, however, special consideration by the Administration. In any case the thickness of the membranes should normally not exceed 10 mm.”

5. The use of membrane tanks on inland waterway vessels was discussed at the meeting of the Recommended ADN Classification Societies in March 2014. The classification societies support the use of such tanks on inland vessels. Lloyds Register and other classification societies explicitly said they have rules for the use of membrane tanks which are applicable for both seagoing and inland vessels.

III. Technical description of the proposed Argos-GL

6. Argos Bunkering B.V. in Rotterdam is considering the use of such tanks on the projected tank vessel *Argos-GL*. If these kind of tanks would be permitted this vessel should enter service in 2015.
7. The ‘Argos-GL’ is a type G tanker which will be built for the carriage of LNG and diesel. The ship will be equipped with two cargo tanks of 935m³ for the carriage of LNG and four tanks of 380m³ for the carriage of diesel. As the LNG tanks exceed 380m³ the ship will be build according to the requirements of ADN 9.3.4.

Attached is the general arrangement plan of the vessel (Attachment 1, drawing 2012-18), and an impression of the vessel (Attachment 2).

The LNG tanks will be of the membrane type Mark III and be delivered by the French company GTT. This type of tank was developed in the 1960s and has been installed on hundreds of seagoing LNG tankers since. Attached is a picture of the tank lay-out (Attachment 3, Mark III overview).

These tanks comply with the relevant class rules of Lloyds Register which is the classification society involved in this project.

IV. Deviations from the ADN

8. Membrane tanks, and the way they are installed, deviate from the current regulations in the ADN. These deviations are:

A. Table C

A1. Table C, UN 1972 (LNG), Column 7, cargo tank design: 1 (pressure tank). Although the membrane tank is a pressurised tank (70 kPa), it does not comply with the definition of a pressure tank according ADN 1.2.1. “Pressure tank” (≥ 400 kPa).

A2. Table C, UN 1972 (LNG), Column 8, cargo tank type: 1 (independent tank). Although the tank is independent from the ships’ structure involving the temperature (no cold transfer from the cargo to the vessel), it is not independent from a structural point of view.

B. 9.3.1.0 Materials of Construction

B1. 9.3.1.0.1 (a) Material of cargo tanks: The membrane tanks are made of plywood, polyurethane foam, aluminium foil and stainless steel.

B2. 9.3.1.0.2 Use of wood, aluminium and plastics in the cargo zone. The membrane tanks are made of plywood, polyurethane foam, aluminium foil and stainless steel.

C. 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 to be pressurised tanks, 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 recognised classification societies.

D. 9.3.1.52.1 a) *Electrical equipment in the cargo tanks.*

The electrical motor for the discharge pump is installed inside the cargo tanks. This is a fully acceptable arrangement according to the IGC Code and classification requirements.

V. Request for a recommendation

9. As membrane tanks do not comply with the current ADN requirements, a recommendation for the first inland waterway vessel with these tanks will be necessary. This recommendation should be based on paragraph 1.5.3.2 of the ADN.
10. A recommendation is therefore requested for the use of membrane tanks for the carriage of Liquefied Natural Gas on the projected vessel Argos-GL on the basis of a trial for the period until 31 December 2018. If successful, a proposal would be made to amend ADN to allow for the use of Membrane Tanks permanently

Request for a recommendation

Decision of the ADN Administrative Committee relating to the tank vessel “Argos-GL”

Derogation No. xx/2014 of 2014

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).

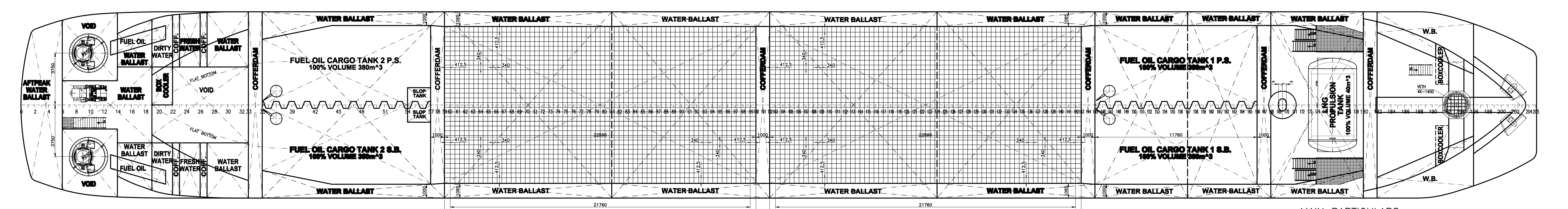
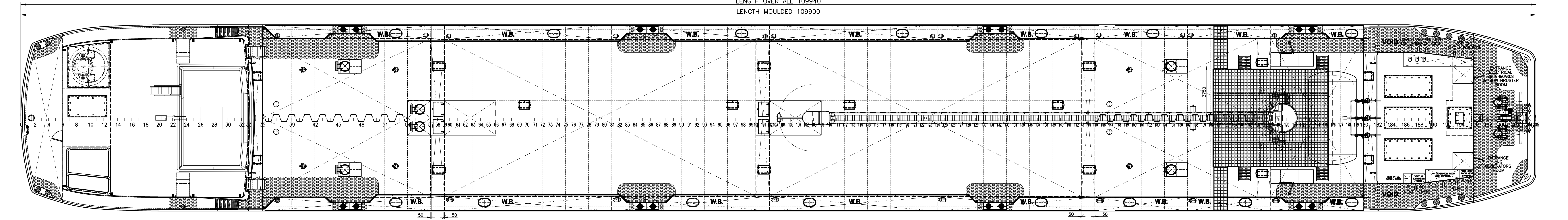
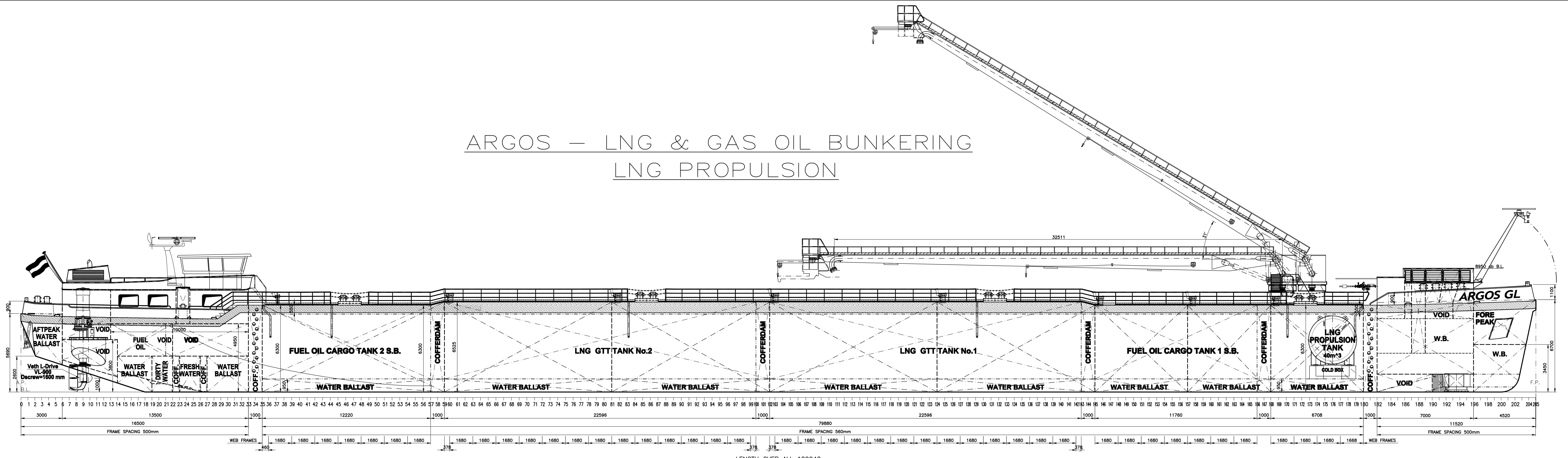
Pursuant to paragraph 1.5.3.2 of the Regulations annexed to ADN, the above-mentioned vessel may deviate until 31 December 2018 from the requirements:

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).
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.
3. *9.3.1.0.1 Tank materials*. The membrane tanks are made of plywood, polyurethane foam, aluminum foil and stainless steel.
4. *9.3.1.0.2 Use of wood, aluminum and plastics in the cargo zone*. The membrane tanks are made of plywood, polyurethane foam, aluminum foil and stainless steel.
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.
6. *9.3.1.52.1 a) Electrical equipment in the cargo tanks*. The electrical motor for the discharge pump is installed inside the cargo tanks. This is a fully acceptable arrangement according to the IGC Code and classification requirements.

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

1. All data related to the use of the membrane tanks shall be collected by the carrier. The data shall be sent to the competent authority on request;
2. An evaluation report shall be sent each year to the UNECE secretariat every six months 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.

ARGOS – LNG & GAS OIL BUNKERING LNG PROPULSION



MAIN PARTICULARS

LENGTH O.A. (+2x20mm SHEERSTRAKE)	109,94 m
LENGTH MLD.	109,90 m
BREADTH MLD.	13,50 m
BREADTH O.A. (+2x20mm SHEERSTRAKE)	13,54 m
DEPTH MLD.	6,30/6,525 m
SCANTLING DRAUGHT	4,50 m
AIR DRAUGHT MAX (at T=1,50m)	8,50 m

CLASSIFICATION Lloyd's Register

CLASS NOTATION:
 *A1 L.H.W. Tanker Type G,
 Fuel oil tanks: s.g.1.0, p.v. +50kPa, Temp. +80 Celsius
 LNG tanks: s.g. 0,5 t/m³, p.v. 70 kPa, Temp. -165 Celsius
 In association with a List of Defined Cargoes
 Loading sequence: "D" (Defined)
 Inland navigation: Zone 2

CARGO ARRANGEMENT

LNG GTT BUNKER TANKS
 NUMBER OF LNG BUNKER TANKS 2
 VOLUME 100% 935 m³ x 2 = 1870 m³
 VOLUME 98% 917 m³ x 2 = 1834 m³

FUEL OIL BUNKER TANKS
 NUMBER OF FUEL OIL BUNKER TANKS 4
 VOLUME 100% 380 m³ x 4 = 1520 m³
 VOLUME 97% 368 m³ x 4 = 1472 m³

REV.	DATE	DRAWN	DESCRIPTION

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ROMMERTS
SHIP DESIGN

Argos Group B.V.

LNG & FUEL OIL BUNKER TANKER – mts "ARGOS GL"
 GENERAL ARRANGEMENT (GTT TANKS)

FORMA: —
 SCALE: 1:100

DRAWN: H.P.
 DATE START: 07.11.2013
 DATE LAST: 05.03.2014

PROJECT NO.: 2012-18
 DRAWING NO.: 10
 SHEETS: 1
 SHEET NO.: 1



MarkIII CCS: Description

- Insulating panel made of re-inforced PU foam
- Corrugated primary membrane made of SUS304L
- Secondary membrane made of Triplex (aluminum foil between two glass cloths)

