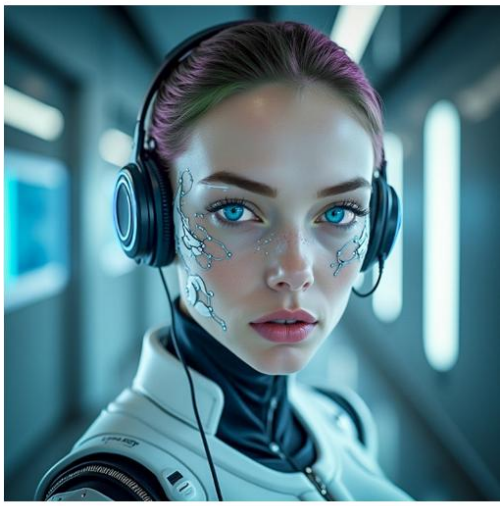
2026 LNG as a Bunker Fuel - LNGF (3 Days)

What is new?

Cassandra



'Only those systems that use optimal information can function. Let me test yours'

TTT funded the development of an Artificial Intelligence named 'Cassandra'. Based on The General Law of Functionality, Cassandra can test and predict HSEQ Performance and Operational Excellence. She detects knowledge gaps and acts as an Early Warning System preventing risk. This is a unique service only offered by us.

This LNG as a Bunker Fuel training course explains everything you need to know to ensure you are up to date with this exciting new development in the marine sector.

This three day course will enable you to make early and confident assessments of why, how and what LNG as Fuel (LNGF) will mean to you and your terminal or port.

Whether you are involved in new terminal to market LNG as Bunker Fuel or existing terminal planning a LNG Bunkering Setup we will guide you through the technical and commercial aspects of the decision making process. It is based on the latest publications by the Singapore Standards Council 2017-2020.

This course is aimed at LNG Bunker Surveyors Jetty Operators, Jetty Supervisors, Loading Masters, Ship & Barge Operators, Terminal Operators and Technical Management. If you are considering the advantages and disadvantages of using LNGF this course is for you. Moving from LNG Import and re-gasification to selling LNG in Liquid form to ship's using it as a fuel is a major investment in both time and money and this course will give you the tools to make the transition as smooth as possible.

What will you learn?

By the end of this course you will be able to:

- Supervise and execute LNG Bunkering Quality and Quantity Control, Surveys and Inspections.
- Explain the legislative and commercial drivers for using LNG as Fuel
- evaluate the hazards related to LNG usage and handling
- Recognize the relevant regulatory acceptance by countries, port authorities, IMO and classification societies
- review design issues for marine gas fuel installations, including high pressure and low pressure gas supply systems
- determine the critical technical issues regarding design, fuel storage, bunkering and operation
- demonstrate an awareness of risk assessment methods to evaluate alternative design

Inhoud

SESSION 01 – INTRODUCTION FOR THE USE OF LNG AS FUEL

Understand where natural gas comes from & transportation

- Natural gas constituents
- Processing natural gas
- Composition and energy content relationship
- Transporting natural gas by pipe or by ship
- Main exporting and importing countries, NG reserves

Why use LNG as a fuel?

- MARPOL Annex VI why is it needed?
- Background to MARPOL Annex VI
- Overview of Annex VI
- Regulation 13 NOx
- Regulation 14 SOx
- Compliance Options

LNG Fueled Vessels Facts & Figures

- Vessels Fueled by LNG
- Small scale LNG infrastructure development
- Environmental emissions comparison

TR 56 PART 1 General Introduction to LNG Bunkering

SESSION 02 – LNG PROPERTIES AND GAS LAW REVISION

Composition of natural gas

- Differences in load port compositions
- Effect of different compositions
- Physical properties of the components

Relationship between pressure and temperature

- Saturated vapour pressure
- Relationship of SVP with temperature
- Boiling
- Change of boiling point with temperature

How LNG is kept cold

- Evaporation and boiling in a tank
- Dropping pressure to cool liquid

Natural gas vapor

- Vapor density
- The visible white cloud
- Difference between a vapour and a gas

Flammable range of natural gas

- Flammable mixtures in air
- Flammable range diagram

Managing tank atmospheres

- Inerting to avoid a flammable atmosphere

- Gas freeing to avoid a flammable atmosphere

Other properties of Methane

- Flash point
- Auto ignition temperature

SESSION 03 — HAZARDS OF LNG

Low Temperature

- Cold burns and frostbite
- Liquid and vapor effect of ship structures
- Brittle fracture

Pressure

- In tanks
- In pipelines

Flammability

- Flammable range in a vapor cloud
- Ignition of a vapor cloud
- Ignition of a cloud from a vent mast
- Burn back of ignited clouds
- Vapor cloud explosions, detonation and deflagration
- BLEVE

Sloshing in membrane tanks

- In large LNGCs
- In small fuel tanks and bunker vessels

Rollover

- Stratification of layers
- How it may occur

SESSION 04 — REGULATIONS

Current regulations status

- SOLAS statement on low flashpoint fuels

Rules for bunker vessels

- The IGC code

Rules for vessels using LNG as a marine fuel

- The IGF code
- Evolution of the IGF code
- IMO interim guidelines for LNG as a fuel
- Crew training requirements
- TR-56 SINGAPORE STANDARD
- SGMF LNG Bunkering Safety Guidelines.
- Proposed amendments to STCW
- National regulations for inland waterways
- Additional guidance – SGMF
- TR56- PART 4 Competence and Roles performed by Personnel Involved in LNG Bunkering Operation.

SESSION 05 — LNG CONTAINMENT SYSTEMS

Tank types approved by the IGC code

- Independent tanks, A,B,C and Membrane tanks

Type A tanks

- Description of tank type
- Main characteristics

Type B tanks

- Description of tank type
- Main characteristics

Type C tanks

- Description of tank type
- Main characteristics

Membrane tanks

- Membranes generally
- NO96 description
- MkIII description

Options for bunker vessels

- Examples of small scale LNGCs with type C & membrane
- Comparison of size and weight differences

Tank location requirements

- Requirement for greater volume
- Draft IGF code requirements
- Examples of membrane and type C tank usage

SESSION 06 — BUNKER DELIVERY METHODS

TR56 PART 2 LNG BUNKERING

Requirements for Custody Transfer

Methods of bunker delivery

- Pipe, truck or barge to ship
- container swap out

Bunker station and hose requirements

- Draft IGF requirements
- Dry disconnect couplings
- Emergency release system
- Emergency shutdown

Management of pressure during the bunker transfer

- Factors to consider
- Pressure and temperature relationship
- Typical tank pressure settings
- Membrane to membrane transfer
- Type C to membrane transfer
- Membrane to type C transfer
- Type C to type C transfer

- Keeping cargo cold in a bunker vessel

SESSION 07 - LNG BUNKERING CHECKLIST TR56-PART 3

Exercise to fill and Understand Annex A LNG Bunkering checklist by participating Delegates.

Annex B Examples of Hand Signals for Bunkering Communication

Annex C Determination of Safety Zones

Annex D Discuss Emergency Scenarios with Participants

SESSION 08 – BUNKERING SAFETY CONSIDERATIONS

Organisation

- Master
- Person in charge

Communications

- Receiving vessel and bunker supplier
- Verbal & non verbal communications
- Hand Signals as per TR56.

Hazardous areas

- Definition of the hazardous area
- Electrical equipment in hazardous areas

Cryogenic protection Controlling sources of ignition

- Potential sources of ignition
- Static electricity
- Galvanic currents

PPE

- Protective clothing
- Resuscitators and BA

SESSION 09 – THE BUNKERING OPERATION - PROCESS

LNG Bunkering Procedure and Safety Distances as per TR56 PART-3

Before bunkering

- Compatibility
- Safety
- Checklists
- Weather
- Lighting
- Authorizations/Notifications
- Maximum filling level

Hose connection

- Connection
- Purging
- Leak testing

During bunkering

- Supervision

- Starting
- Bulk transfer
- Topping off
- Filling Limits
- Vapour management

After bunkering

- Post transfer checklist
- Draining and purging of hoses
- Disconnection of hoses

SESSION 10 — TYPES OF GAS FUELLED ENGINES

Propulsion systems using gas fuelled engines

- Electrical and mechanical systems
- Fuel gas delivery pressures

Basic principles of gas fueled engines

- Pure gas engines
- 4 Stroke duel fuel engines
- 2 stroke dual fuel engine HP and LP gas injection

Knocking and methane number

- Cause of knocking
- Problems caused by knocking
- Methane number and relationship to knocking

SESSION 11 — MANAGEMENT OF LNG FUEL TANKS

Gas fuel management and delivery systems

- Requirements of stored fuel systems
- Main components in delivery system
- Example of Wartsila LNGPac for LP delivery
- Example of HP gas delivery system

High fuel demand

- Delivery of BOG gas to engines
- Generation of additional gas

Low fuel demand

- Delivery of BOG gas to engines
- Dealing with excess BOG

Bringing a tank into service

- Inerting
- Gassing up
- Cooling down

Taking a tank out of service

- Removal of liquid
- Warming up
- Inerting
- Aerating

SESSION 12 – QUANTITY AND QUALITY MEASUREMENT

Understand the requirement to measure quantity and quality

- Recognize that LNG traded on energy content which varies with evaporation
- Discuss the variability of LNG composition around the world
- Understand the need to pay for what is received and the taxes due
- State the requirement to know the Methane Number for engine performance

Quantity measurement

- List the measurement options
- Describe a Coriolis Mass Flowmeter
- Describe an Ultrasonic Flowmeter
- Describe the way in which density is determined

Quality measurement

- Recognize the issues associated with taking a sample of LNG liquid
- Describe the way in which samples may be taken
- Discuss the use of gas chromatography in determining composition of samples

SESSION 13 — EMERGENCY RESPONSE

Leaks

- Detection
- Response
- Protection from low temperatures
- Use of water spray to deflect gas clouds

Venting

- Location of vent mast
- Vapor cloud dispersion
- Lightning strike

Fighting Gas Fires

- Fire-fighting equipment
- Techniques for fighting gas fires
- Use of dry powder

Your Trainer: Captain. Shyam Paliwal

Shyam has more than 12 continuous years of successful hands-on problem solving and decision making experience in challenging, dynamic and multifaceted marine work environments at sea and ashore, in a position of responsibility or other crucial decision-making leadership capacities. This includes 7 years as a Captain/Senior officer aboard deep-draft LNG tanker vessels transporting volatile cargoes in the world-wide liquid gas trade, with unblemished safety record as well as outstanding personnel evaluations.
This was followed by 5 years of work experience at LNG and Oil & Gas Terminals in Korea in the capacity of LNG advisor to Shell Trading and Shipping Company (STASCO). During his time with Shell he was responsible for Oil loss control and helped save millions of dollars by preventing shortages and contaminations. Shyam has worked as a Consultant in Korea for P&I clubs in investigating contamination losses of petroleum products. He has successfully reduced the vessel turnaround times and increased berth utilization. He commissioned the 4 largest LNG carriers in the world the Q-Max vessels at LNG Import terminals in Korea. Each vessel is an LNG terminal on its own with a re-liquefaction plant and an enclosed flare. Shyam also supervised the building of 25 Oil and LNG Tankers at Samsung, Daewoo and Hyundai Shipyards in Korea as a Nautical Inspector while working for Shell in South Korea. He provided LNG marine operations, safety and regulatory compliance consulting services to major energy and marine transportation companies. Shyam has significant shore side operations management experience with broad knowledge of commercial aspects of global maritime enterprise and energy shipping. He holds various marine technology patents and copyrights. He is a Master Mariner and a member of the Nautical Institute, UK.
Shyam has trained hundreds of loading masters, operators and managers worldwide for TankTerminalTraining.

We make people better!