

SIGTTO LNG COMPETENCY

CARGO OPERATIONS AT MANAGEMENT LEVEL

TRAINING COURSE

A. OVERALL AIM

To improve the theoretical knowledge, understanding and skills of Officers involved in the handling and management of LNG as cargo.

More specifically, the training course is intended for:

- Officers with seagoing service and experience mostly on oil and chemical tankers. The completion of this course is considered as a requirement according to the SIGTTO Experience LNG Matrix Guidelines for Officers to be recruited on a LNGC.
- Experienced Officers in the LNGCs who are responsible for the planning and conduct of cargo operations at the Deck or Cargo Equipment Management Level. It can serve as a refresher course, at which, new developments in the equipment, practices and lessons learned will be presented and discussed.



LNGC MINERVA PSARA at Cape Horn, April 2021

B. LEARNING OBJECTIVES – COURSE STRUCTURE

The syllabus of the course has been adjusted from the SIGTTO LNG Shipping Suggested Competence Standard, which provides best practice training guidance for Officers on LNG Carriers. The SIGTTO Standard has been structured according to the STCW Standards of Competence and Training, with the exception that the standards of competence are meant as outcomes of effective performance (competencies that are necessary to function efficiently at the appropriate level – Management or Operational).

Our central aim is to provide in a comprehensive way, the knowledge listed in each one of the proposed Modules of the SIGTTO Competence Standard and stimulate the participating Officers to carefully go through the underpinning knowledge in the relevant sections.

The Modules that are to be delivered are structured as follows:

MODULE 1

Fundamental Knowledge & Understanding of LNG Cargoes

It provides fundamental knowledge on the properties and characteristics of the liquefied natural gas and explanations of how physics apply to the change of the status of various gases.

An overview of the common containment systems is presented, together with the applicable Codes and Regulations, the tank atmosphere flammability theory, the safety, environmental hazards and impacts of the LNG.

MODULE 2A

Design and Equipment of LNGCs

The Module 2 corresponds to the content of SIGTTO Competence Standard Deck Management 7 (Ensuring the Integrity of Cargo Containment, Cargo Equipment and Cargo-Related Spaces) and of Cargo Equipment Management 5 (Ensuring Effectiveness of maintenance, testing and inspection of cargo equipment and spaces).

In Module 2A, the design of the two cargo containment systems applied in the SHI and DSME vessels of the company (*MARK III Flex Plus* and *NO-96 GW*) will be explained. It will be focused on the main components of:

- *MARK III Flex Plus* system (stainless steel as primary barrier in an orthogonal corrugated system and Triplex as secondary barrier made of two glass cloths with an aluminum foil in between, and with a rigid polyurethane foam as insulations).
- *NO-96 GW* (with Invar 0.7 mm as primary and secondary barrier and glasswool as primary and secondary insulation material).

MODULE 2B**Design and Equipment of LNGCs**

It is part of Module 2, aimed at help the Cargo Equipment, Engineer and Deck Officers acquire knowledge and understanding of the following:

- Inert Gas and Dry Air Systems
- Inert Gas Generator
- Nitrogen Generator
- LNG Vaporizer
- Compressors – General Theory
- HD Compressors
- LD Compressors

MODULE 2C**Design and Equipment of LNGCs**

It is part of Module 2, aimed at help the Cargo Equipment, Engineer and Deck Officers acquire knowledge and understanding of the following:

- Gas Heaters
- LNG Vaporizer/Forcing Vaporizer
- Cargo Pumps/Spray Pumps/Emergency Cargo Pump
- Cryogenic Cargo Valves
- Cargo Liquid/Vapour Valves
- Cargo Tank Protection Devices
- Piping
- Reliquefaction Plant
- GCU
- Other Cargo Related Spaces

MODULE 3**Support Systems and Equipment**

This Module is the second part of the SIGTTO Deck Management 7 and of Cargo Equipment Management 5, aimed at providing knowledge on the following:

- Nitrogen Generators
- Cofferdams Heating System
- Fixed Gas Detection System
- Water Curtain, Drenching System and Fixed Dry Powder Installation
- Level Gauging System
- Hazardous Areas and the use of certified Electrical Equipment
- Custody Transfer System – CTS and IAS – Alarm Monitoring System

MODULE 4

Standard Cargo Cycle Operations

This Module helps the Officers acquire an understanding of the whole cargo cycle (from shipyard to dry dock), its separate stages, the equipment that must be used and become aware of the safety and process monitoring requirements.

The entire cargo cycle to be covered includes the following stages:

- Cargo Tank Cleaning
- Hold Space and Cargo Tank Drying
- Nitrogen Purging of Containment System
- Inerting of Cargo System
- Ship & Shore Preparation of Manifold Connection
- Gassing Up (Purging) of Cargo System
- Cool Down of Cargo System
- Loading
- Loaded and Ballast Passage
- Discharging
- Warm Up
- Gas Freeing
- Aeration

MODULE 5

Commercial Aspects of the LNG Transportation

This Module helps the Officers develops an awareness of the commercial aspects of the LNG transportation by explaining the basic terms and conditions under which LNG is bought and sold and its implications on vessel operators. The Module includes the following:

- Terms and Conditions
- Vetting and Inspection Process
- Terminal Compatibility Assessment
- Port State Control & Vetting
- Commercial Considerations



MODULE 6

LNG AS FUEL

This Module provides elementary knowledge on the use of boil-off gas as fuel giving emphasis to the two types of dual fuel main engines installed in the fleet vessels of the company.

- MAN B & W ME- GI
- Win GD XDF

C. TIME TABLE

DAY 1

Time	Topics
09.15 – 10.00	The SIGTTO Competence Standard – Overview of Minerva Gas
10.00 – 11.15	LNG properties, characteristics, hazards and impacts (MODULE 1)
11.15 – 11.30	Coffee Break
11.30 – 12:15	Design and Equipment of LNGCs (MODULE 2A) Cargo Containment Systems
12.15 – 13.30	Design and Equipment of LNGCs (MODULE 2B) IGS/IGG, HD/LD Compressors, Vaporizers
13.30 – 14.00	Lunch Break
14.00 – 16.00	Design and Equipment of LNGCs (MODULE 2C) Gas Heaters, Cargo Pumps, Piping/Valves, GCU, Reliquefaction Plant
16.00 – 16.15	Coffee Break
16.15 – 17.00	Introduction to the IGC Code – Type 2G Vessels

DAY 2

Time	Topics
09.15 – 11.15	Support Systems & Equipment (MODULE 3) CTS, IAS, Cofferdam Heating Systems, Gas Detection, Level Gauging, etc.
11.15 – 11.30	Coffee Break
11.30 – 13:30	Standard Cargo Cycle Operations (MODULE 4) The entire cargo cycle from shipyard to shipyard
13.30 – 14.00	Lunch Break
14.00 – 17.00	Simulation Practice in K-Sim LCHS Simulator 145.000 m ³ Membrane LNG Carrier

DAY 3

Time	Topics
09.15 – 11.15	Commercial Aspects of LNG Transportation (MODULE 5) Terms and conditions, Principles of Measurement, PSC/Vetting, Commercial Considerations
11.15 – 11.30	Coffee Break
11.30 – 13:30	LNG as Fuel (MODULE 6) An overview of dual fuel diesel engines - WINGD XDF & MAN ME-GI
13.30 – 14.00	Lunch Break
14.00 – 17.00	Simulation Practice in K-Sim LCHS Simulator 145.000 m ³ Membrane LNG Carrier

Notes on the LNG CHS Simulator

The Full-Mission and Desk-Top LNG Cargo Handling Simulator (K-Sim Neptune CHS) simulates a Steam Turbine LNGC of 145.000 m³. It consists of a Centralized Cargo Control Room with all necessary consoles and instrumentation including an on-line loading, stress and stability instrument, IGS/IGG Panel, a fixed gas detection system with a compartment simulating the shore loading/discharging terminal station and local deck post stations. The full mission liquid cargo handling simulator is connected to six (6) desk top cargo handling stations and a debriefing room.



Equipment	Number	Specification
Cargo Containment System		GTT NO 96-2 Evolution System
Main Cargo Pumps	8	Vertical Centrifugal Submerged 1650 m ³ /h x 150 mlc
Stripping/Spray Pump	5	Vertical Centrifugal Submerged 50 m ³ /h x 135 mlc
Emergency Cargo Pump	1	Vertical Centrifugal Submerged 550 m ³ /h x 150 mlc
Vacuum Pump	2	Rotary Vane - 1250 m ³ /h
LNG Vaporizer	1	Shell/Tube - 3.200 kW
Forcing Vaporizer	1	Shell/Tube - 1.400 kW
Inert Gas Generator	1	IGG/14.500 m ³ /h X 25 kpa g
Nitrogen Generator	2	Low Pressure Membrane Separation 125 NM3
HD Compressor	2	Horizontal Centrifugal - 18.000 m ³ /h x 1.96 bar
LD Compressor	2	Horizontal Centrifugal - 3.000 m ³ /h x 1.96 bar
CTS	4	Radar Type, Accuracy ± 7.5 mm
Float Level Gauge System	4	Float Type, Accuracy ± 7.5 mm
HD Heater	1	Shell/Tube, 3.200 kW
LD Heater	1	Shell/Tube, 480 kW
Cargo Tank Safety Valve	8	Plot Operated Valves Pressure: 25 kpa g Vacuum: 1 kpa g
Insulation Space Safety Valve	16	Pilot Operated - Pressure 1 kpa g