



BunkerLogix

FLEXIBLE LNG BUNKERING  
VALUE CHAIN IN THE SPANISH  
MEDITERRANEAN COAST

## LNG Bunkering Ship to Ship Procedure



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## INTRODUCTION

As part of the BunkerLogix project, the LNG bunkering ship to ship procedure was developed together with DVN GL. The BunkerLogix Project is led by Repsol, and consists of the development of a LNG Bunkering value chain in the Spanish Mediterranean Coast. Two size vessels are considered:

- LNG Tanker for Liquefied Natural Gas (LNG) with 5.000 m<sup>3</sup> of cargo capacity, categorized as IMO Ship Type 2G and with two (2) independent cylindrical cargo tanks of IMO Type C
- LNG Tanker for Liquefied Natural Gas (LNG) with 10.000 m<sup>3</sup> of cargo capacity, categorized as IMO Ship Type 2G and with two (2) independent cylindrical cargo tanks of IMO Type C

The purpose of this document bunker procedure is to provide guidance to the Masters and operators of the BunkerLogix LNG carriers undertaking side-by-side ship-to-ship transfer or bunkering of LNG. These bunkering procedures directly address these side-by-side ship-to-ship bunkering operations of LNG between the BunkerLogix vessels and receiving vessels.

The bunkering procedure covers the full transfer or bunkering sequence from the moment in which the LNG Bunkering vessel is navigating to the bunkering area until, and including, the disconnection of the LNG hoses after completing the supplying operation, including:

- Communication aspects (in the harbour) between all involved parties
- Navigational aspects of bunker vessels in the harbour Technical aspects and requirements
- Operational aspects to allow for safe transfer
- Pre transfer phase
- Transfer phase
- Post transfer phase
- Standards for training and qualification of the crew and involved harbour people
- Emergency procedures
- Location specific and metrological requirements with potential impact on safety
- Ways of simultaneous operations

The bunkering procedure is applicable to both BunkerLogix LNG tankers, unless specifically mentioned otherwise, and a wide range of receiving ship types equipped with LNG tanks of type C. Bunkering into atmospheric tanks and bunkering without using a pump is out of scope of the present vessels' design.

## SCOPE AND APPROACH

The purpose of this document is to provide a procedural description of how LNG bunkering between two ships should be performed. The focus is on the operational and technical requirements needed for the bunker (supply) vessel to bunker LNG. Requirements and procedures for the receiving vessel are out of scope, although the interfaces are included. This procedure has been worked out to handle the specific details of this operation in a safe way. Although the scope of the bunkering procedure is specifically made for ship to ship (STS) bunkering of LNG in a port environment, it could also be used for bunkering outside port limits.

Several bunkering procedures and guidelines have been written by operators, ports authorities or by joint venture projects since the introduction of LNG as fuel for ships. Some of these are also publicly available, such as the STS bunkering procedures published by the Swedish Marine Technology Forum (SMTF)<sup>1</sup>. DNV GL accepted and approved the concept in principle and much of the guidance structure in the fore lying procedure is based on this guideline.

SIGTTO also published an LNG STS transfer guideline<sup>2</sup> to offer guidance to the masters and operators of vessels undertaking large scale STS transfers of LNG (as cargo). In particular the requirements for the mooring of the vessels are not transferable to small vessels due to the big variation of size and different kind of mooring equipment. However, general safety requirements for the transfer and the equipment, manoeuvring, procedures alongside and emergency planning are relevant for the development of STS guidelines for bunkering LNG as fuel.

Additionally LNG bunkering standards have been developed and provide key technical and operational requirements for bunkering procedures. For example, the ISO standard for system and installations to supply LNG as fuel for ships (ISO/TS 18683<sup>3</sup>) provides a technical specification with the basic requirements for each operation in order to ensure the safe and secure and efficient transfer of LNG as a fuel to the ship.

Classification societies such as DNV GL have recently published recommended practices and guidelines for LNG bunkering. For instance, DNV GL has written a recommended practice with the overall objective to provide guidelines and recommendations required to protect the safety of people and the environment during LNG bunkering<sup>4</sup>.

The present bunkering procedure is written based on a comprehensive review and selection of the best available guidance and technical specifications provided in existing bunkering procedures, guidelines, recommended practices and standards. The bunker procedure is specifically written (tailor-made) for the LNG Bunker Vessel (LNG cargo storage capacity of 5.000m<sup>3</sup> and 10.000m<sup>3</sup>) designed in the BunkerLogix project. This means that the specific

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<sup>1</sup> LNG ship to ship bunkering procedure, Swedish marine technology forum

<sup>2</sup> LNG Ship to Ship Transfer Guidelines, SIGTTO, 2013

<sup>3</sup> Guidelines for system and installations to supply LNG as fuel for ships (ISO/TS 18683), International Organization for Standardization

<sup>4</sup> Development and operation of liquefied natural gas bunkering facilities, Recommended Practice, DNV GL, 2014

details of the operation and the ship's design technical specifications are included in the procedure. The design of the LNG Bunker Vessel is primarily based on the requirements specified in the IGC Code<sup>5</sup>, an international code for the construction and equipment of ships carrying liquefied gases in bulk, and compliance of "DNV Rules for Classification of Ships" requirements.

Two working scenarios are considered:

- A scenario of bunkering within port waters, giving bunker service to vessels docked in the port. The average discharged amount in this scenario is estimated at 200-300 m<sup>3</sup> of LNG
- A scenario of LNG discharge outside port limits. The discharged amount in this case is considered to be the entire load of the supplying vessel.

These procedures have been prepared with regard to technical and safety issues concerning these bunkering operations of LNG and take into account the information made available to the DNV GL project team.

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<sup>5</sup> International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, IMO IGC Code.

# TABLE OF CONTENTS

- 0- DISCLAIMER
- 1- INTRODUCTION
- 2- SCOPE AND APPROACH
- 3- GLOSSARY – ABBREVIATIONS
- 4- RULES, REGULATIONS AND STANDARDS
  - 4.1-International Rules
  - 4.2-Classification Societies Requirements
  - 4.3-Standards
- 5- LNG PROPERTIES AND POTENTIAL HAZARDS
  - 5.1-Physical Properties and composition of LNG cargo/fuel
  - 5.2-Hazards involved when handling LNG
- 6- BUNKERING PROCEDURES
  - 6.1-GENERAL PRINCIPLES
  - 6.2-CONDITIONS AND REQUIREMENTS
    - 6.2-1. Approval
    - 6.2-2. Ship compatibility
    - 6.2-3. Transfer area zoning
    - 6.2-4. Operational envelope, environmental conditions and visibility
  - 6.3-SAFETY
    - 6.3-1. General
    - 6.3-2. Personnel Education and Training
    - 6.3-3. Safety zone
    - 6.3-4. Security zone
    - 6.3-5. Risk Assessment
    - 6.3-6. ESD-system and philosophy
    - 6.3-7. Maintenance
    - 6.3-8. Redundancy
    - 6.3-9. Cryogenic protection
    - 6.3-10. Fire-fighting and fire protection and extinguishing systems
    - 6.3-11. Fire and Gas Detection Systems
    - 6.3-12. Smoking and Naked Light
    - 6.3-13. Vessel communication systems & radar
    - 6.3-14. Static Electricity and Arcing
    - 6.3-15. Earth on switchboard
    - 6.3-16. Venting Requirements
    - 6.3-17. Accommodation openings
    - 6.3-18. Crew Safety
    - 6.3-19. Simultaneous operations
    - 6.3-20. Bunkering in transit
  - 6.4-COMMUNICATIONS
    - 6.4-1. General
    - 6.4-2. Language

- 6.4-3. Communication between ships
  - 6.4-4. Procedure for communication failure
  - 6.5-EMERGENCY OPERATIONS AND SYSTEMS
    - 6.5-1. Emergency signal
    - 6.5-2. Management of Change
    - 6.5-3. State of readiness for an Emergency
    - 6.5-4. Ships Contingency Plan
    - 6.5-5. Emergency Shutdown System
    - 6.5-6. Emergency shutdown valves
    - 6.5-7. Emergency situations
    - 6.5-8. ERS - Emergency Release System and Couplings
  - 6.6-LNG BUNKERING AND CARGO SYSTEM DESCRIPTION
    - 6.6-1. General
    - 6.6-2. Equipment
  - 6.7-BUNKER PROCESS FOR THE LNG BUNKER VESSEL
    - 6.7-1. Operation pattern
    - 6.7-2. Checklists
    - 6.7-3. Bunkering operation philosophy
    - 6.7-4. Pre-Bunker Operations
    - 6.7-5. Pre-Transfer Operations
    - 6.7-6. During Bunkering Operations
    - 6.7-7. After Bunkering Operations
  - 6.8-BUNKER DISPUTES
    - 6.8-1. General
    - 6.8-2. Bunker Delivery notes/receipts
  - 6.9-BUNKER SAMPLING PROCEDURES
- 7- REFERENCES

APPENDIX A: IAPH LNG BUNKER CHECKLIST SHIP TO SHIP

APPENDIX B: SAFETY ZONE DETERMINATION

- B.1. Deterministic approach
- B.2. Risk based approach
- B.3. Summary

APPENDIX C: LNG BUNKER VESSEL SYSTEM P&ID'S

APPENDIX D: BUNKERING OPERATING MANUAL

- D.1. ENGINE PROPULSION AND POWER SUPPLY SYSTEM
- D.2. CARGO HANDLING AND LNG BUNKERING

APPENDIX E: BUNKER DELIVERY NOTE