Smålands-
hamnar AB

CERTIFIERAD
ISO 9001
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OHSAS 18001
Ledningssystem för kvalitet, miljö och arbetsmiljö

# LNG Bunkering Regulations

**Port of Oskarshamn**

2019-03-22


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# 1 Introduction

## 1.1 General

During an extended period (since 2006), the EU has gradually tightened the requirements on sulfur content of traditional shipping fuels (down to 0.1%) and introduced restrictions on emissions of environmentally and health hazardous NOx, SOx and particles within the sulfur emissions control area (SECA), which includes the Baltic Sea. LNG (liquefied natural gas) is one of the main alternatives to replace traditional fuels in the shipping industry.

The sulfur emissions control area (SECA) is already trafficked by a number of cargo ships, passenger ships and cruise ships using LNG as fuel. An increase in the number of vessels using LNG as fuel is to be expected in the coming years.

Destination Gotland will initiate ferry traffic from the port of Oskarshamn to the port of Visby with a newly built LNG powered passenger ship in 2019. LNG bunkering of the passenger ship will be carried out in the port of Oskarshamn (ship-to-ship and truck-to-ship) and this will mark the introduction of LNG to the port of Oskarshamn.

## 1.2 Purpose

The purpose of the LNG bunkering regulations is to present the regulations concerning LNG bunkering (ship-to-ship and truck-to-ship) established by Smålandshamnar to ensure safe LNG bunkering operations in the port of Oskarshamn.

The LNG bunkering regulations shall support LNG suppliers (ships or trucks) and LNG receivers (vessels) that will handle LNG in the port of Oskarshamn. It is the responsibility of the LNG supplier and the LNG receiver to acquire knowledge and understanding of the content of the LNG bunkering regulations.

## 1.3 Application

The LNG bunkering regulations shall be read as a supplement to the general operating regulations for the port of Oskarshamn. It should be noted that only relevant parts of the general operating regulations shall be considered (see section 2.4). Port regulations and operating regulations for the port of Oskarshamn can be downloaded here: www.smalandshamnar.com

The LNG bunkering regulations for the port of Oskarshamn are based on the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen (the Swedish Transport Agency).

Direct references to both the general operating regulations for the port of Oskarshamn and the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen

are presented in this document.

## 1.4 Contact

For any questions concerning the LNG bunkering regulations, please contact:

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# 2 Regulations

## 2.1 General

LNG bunkering operations in the port of Oskarshamn must be carried out in accordance with the general operating regulations for the port of Oskarshamn, national legislation and recognised international and national standards and guidelines. It is the responsibility of the LNG supplier and the LNG receiver to make sure that these are followed.

In this context, the Swedish Work Environment Act (1977:1160) and the regulations for port work (AFS 2001:9), as well as the general operating regulations for the port of Oskarshamn, the rules for visitors and contractors in the port of Oskarshamn and the port regulations for the port of Oskarshamn are fundamental.

A complete list of relevant national laws and relevant international and national standards and guidelines can be found in the following documents:

- The national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen
- The international guidelines for LNG bunkering from EMSA (European Maritime Safety Agency)

A selection of relevant national legislation and relevant international and national standards and guidelines are presented in the following sections.

## 2.2 European and national legislation

The Work Environment Act (1977:1160)

Regulation (AFS 2001:9) for port work

Regulation (MSBFS 2018:5) on the transport of dangerous goods by road and terrain (ADR-S)

IMO - IGF Code - International Code of Safety for Ships Using Gases or Other Low-Flashpoint Fuels (IMO Res.MSC.391 (95))

Regulation (TSFS 2017:89) on the safety of ships using gases or alternative fuels with a low flash point (IGF code)

IMO - IGC Code - International Code for Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (IMO Res.MSC.5 (48))

Regulation (SJÖFS 2006:36) on transport by sea of liquefied gases in bulk (IGC code)

IMO - International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) (2010)

Regulation (SRVFS 2004:7) on explosion hazardous environment when handling flammable gases and liquids

## 2.3 International standards and guidelines

**ISO (International Organization for Standardization)**

ISO/TS 18683:2015 – Guidelines for systems and installations for supply of LNG as fuel to ships

ISO 20519:2017 – Ships and marine technology - Specification for bunkering of liquefied natural gas fuelled vessels

ISO 28460:2010 – Petroleum and natural gas industries - Installation and equipment for liquefied natural gas - Ship-to-shore interface and port operations

**SGMF (Society for Gas as a Marine Fuel)**

Safety Guidelines – LNG Bunkering (2017)

Bunkering of ships with LNG – Competency Guidelines (2017)

Recommendation of Controlled Zones during LNG Bunkering (2018)

Simultaneous Operations (SIMOPs) during LNG Bunkering (2018)

**EMSA (European Maritime Safety Agency)**

Guidance on LNG Bunkering to Port Authorities and Administrations (2018)

**SIGTTO (Society of International Gas Tanker and Terminal Operators)**

LNG Operations in Port Areas (2003)

ESD Arrangements & Linked Ship/Shore Systems for Liquefied Gas Carriers (2009)

**IAPH (International Association of Ports and Harbors)**

LNG Bunkering Safety Checklists (Ship-to-Ship, Truck-to-Ship, Shore-to-Ship) (2015)

**DNV GL (Det Norske Veritas – Germanischer Lloyd)**

DNVGL-RP-G105 - Development and Operation of Liquefied Natural Gas Bunkering Facilities (2015)

**IEC (International Electrotechnical Commission)**

IEC 60079-10-1:2015 - Explosive atmospheres - Part 10-1: Classification of areas - Explosive gas atmospheres

IEC 60092-502:1999 - Electrical installations in ships –Part 502: Tankers – Special features

## 2.4 Smålandshamnar

Port regulations (2009)

Operating regulations Smålandshamnar AB – Oskarshamn & Västervik (2018)

Including:

- Section 3 – Handling of goods
- Section 4 – Bunkering
- Section 6 – Ship in oil port
- Section 7 – Unloading and loading of oils, gases and chemicals in bulk

Rules for visitors and contractors – Oskarshamn & Västervik (2017)

# 3 LNG properties

LNG (liquefied natural gas), or LBG (liquid biogas), is natural gas that has been cooled to a temperature of about -160 °C and liquefied. The main component of LNG and natural gas is methane (85% - 99%).

The volume for LNG is approximately 1/600 of the equivalent for gaseous natural gas. This results in a number of practical and economic advantages in terms of storage and distribution of the gas.

Conversely, at atmospheric conditions (e.g. in case of discharge), LNG will quickly evaporate into natural gas and form a large gas cloud. Natural gas is colourless and odourless. The visible white cloud consists of water particles (moisture) in the air that freeze in contact with the cold natural gas.

Natural gas is lighter than air and rises at temperatures above -110 °C. Given the low temperature around -160 °C, the vaporised natural gas will initially spread along the ground.

The risks related to LNG and natural gas are associated with its cryogenic (cold damage) and flammable (pool fire, jet fire and flash fire) properties. It should be noted that LNG is only ignitable after it has evaporated to natural gas. Natural gas is ignitable in concentrations between 4% and 16% when mixed with air.

# 4 LNG bunkering

## 4.1 General

LNG bunkering operations in the port of Oskarshamn must be in accordance with the general operating regulations for the port of Oskarshamn, national legislation and recognised international and national standards and guidelines.

A number of operational and technical recommendations and requirements are presented in the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen. This includes:

- Section 4.1 – Safety
- Section 4.7 – Loading station onboard
- Section 4.8 – Loading hoses
- Section 3.9 – Manifold
- Section 9.4.1 – Operational and technical requirements

Smålandshamnar also refers to relevant parts of section 4 and section 7 of the general operating regulations for the port of Oskarshamn.

## 4.2 Specific requirements for LNG receivers and suppliers

A number of specific requirements for LNG receivers and LNG suppliers have been established by Smålandshamnar.

### 4.2.1 LNG supplier (ship)

Vessels that deliver LNG in the port of Oskarshamn must comply with the IGC code (IMO Res.MSC.5 (48)).

The LNG supplier must have a documented action plan (internal) for emergencies (see section 6).

Furthermore, the vessel must have received all necessary approvals from Transportstyrelsen according to section 4.15 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane.

### 4.2.2 LNG supplier (truck)

Trucks and truck drivers delivering LNG in the port of Oskarshamn must comply with regulation (MSBFS 2018:5) on the transport of dangerous goods by road and terrain (ADR-S).

The LNG supplier must have a documented action plan (internal) for emergencies (see section 6).

### 4.2.3 LNG receiver (ship)

Vessels that receive LNG in the port of Oskarshamn must comply with the IGF code (IMO Res.MSC.391 (95)). For older vessels that are not covered by the IGF code the IMO.Res.MSC.285(86) and alternative design applies.

The LNG receiver must have a documented action plan (internal) for emergencies (see section 6).

Furthermore, the vessel must comply with the requirements of sections 4.16 and 9.2 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

## 4.3 Notification

A written notification of a vessel call at the port of Oskarshamn must be made to the Traffic Department at Smålandshamnar no later than 24 hours before the arrival of the LNG supplier, in accordance with §18 in the port regulations for the port of Oskarshamn, and section 2.1 of the general operating regulations for the port of Oskarshamn. This is only relevant for LNG bunkering by ship (ship-to-ship).

Furthermore, a written notification of the LNG bunkering operation shall be made to the Traffic Department at Smålandshamnar and the local emergency service of Oskarshamn (raddningstjansten@oskarshamn.se) no later than 48 hours before the arrival of the LNG supplier, in accordance with section 4.2 of the general operating regulations for the port of Oskarshamn. This is relevant for LNG bunkering by ship (ship-to-ship) and truck (truck-to-ship).

The notification must at least include:

- Date and time
- Intended LNG bunkering site
- Brief description of the LNG bunkering operation (e.g. any SIMOPS)

- Defined control zones (including map presentation)

In addition, a written notification of the introduction of dangerous goods must be made to Smålandshamnar no later than 24 hours before the arrival of the LNG supplier, in accordance with section 3.3 of the general operating regulations for the port of Oskarshamn. This is especially relevant for LNG bunkering from truck (truck-to-ship). The notification may be combined with the notification of LNG bunkering operation.

## 4.4 Checklist for LNG bunkering

A checklist that documents all steps and preparations needed to ensure a safe LNG bunkering operation in the port of Oskarshamn shall be prepared. The checklist must be completed and signed by both the LNG supplier and LNG receiver. After completing the LNG bunkering operation, the checklist must be saved and presented to Smålandshamnar upon request.

Smålandshamnar advises the LNG supplier and LNG receiver to use the IAPH checklists for LNG bunkering. These can be downloaded here: www.smalandshamnar.com

Smålandshamnar also refers to relevant parts of section 4.4 - 4.6 in the general operating regulations for the port of Oskarshamn.

## 4.5 Approved sites for LNG bunkering

LNG bunkering operations may only be carried out at approved sites in the port of Oskarshamn.

The following sites in the port of Oskarshamn are approved for LNG bunkering operations:

- Quay 13
- The seaside of ships moored at quay 13

In order for further LNG bunkering sites to be approved, a specific risk analysis must be prepared by the LNG supplier. The risk analysis shall be reviewed and approved by relevant authorities and Smålandshamnar, according to requirements in section 4.4 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

## 4.6 LNG bunkering safety

Given the central location and the high level of activity in the port of Oskarshamn, it is of utmost importance to ensure a safe LNG bunkering operation in accordance with section 4.1 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

Smålandshamnar also refers to relevant parts of section 1.4, section 3.3, sections 3.6 - 3.7 and section 6.15 of the general operating regulations for the port of Oskarshamn.

### 4.6.1 Control zones

A number of control zones must be established around the LNG bunkering site, in accordance with section 12 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

The purpose of such control zones is to prevent interference and ensure a safe LNG bunkering operation. Relevant control zones must be clearly marked in connection with the LNG bunkering operation (e.g. by signs and barriers).

For each LNG bunkering site, the following zones must be defined and established before the LNG bunkering operation begins:

- Hazardous zone
- Safety zone
- Monitoring and security zone

The Hazardous zone is defined as the zone (three-dimensional) within which an explosive and combustible atmosphere can be expected during the LNG bunkering operation. An explosive and combustible atmosphere is defined, inter alia, in accordance with the regulation (SRVFS 2004:7) on hazardous environment when handling flammable gases and liquids.

The Safety zone is defined as the zone (three-dimensional) within which an explosive and combustible atmosphere may occur following leakage during LNG bunkering. In the safety zone, ignition sources should be limited as far as possible and only required personnel and activities are allowed. The safety zone must be defined on the basis of a specific deterministic or probabilistic risk analysis prepared by the LNG supplier. The specific risk analysis shall be reviewed and approved by Smålandshamnar, according to the requirements in section 4.4 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

The Monitoring and security zone is defined as the zone where continuous monitoring is necessary to ensure that adjacent activities (e.g. traffic) do not run the risk of interfering with the LNG bunkering operation, or compromising the safety around it. The monitoring zone shall be defined on the basis of practical conditions at the LNG bunkering site (e.g. visibility and neighbouring activities). Activities do not necessarily need to be restricted within the monitoring and security zone. However, since the monitoring and security zone may limit neighbouring activities, it is important that its purpose and extent are clearly communicated to affected parties.

The extent of the safety zone and the monitoring and security zone starts from the overall outer contour of the equipment, the truck or the vessel involved in the LNG bunkering operation.

In connection with the notification of LNG bunkering to Smålandshamnar, the LNG supplier shall notify defined control zones (see section 4.3).

### 4.6.2 Personal protective equipment

In order to ensure that the personnel involved in the LNG bunkering operation is protected from the risks of LNG (cold damage and flammability), suitable personal protective equipment (PPE) must be used.

Recommendations on PPE are presented in section 4.10 and section 14 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

Smålandshamnar also refers to relevant parts of section 1.5, section 2.9, and section 6.15 of the general operating regulations for the port of Oskarshamn.

### 4.6.3 Maritime safety

The LNG supplier and LNG receiver must, by their respective commander/ship captain (or truck driver), individually, define weather condition criteria during which it is safe to carry out an LNG bunkering operation.

It is the responsibility of the LNG supplier, in accordance with §5 in the port regulations for the port of Oskarshamn, to ship the vessel so that other vessels are not exposed to danger in the port of Oskarshamn.

## 4.7 Training

The LNG bunkering operation must be monitored by a responsible person (bunkering watch) from the LNG supplier or the LNG receiver, in accordance with section 3.6 of the general operating regulations for the port of Oskarshamn, and section 4.6 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

The responsible must have adequate training and experience to ensure a safe LNG bunkering operation and be able to act in case of emergency, in accordance with section 4.14 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

Documentation of training and experience must be presented to Smålandshamnar upon request.

Recommendations on training are presented in section 4.14 and 11 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

Furthermore, all personnel involved in the LNG bunkering operation must have adequate knowledge about the rules for visitors and contractors in the port of Oskarshamn. Rules for the port of Oskarshamn can be obtained from: www.smalandshamnar.com

Notification and registration of personnel involved in an LNG bunkering operation shall, based on the rules for visitors and contractors for the port of Oskarshamn, be made in writing to:

claes.mollden@smalandshamnar.com
stefan.johansson@smalandshamnar.com
info@smalandshamnar.com

This only needs to be done for individual personnel prior to their first visit to the port of Oskarshamn (not on every regular visit).

## 4.8 SIMOPS

SIMOPS (simultaneous operation) refers to simultaneous activities that potentially may disrupt or compromise the safety of an LNG bunkering operation. Examples of SIMOPS can be loading/unloading of goods from ships, oil bunkering to neighbouring ships and check-in/boarding of passengers and vehicles to ships.

In order for SIMOPS to be approved, a specific risk analysis must be prepared by the LNG supplier or LNG receiver (the one who desires SIMOPS). The risk analysis shall then be reviewed and approved by Smålandshamnar, as required by section 4.11.4 and 4.13 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

The following SIMOPS are not currently approved within the safety zone (see section 4.6.1) for LNG bunkering operations in the port of Oskarshamn:

- Boarding of passengers/cars to and from ships

The following SIMOPS are not currently approved during LNG bunkering in the port of Oskarshamn:

- Loading/Unloading of dangerous goods to and from ships

Smålandshamnar also refers to the port regulations for the port of Oskarshamn.

# 5 Responsibilities

## 5.1 General

Recommendations and requirements regarding the division of responsibility are found in section 4.11 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.

Smålandshamnar also refers to relevant parts of section 4.3 of the general operating regulations for the port of Oskarshamn.

## 5.2 LNG supplier/LNG receiver

The LNG supplier must submit a notification of an LNG bunkering operation to the Traffic Department at Smålandshamnar and the local emergency service of Oskarshamn no later than 48 hours before arrival (see section 4.3).

The LNG supplier and LNG receiver are ultimately responsible for the LNG bunkering operation through the respective commander/ship captain (or truck driver). The responsibility of the respective commander/ship captain can be delegated to a responsible person (bunkering watch).

The LNG bunkering operation must be monitored by a responsible person (bunkering watch) from the LNG supplier and the LNG receiver, respectively.

The responsible (bunkering watches) must have adequate training and experience to ensure a safe LNG bunkering operation and be able to act in case of an emergency (see section 4.7). Furthermore, the responsible persons (bunker watches) must have knowledge of the regulations that exist in the port of Oskarshamn and ensure that these are followed incl. enforce the defined control zones).

The LNG supplier is responsible for the part of the LNG bunkering operation that is controlled from the LNG bunkering vessel/truck (e.g. pumping), whereas the LNG receiver is responsible for the part of the LNG bunkering that is controlled from the receiving vessel (e.g. receiving). Both are responsible for terminating the LNG bunkering operation in case of unexpected problems to avoid an emergency.

A checklist for the LNG bunkering operation should be completed and signed by both the LNG supplier and the LNG receiver (see section 4.4).

## 5.3 Smålandshamnar

Smålandshamnar is responsible for ensuring that a regulatory framework for LNG bunkering in the port of Oskarshamn is established and available to LNG suppliers and LNG receivers.

The regulatory framework imposes requirements on the LNG supplier and LNG receiver and by their compliance with the LNG bunkering regulations, Smålandshamnar indirectly approves the LNG bunkering operations carried out by the LNG supplier and LNG receiver.

Relevant documentation must be presented by the LNG supplier and LNG receiver upon request from Smålandshamnar.

# 6 Emergency

The LNG supplier and LNG receiver must have a documented action plan (internal) for the

handling of emergencies and to, as far as possible, limit the effects of potential accident scenarios with regard to health and environment. The emergency action plan (internal) and the related LNG bunkering manual shall be forwarded to Smålandshamnar for review and approval well in advance before the LNG bunkering operation.

Furthermore, the LNG supplier and LNG receiver must make sure they have knowledge and understanding of the overall action plan (external) for emergencies, established in the cooperation of the emergency services, the accident checklist and the emergency telephone list that are attached to the general operating regulations for the port of Oskarshamn.

Recommendations regarding the action plan (internal and external) are given in section 13 and section 14.4 of the national guidelines (TSG 2018–4023) for bunkering of liquid methane from Transportstyrelsen.

Smålandshamnar also refers to relevant parts of section 1.6, section 2.10, section 3.5, section 4.7 and section 6.16 - 6.18 of the general operating regulations for the port of Oskarshamn.

## 6.1 Reporting

All incidents, accidents and injuries that occur in connection with LNG bunkering operations must immediately be reported to Smålandshamnar (written and verbally) in accordance with §27 in the port regulations for the port of Oskarshamn.

A template for incident/non-conformity reports can be downloaded from:

http://www.smalandshamnar.com/documents/portohamn/documents/hafte%20regler%20for%20besokande%20och%20entreprenorer%20smalandshamnar%20ab%202018.pdf

Further requirements regarding reporting obligation are presented in section 4.5 of the national guidelines (TSG 2018-4023) for bunkering of liquid methane from Transportstyrelsen.