



GUIDE FOR

LNG BUNKERING

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Foreword

Recently, the marine industry has seen growing interest in the use of alternative fuels such as LNG and alternative technologies such as exhaust emission abatement equipment to meet stricter international, regional, national, and local air emissions legislation. These techniques are primarily aimed at meeting the IMO Annex VI Regulations 13 and 14 requirements for nitrogen oxide emissions from diesel engines and sulfur oxide emissions from all fuel-burning equipment on board.

Most LNG-fueled vessels in operation at the time of issuance of this Guide receive LNG bunkers on a relatively small scale, typically through a shore-to-ship basis by road tankers or dedicated shore side LNG tanks. To support the further growth and development of LNG fueled vessels for short sea and international trade it is recognized that more dedicated LNG infrastructure needs to be developed; particularly small scale LNG storage and distribution centers together with dedicated LNG bunkering vessels enabling ship-to-ship LNG transfer. Furthermore, it is envisaged that greater LNG transfer rates than those typically used for refueling the current gas fueled ship fleet will be required and this will necessitate the deployment of new and additional bunkering equipment and operational practices.

Accordingly, this Guide has been developed in order to outline the requirements for the design, construction and survey of liquefied gas carriers and barges fitted with dedicated LNG transfer arrangements and intended to operate in regular LNG bunkering service. While application of this Guide is optional, the LNG bunkering systems are to be designed, constructed, and tested in accordance with the requirements of this Guide when the optional **LNG Bunkering** notation is requested. Among other safety topics, the Guide addresses bunkering station safety; lifting and hose handling equipment; control, monitoring and ESD safety systems; and emergency release systems.

The optional **LNG Bunkering** notation detailed under 1/7.1 of this Guide may be assigned when such vessels are verified to meet the requirements of this Guide. This Guide is focused on the requirements for bunkering of LNG, the remainder of the vessel is to comply with the applicable edition of the ABS Rules.

A list of relevant documentation, regulations, standards and guides is included as Appendix 1 to this Guide.

This Guide becomes effective on the first day of the month of publication.

Users are advised to check periodically on the ABS website www.eagle.org to verify that this version of this Guide is the most current.

We welcome your feedback. Comments or suggestions can be sent electronically by email to rsd@eagle.org.



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SECTION 1 General

1 Scope and Application

Application of this Guide is optional. However, compliance with requirements of the Guide is compulsory when seeking the optional **LNG Bunkering** notation, see 1/7.1. This Guide has been developed to outline the requirements for the design, construction, and survey of liquefied gas carriers and barges fitted with dedicated LNG transfer arrangements and intended to operate in regular LNG bunkering service. This Guide is focused on the requirements for bunkering of LNG, the remainder of the vessel is to comply with the applicable edition of the ABS Rules.

Users of this Guide are advised that the process of bunkering LNG involves a number of interested parties, including a vessel's flag Administration, national regulatory bodies and port authorities. Therefore proposals are subject to review and approval by the applicable authorities with respect to installed safety equipment, operational practices, crew training, bunkering safety distances, simultaneous operations, etc. Accordingly ship designers, shipyards, ship owners/operators and other interested stakeholders are encouraged to determine the full applicable requirements and obtain the necessary approvals as early as possible in any LNG bunkering new construction or conversion project.

3 Objectives

The objective of this Guide is to provide criteria for the design, construction, installation, survey and operation of LNG transfer arrangements, associated machinery, equipment and systems in order to minimize risks to the vessel, crew and the environment. Detailed requirements are provided to achieve this objective in accordance with the following key principles and requirements:

- Vessel construction is in accordance with the *ABS Rules for Building and Classing Steel Vessels (Steel Vessel Rules)*, *ABS Rules for Building and Classing Steel Vessels Under 90 Meters (295 feet) in Length (Under 90m Rules)*, *ABS Rules for Building and Classing Steel Barges (Barge Rules)* or the *ABS Rules for Building and Classing Steel Vessels for Service on Rivers and Intracoastal Waterways (River Rules)*, as applicable.
- LNG containment systems are designed in accordance with Chapter 4 of the IGC Code, as incorporated by Section 5C-8-4 of the *Steel Vessel Rules*.
- LNG tank pressure, temperature and loading/filling limits are maintained within the design limits of the tank at all times.
- Means are provided to evacuate, purge and gas free the LNG tanks.
- LNG tanks are in a protected location.
- LNG containment spaces, bunkering stations and machinery spaces containing LNG or gas processing equipment are located and arranged such that the risk of any release of liquid or vapor will be minimized. Arrangements are provided for safe access during operations and inspections.
- LNG piping, systems and arrangements provide safe handling of liquid and vapor under all operating conditions. Means are provided to inert and gas free piping and systems.
- Bunker stations are arranged to provide compatible LNG transfer.
- Automation, instrumentation, monitoring and control systems are provided to minimize the risks with carriage, distribution and bunkering of LNG.
- Operation and maintenance manuals are provided for all LNG containment and transfer equipment and systems covering operation, maintenance and repair procedures.

5 Definitions

5.1 Breakaway Coupling

Breakaway Coupling means an LNG bunkering line coupling designed to separate at a pre-determined load to prevent damage to installed LNG transfer equipment; typically incorporates a dry-break feature to avoid unwanted LNG release.

5.3 Bunkering

Bunkering means the transfer of fuel to a vessel or facility in the form of LNG or traditional marine fuels such as residual or distillate fuel oils.

5.5 Cargo Machinery Space

Cargo Machinery Space are the spaces where cargo compressors, pumps or processing units are located.

5.7 Dual Fuel Diesel Engine

Dual Fuel Diesel Engine is a diesel engine that can burn natural gas as fuel with liquid (pilot) fuel and also have the capability of running on liquid fuel only.

5.9 Enclosed Space

Enclosed Space means any space within which, in the absence of artificial ventilation, the ventilation will be limited and any explosive atmosphere will not be dispersed naturally. See also 4-8-4/27 of the *Steel Vessel Rules*.

5.11 Emergency Release Coupling (ERC)

ERC means emergency release coupling; typically incorporates a dry-break feature to avoid unwanted LNG release. May be termed *PERC* for powered emergency release coupling.

5.13 Emergency Shutdown (ESD)

ESD means emergency shutdown. ESD (otherwise known as ESD-1) is the emergency shutdown of the LNG transfer in a controlled manner. ESD-2 is the automatic activation of the Emergency Release System. For further information refer to SIGTTO "ESD Arrangements and Linked Ship/Shore Systems for Gas Carriers".

5.15 Hazardous Area

Hazardous Area means an area in which an explosive gas atmosphere is, or may be expected to be, present in quantities such as to require special precautions for the construction, installation and use of equipment. See also 4-1-1/1.9.4 and 4-8-4/27 of the *Steel Vessel Rules*.

5.17 Non-Hazardous Area

Non-hazardous Area means an area in which an explosive gas atmosphere is not expected to be present in quantities such as to require special precautions for the construction, installation and use of equipment.

5.19 International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IGC Code)

IGC Code means the International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk, as amended.

5.21 Lower Explosive Limit (LEL)

LEL means the lowest concentration (percentage) of a gas or a vapor in air capable of producing a flash of fire in presence of an ignition source.