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Standard for a Liquefied Natural Gas (LNG) Bunker Checklist

Bunker station to Ship

Edition 1.0

Adopted by the Police Regulations Committee on 27 October 2021

Foreword

The WPCI (World Ports Climate Initiative) working group of the IAPH (International Association of Ports and Harbors) has developed three lists for bunkering with liquefied natural gas (LNG) (truck to ship, ship to ship or ship to shore bunkering) for vessels using liquefied natural gas (LNG) as a propulsion fuel. These lists are already in use in many seaports, in particular Rotterdam and Antwerp. The CCNR, given its desire to standardise practices to the greatest extent possible, and in partnership with the IAPH, has modified the shore to ship bunkering checklist to tailor it to the Rhine context and its regulations without amending its structure, spirit and safety levels.

Vessels navigating on the Rhine shall be subject to the requirements of the Rhine Police Regulations (RPR), in particular Article 15.07(5)(b) and (6). They state that *“before commencing bunkering with liquefied natural gas (LNG), the master of the receiving ship shall be required to ensure: [...]”*

- b) *that a liquefied natural gas (LNG) bunker checklist for vessels bearing the identification mark referred to in Article 2.06 in accordance with the standard defined by the CCNR has been completed and signed by himself, or by an individual acting on his behalf, and by the individual responsible for the bunkering facility and that the answer to all the questions on the list is 'yes'. ” Irrelevant questions are to be deleted. If not all the questions can be answered in the affirmative, bunkering shall only be authorised with the authorisation of the competent authority*

The current standard comprises

- a liquefied natural gas (LNG) bunker checklist (bunker station to ship). It comprises 4 parts (A, B, C, D). The completion of part A is voluntary, but recommended, completion of parts B, C and D is obligatory.
- guidelines for helping the user to complete the list.

The current edition of this standard can be downloaded from the CCNR website (www.ccr-zkr.org) and is available in German, French, Dutch and English.

This standard applies to bunkering with liquefied natural gas (LNG) as a fuel. It does not apply to loading liquefied natural gas (LNG) as a cargo.

CODING OF ITEMS

The presence of the letters 'A', 'P' or 'R' in the column entitled 'Code' indicates the following:

- A 'Agreement' Indicates that the referenced consideration should be addressed by an agreement or procedure that should be identified in the 'Remarks' column of the checklist or communicated in some other mutually acceptable form.
- P 'Permission' Indicates that in the case of a negative answer to the statements coded 'P', no operations are to be conducted without the written permission from the competent authority.
- R 'Re-check' Indicates items to be re-checked at appropriate intervals, as agreed between both parties and stated in the declaration.

The joint declaration should not be signed until all parties have checked and accepted their assigned responsibilities and accountabilities. When duly signed, this document is to be kept on board at least three months of the liquefied natural gas (LNG) receiving vessel conform applicable regulations or company requirements.

Liquefied natural gas (LNG) bunker checklist Bunker station to ship

PART A: Planning stage checklist for liquefied natural gas (LNG) bunker operations

This part of the checklist can be used as a guideline for exchanging information and for discussing safety aspects when planning bunkering with liquefied natural gas (LNG). It is recommended that this part of the checklist be completed when placing the bunker order.

Planned date and time: _____

Port / Terminal or Berth: _____

Liquefied natural gas (LNG) receiving ship: _____

Liquefied natural gas (LNG) bunker station: _____

	Check	Ship	Bunker station	Terminal / berth	Code	Remarks
1	Competent authorities have granted permission for liquefied natural gas (LNG) bunker operations for the specific location and time.				P	
2	The terminal / berth representative has granted permission for liquefied natural gas (LNG) bunker operations for the specific location and time.				P	
3	Competent authorities have been notified of the start of liquefied natural gas (LNG) bunker operations as per local regulations.					Day / time notification: _____ Day / Time notified: _____
4	The terminal / berth representative has been notified of the start of liquefied natural gas (LNG) bunker operations as per terminal / berth regulations.					If applicable Day/time notification: _____ Day time notified: _____
5	It shall be possible for the competent authorities' requirements to be observed.					e.g. Port byelaws
6	It shall be possible for the terminal / berth requirements to be observed.					If applicable E.g. terminal / berth regulations

	Check	Ship	Bunker station	Terminal / berth	Code	Remarks
7	All personnel involved in the liquefied natural gas (LNG) bunker operations have the appropriate training and have been instructed on the specific liquefied natural gas (LNG) bunker equipment and the procedures that are carried out.	For the ship:	For the bunker station:	For the terminal / berth:		
8	The operating manual of the LNG system, including bunkering operations and prescribed by ES-TRIN, Annex 8, 1.4.9, is available.					
9	In case of a bunkering without sufficient daylight, the arrangements for appropriate illumination of the liquefied natural gas (LNG) bunker operations area have been agreed upon.				A	
10	All liquefied natural gas (LNG) transfer and gas detection equipment is certified, in good condition and appropriate for the service intended.	For the ship:	For the bunker station:		A	
11	The procedures for bunkering, cooling down and purging operations have been agreed upon by ship and bunker station				A	Reference to procedures:
12	The system and method of electrical insulation have been agreed upon by ship and bunker station.				A	Method:
13	The restricted area has been agreed upon and designated.				A	Restricted area _____ mtr / ft
14	Regulations with regards to ignition sources can be observed.	For the ship:	For the bunker station:	For the terminal / berth:	A	
15	All required firefighting equipment is ready for immediate use.	For the ship:	For the bunker station:	For the terminal / berth:		

For registration of the representatives involved in the planning:

Ship	Bunker station	Terminal / Berth
Name	Name	Name
Rank	Position	Position
Date	Date	Date
Time	Time	Time

PART B: Before Liquefied Natural Gas (LNG) Transfer Checklist

(This part must be completed before actual transfer operations start)

Date and time: _____

Port / Terminal or Berth _____

Liquefied natural gas (LNG) receiving ship: _____

Liquefied natural gas (LNG) bunker station: _____

	Check	Ship	Bunker station:	Terminal / berth	Code	Remarks
16	Part A was used in preparation prior to the bunker operation, in accordance with the recommendation in the foreword.	For the ship:	For the bunker station:	For the terminal / berth:		If applicable
17	Present weather and wave conditions are within the agreed limits.				A R	
18	The liquefied natural gas (LNG) receiving ship is securely moored. Regulations with regards to mooring arrangements are observed. Sufficient fendering is in place.				R	
19	There is a safe means of access between the ship and shore including a safe emergency escape route between ship and shore.				R	
20	All required firefighting equipment is ready for immediate use.	For the ship:	For the bunker station:	For the terminal / berth:		
21	The liquefied natural gas (LNG) bunker operations area is sufficiently illuminated.				A R	
22	The ship is able to move under its own power in a safe and non-obstructed direction.	For the ship:			R	
23	Adequate supervision of the liquefied natural gas (LNG) bunker operations is in place both on the ship and at the bunker station and an effective watch is being kept at all time.					

	Check	Ship	Bunker station:	Terminal / berth	Code	Remarks
24	An effective means of communication between the ship's master and the bunker station operator has been established and tested. The communication language has been agreed upon.				A R	VHF / UHF Channel: _____ Language: _____ Primary System: _____ Backup System: _____
25	The emergency stop signal and shutdown procedures have been agreed upon, tested, and explained to all personnel involved. Emergency procedures and plans and the contact numbers are known to the persons in charge.				A	Emergency Stop Signal: _____
26	The predetermined restricted area has been established. Appropriate signs mark this area on both bunker station and ship.				A	
27	The restricted area is free of other ships, unauthorized persons, objects and ignition sources.				R	
28	External doors, portholes and accommodation ventilation inlets are closed as per operational documentation.				R	At no time they should be locked
29	The gas detection equipment has been operationally tested and found to be in good working order.					
30	Material Safety Data Sheets (MSDS) for the delivered liquefied natural gas (LNG) fuel are available.				A	
31	Regulations with regards to ignition sources are observed.				R	
32	Appropriate and sufficient suitable protective clothing and equipment is ready for immediate use.					
33	Personnel involved in the connection and disconnection of the bunker hoses and personnel in the direct vicinity of these operations make use of sufficient and appropriate protective clothing and equipment.					

	Check	Ship	Bunker station:	Terminal / berth	Code	Remarks
34	A (powered) emergency release coupling ((P)ERC) is installed and is ready for immediate use.					If applicable
35	The water spray system has been tested and is ready for immediate use.					If applicable
36	Spill containment arrangements are of an appropriate material and volume, in position, and empty.					
37	Hull and deck protection system is in place and ready for immediate use.					If applicable
38	Bunker pumps and compressors are in good working order.				A	If applicable
39	All control valves are well maintained and in good working order.					
40	Bunker system gauges, high level alarms and high-pressure alarms are operational, correctly set and in good working order.					
41	The ship's bunker tanks are protected against inadvertent overfilling at all times, tank content is constantly monitored and alarms are correctly set.				R	Intervals not exceeding _____ minutes
42	All control, monitoring and safety devices on the liquefied natural gas (LNG) installations are checked, tested and found to be in good working order.					
43	Pressure control equipment and boil off or re-liquefaction equipment is operational and in good working order.					If applicable
43a	The vapour connections are properly connected and supported.					If applicable

	Check	Ship	Bunker station:	Terminal / berth	Code	Remarks
44	Both on the ship and in the bunker station, the ESDs, automatic valves or similar devices have been tested, have found to be in good working order, and are ready for use. The closing rates of the ESDs have been exchanged.				A	ESD Ship: _____seconds ESD Truck: _____seconds
45	The liquefied natural gas (LNG) bunker line has been checked. Unused connections are closed, blanked and fully bolted.					
46	Liquefied natural gas (LNG) bunker hoses, fixed pipelines and bunkering manifolds are in good condition, properly rigged, supported, properly connected, leak tested and certified for the liquefied natural gas (LNG) transfer.					
47	The bunker connections between the ship and the bunker station are provided with dry-disconnect type couplings.					If applicable
48	The bunker connections between the ship and the bunker station have adequate electrical insulating means in place.					
49	Dry-disconnect type couplings are in place on the liquefied natural gas (LNG) bunker connections. They have been visually inspected for functioning and found to be in a good working order.					
50	The ship's emergency fire control plans are located externally.					Location: _____
51	An International Shore Connection has been provided.					If applicable
52	Competent authorities have been informed that liquefied natural gas (LNG) bunker operations are commencing and have been requested to inform other vessels in the vicinity.					Date/time of the notification: _____

PART C: Liquefied Natural Gas (LNG) Transfer Data
(This part should be completed before actual transfer operations start)

Agreed starting temperatures and pressures

Agreed Physical Quantity Unit (PQU): m³ tonnes _____

	Ship		Liquefied natural gas (LNG) bunker station:		
	Tank 1	Tank 2	Tank 1	Tank 2	
Liquefied natural gas (LNG) tank start temperature:					__ °C / __ °F
Liquefied natural gas (LNG) tank start pressure:					bar / psi* (rel.)
Liquefied natural gas (LNG) tank available (rest) capacity:					PQU

* delete as appropriate

Agreed bunker operations

Agreed Physical Quantity Unit (PQU): m³ tonnes _____

	Tank 1	Tank 2	
Agreed quantity to be transferred:			PQU
Starting pressure at the bunkering manifold:			bar / psi* (rel.)
Starting rate:			PQU per hour
Max transfer rate:			PQU per hour
Topping up rate:			PQU per hour
Bunkering manifold maximum start pressure:			bar / psi* (rel.)

* delete as appropriate

Agreed maximums and minimums

	Maximum	Minimum	
Pressures during bunkering:			bar / psi* (rel.)
Pressures in the liquefied natural gas (LNG) bunker tanks:			bar / psi* (rel.)
Liquefied natural gas (LNG) temperatures:			__ °C / __ °F
Filling limit of the liquefied natural gas (LNG) bunker tanks:			%

* delete as appropriate

Restrictions in LNG bunker operations

Restricted activity	Ship	Bunker station	Terminal / berth

Declaration

We, the undersigned, have checked the above items in parts B and C in accordance with the instructions and have satisfied ourselves that the entries we have made are correct.

We have also made arrangements to carry out repetitive checks as necessary and agreed that those items coded 'R' in the checklist should be re-checked at intervals not exceeding _____ hours.

If, to our knowledge, the status of any item changes, we will immediately inform the other party.

Ship	Bunker station	Terminal / berth
Name	Name	Name
Rank	Position	Position
Signature	Signature	Signature
Date	Date	Date
Time	Time	Time

Record of repetitive checks								
Date								
Time								
Initials for ship								
Initials for bunker station								
Initials for terminal / berth								

Part D: After Liquefied Natural Gas (LNG) Transfer Checklist
(This part should be completed after transfer operations have been completed)

	Check	Ship	Bunker station	Terminal / berth	Code	Remarks
53	Bunker hoses, fixed pipelines and bunkering manifolds have been purged and are ready for disconnection.				A	
54	Remotely and manually controlled valves are closed and ready for disconnection.				A	
55	After disconnection the liquefied natural gas (LNG) restricted area has been deactivated. Appropriate signs have been removed.				A	
56	The terminal / berth representative has been informed of the completion of liquefied natural gas (LNG) bunker operations					Time of notification: _____ hrs
57	Competent authorities have been notified that liquefied natural gas (LNG) bunker operations have been completed and have been requested to inform other vessels in the vicinity.					Time of notification: _____ hrs
58	If applicable, near misses and incidents have been reported to competent authorities.					Report nr: _____

Declaration

We, the undersigned, have checked the above items in Part D in accordance with the instructions and have satisfied ourselves that the entries we have made are correct.

Ship	Bunker station	Terminal / berth
Name	Name	Name
Rank	Position	Position
Signature	Signature	Signature
Date	Date	Date
Time	Time	Time

GUIDELINES for Bunkering LNG from bunker station to ship

GENERAL

The responsibility and accountability for the safe conduct of operations while a ship is performing liquefied natural gas (LNG) bunkering is shared jointly between the ship's master, the liquefied natural gas (LNG) bunker station operator and, if applicable, the terminal / berth representative. Before the liquefied natural gas (LNG) bunker operations commence, the ship's master, the liquefied natural gas (LNG) bunker station operator and, if applicable, the terminal / berth representative should:

- agree in writing on the bunker procedures, including the maximum transfer rates;
- agree in writing on the action to be taken in the event of an emergency, and
- complete and sign the bunker checklist Bunker station to Ship.

For inland navigation, the term "ship" must be understood as an inland waterway vessel or a convoy and the term "ship's master" must be understood as the boat master according to navigational regulations.

For the checks which are not applicable for all ships, "if applicable" is added in the last column. The "if applicable" marked checks are not mandatory, users can skip these checks by mentioning N.A. in the "Remarks" column.

The principal terms used are defined, at the end of this document, in the part "Abbreviations and definitions".

STRUCTURE OF THE CHECKLIST

The liquefied natural gas (LNG) Bunker Checklist – Bunker station to Ship comprises of four parts.

The first part: **PART A: Planning stage checklist for liquefied natural gas (LNG) bunker operations** addresses the considerations to be made during the planning stage of liquefied natural gas (LNG) bunker operations.

This part of the checklist can be used as a guideline for exchanging information and for discussing safety aspects when planning bunkering with liquefied natural gas (LNG). It is recommended that this part of the checklist be completed before placing the bunker order.

The second part: **PART B: Before Liquefied Natural Gas (LNG) Transfer Checklist** identifies the required physical checks and elements that are verified just before the liquefied natural gas (LNG) bunkering commences. The safety of operations requires that all relevant statements are considered and the associated responsibility and accountability for compliance is accepted, either jointly or singly.

Where a particular item is considered to be not applicable to the ship, to the liquefied natural gas (LNG) bunker station or to the planned operation, a note to this effect should be entered in the 'Remarks' column.

The third part: **PART C: Liquefied natural gas (LNG) Transfer Data** contains the transfer data to be agreed upon. In this section the information on temperature, density, volume, transfer rate, pressure and the physical quantity unit to be used for the liquefied natural gas (LNG) bunkering, are exchanged and agreed upon.

The fourth and final part of the checklist: **PART D: After Liquefied Natural Gas (LNG) Transfer Checklist** contains the considerations to be made after the liquefied natural gas (LNG) bunker operations before disconnecting the bunker connections and finishing the total operations.

USAGE OF THE BUNKER STATION TO SHIP LIQUEFIED NATURAL GAS (LNG) BUNKERING CHECKLIST

The following guidelines have been produced to assist in the joint use of Liquefied Natural Gas (LNG) Bunker Checklist – Bunker station to Ship.

The ship's master and all under his command must adhere strictly to these requirements throughout the ship's stay alongside. The liquefied natural gas (LNG) bunker station operator and, if applicable, the terminal / berth representative must ensure that all personnel do likewise. Each party commits to cooperate fully in the mutual interest of achieving safe and efficient operations.

The ship's master, the liquefied natural gas (LNG) bunker station operator and, if applicable, the terminal / berth representative can appoint responsible persons in charge of bunker operations and authorize them to complete and sign the liquefied natural gas (LNG) bunker checklist.

Responsibility and accountability for the statements within the liquefied natural gas (LNG) Bunker Checklist – Bunker station to Ship is assigned within the document. The acceptance of responsibility is confirmed by ticking or initialling the appropriate box and finally signing the declaration at the end of the checklist. Once signed, this details the minimum basis for safe operations that has been agreed upon through the mutual exchange of critical information.

Some of the checklist statements are directed to considerations for which the ship's master has sole responsibility and accountability. For some checklist statements either the liquefied natural gas (LNG) bunker station operator or terminal / berth representative has sole responsibility and accountability. Some checklist statements assign a joint responsibility and accountability. Greyed-out boxes are used to identify statements that generally may not be applicable to one party, although the ship's master, bunker station operator or terminal / berth representative may tick or initial such sections if they so wish.

Where mentioned in the box; "for the ship", "for the bunker station" or "for the terminal / berth", the involved parties only check and sign for their own responsibilities. The current guidelines recall this with the comment "For this item, the involved parties only check and sign for their own responsibilities."

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 15.07(5)(b) and (6), which state:

"5. *Before commencing bunkering with liquefied natural gas (LNG), the master of the receiving ship shall be required to ensure:*

[...]

b) *that a liquefied natural gas (LNG) bunker checklist for vessels bearing the identification mark referred to in Article 2.06 (of the RPR) in accordance with the standard defined by the CCNR (namely this list) has been completed and signed by himself, or by an individual acting on his behalf, and by the individual responsible for the bunkering facility and that the answer to all the questions on the list is "yes". Irrelevant questions are to be deleted. If not all the questions can be answered in the affirmative, bunkering shall only be authorised with the authorisation of the competent authority;*

[...]

6. *The checklist referred to in (5)(b) shall:*

a) *be completed in duplicate,*

b) *be available in at least one language understood by the individuals referred to in (5)(b) above and*

c) *be retained aboard the vessel for a period of 3 months."*

The assignment of responsibility and accountability does not mean that the other party is excluded from carrying out checks in order to confirm compliance. It is intended to ensure clear identification of the party responsible for initial and continued compliance throughout the ship's stay at the terminal / berth.

The ship's master should check all considerations lying within the responsibility of the liquefied natural gas (LNG) fuelled ship. Similarly, all considerations which are the liquefied natural gas (LNG) bunker station and, if applicable, the terminal / berth responsibility should be checked by the liquefied natural gas (LNG) bunker station operator and, if applicable, the terminal / berth representative respectively. In fulfilling these responsibilities, representatives should assure themselves that the standards of safety on both sides of the operation are fully acceptable.

That can be achieved by means such as:

- confirming that a competent person has satisfactorily completed the checklist;
- sighting appropriate records;
- by joint inspection, where deemed appropriate.

Before the start of operations, and from time to time thereafter for mutual safety, the liquefied natural gas (LNG) bunker station operator and, if applicable, a terminal / berth representative and, where appropriate, the ship's master, may conduct an inspection of the ship and bunker station to ensure that the vessel and bunker station are effectively managing their obligations, as accepted in the liquefied natural gas (LNG) Bunker Checklist – Bunker station to Ship. Where basic safety requirements are found to be out of compliance, either party may require that the liquefied natural gas (LNG) bunker operations are stopped immediately until corrective action is satisfactorily implemented.

CODING OF ITEMS

The presence of the letters 'A', 'P' or 'R' in the column entitled 'Code' indicates the following:

- | | | |
|---|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A | 'Agreement' | Indicates that the referenced consideration should be addressed by an agreement or procedure that should be identified in the 'Remarks' column of the checklist or communicated in some other mutually acceptable form. |
| P | 'Permission' | Indicates that in the case of a negative answer to the statements coded 'P', no operations are to be conducted without the written permission from the competent authority. |
| R | 'Re-check' | Indicates items to be re-checked at appropriate intervals, as agreed between both parties and stated in the declaration. |

The joint declaration should not be signed until all parties have checked and accepted their assigned responsibilities and accountabilities. When duly signed, this document is to be kept on board at least three months of the liquefied natural gas (LNG) receiving vessel conform applicable regulations or company requirements.

EXPLANATION OF THE CHECKS

PART A: Planning stage checklist for liquefied natural gas (LNG) bunker operations

- 1. Competent authorities have granted permission for liquefied natural gas (LNG) bunker operations for the specific location and time.**

Competent authority may be consulted about which other authorities need to approve the bunker operations for the specific location, time and parties involved.

- 2. The terminal / berth representative has granted permission for liquefied natural gas (LNG) bunker operations for the specific location and time.**

Competent authority may be consulted if in doubt of whom to contact at the terminal / berth.

- 3. Competent authorities have been notified of the start of liquefied natural gas (LNG) bunker operations as per local regulations.**

Competent authority may be consulted if in doubt of whom to contact as per local regulations.

- 4. The terminal / berth representative has been notified of the start of liquefied natural gas (LNG) bunker operations as per terminal / berth regulations.**

The terminal / berth representative may be consulted if in doubt about the applicable terminal / berth regulations.

- 5. It shall be possible for the competent authorities' requirements to be observed.**

Ports have specific port regulations and port byelaws. Port authority may be consulted if in doubt about the local regulations. In states that are signatories to SOLAS, the ISPS Code requires for seagoing vessels that the Ship Security Officer and the Port Facility Security Officer co-ordinate the implementation of their respective security plans with each other.

Vessels navigating on the Rhine shall be subject to the requirements of the Rhine Police Regulations (RPR).

- 6. It shall be possible for the terminal / berth requirements to be observed.**

The terminal / berth representative may be consulted if in doubt about the applicable terminal / berth regulations.

- 7. All personnel involved in the liquefied natural gas (LNG) bunker operations have the appropriate training and have been instructed on the specific liquefied natural gas (LNG) bunker equipment and the procedures that are carried out.**

For this item, the involved parties only check and sign for their own responsibilities.

Although all personnel that are involved in liquefied natural gas (LNG) bunker operations should comply with mandatory training requirements, they should also be familiarized with the specific liquefied natural gas (LNG) bunker equipment and procedures for this bunker operation. For this item, the involved parties only check and sign for their own responsibilities.

Vessels navigating on the Rhine shall be subject to the requirements of the Regulations for Rhine navigation personnel (RPN), in particular Article 4a.01(1) and (2).

- 8. The operating manual of the LNG system, including bunkering operations and prescribed by ES-TRIN, Annex 8(1.4.9), is available.**

The ships operating manual, including prescribed bunker operations according to the European Standard laying down Technical Requirements for Inland Navigation vessels (ES-TRIN), Annex 8 and particular 1.4.9 is applicable and familiar to all relevant personnel involved.

- 9. In case of a bunkering without sufficient daylight, the arrangements for appropriate illumination of the liquefied natural gas (LNG) bunker operations area have been agreed upon.**

The areas in which the bunkering manifolds are located, both on board and ashore, should be safely and properly illuminated during darkness. If this requirement is not met, additional lightening must be provided.

- 10. All liquefied natural gas (LNG) transfer and gas detection equipment is certified, in good condition and appropriate for the service intended.**

For this item, the involved parties only check and sign for their own responsibilities.

A list of certification dates, expiry dates and next upcoming intermediate certification dates for the bunkering used equipment should be provided and exchanged. The validation of the certificates has to be performed before liquefied natural gas (LNG) bunkering commences.

Vessels in possession of an inspection certificate shall be subject to the requirements of the Rhine Vessel Inspection Regulations (RVIR) as well as the ES-TRIN, in particular Annex 8 (2.8)

11. The procedures for bunkering, cooling down and purging operations have been agreed upon by ship and bunker station.

The procedures for the intended liquefied natural gas (LNG) bunker operation should be pre planned. They should be discussed and agreed upon by the ship's master, liquefied natural gas (LNG) bunker station operator and if applicable terminal / berth representative prior to the start of the operations. Agreed arrangements should be formally recorded. Any change in the agreed procedure that could affect the operation should be discussed by the involved parties and agreed upon. After agreement by the involved parties, substantial changes should be laid down in writing as soon as possible and in sufficient time before the change in procedure takes place.

12. The system and method of electrical insulation have been agreed upon by ship and bunker station.

The system and method of electrical insulation in the liquefied natural gas (LNG) bunker connection should be pre planned. They should be discussed and agreed upon by the ship's master, liquefied natural gas (LNG) bunker station operator and if applicable terminal / berth representative prior to the start of the operations.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 15.07(5)(a) and (7)(d).

13. The restricted bunker area has been agreed upon and designated.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 1.01(ae), Article 8.11(3) and Article 15.07(4). The bunker area is defined by the RPR as *"the area situated within a radius of 20 metres of the bunkering connection"*.

If applicable restricted area requirements from the liquefied natural gas (LNG) bunkerstation, terminal / berth and local authorities should be taken into account and incorporated.

The requirements for the bunker area around the liquefied natural gas (LNG) bunker location on board of the ship and on the shore should be exchanged, agreed upon and designated between the parties involved in the liquefied natural gas (LNG) bunkering.

For sea-going vessels, recommended minimum distance is 25 metres / 82 feet.

14. Regulations with regards to ignition sources can be observed.

For this item, the involved parties only check and sign for their own responsibilities.

These regulations include, but are not limited to, the smoking ban and provisions concerning naked flames, mobile telephones, pagers, VHF and UHF equipment and radars.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 8.11(3), which states that *"while bunkering with liquefied natural gas (LNG) is in progress, the master shall be required at all times to ensure that a smoking ban on board and within the bunker area is observed. The smoking ban also applies to electronic cigarettes and other similar devices. The smoking ban does not apply in accommodation and the wheelhouse provided that their windows, doors, skylights and hatches are closed."*

Naked lights or open fires include: flame, generation of sparks, unprotected electric light or any surface of which the temperature is equal to or greater than the minimum ignition temperature of the products handled during the operations.

The use of naked lights or open fires on board the ship is prohibited in the bunker area, unless all applicable regulations have been met and it has been agreed upon by the competent authority, liquefied natural gas (LNG) bunker station operator, the ship's master and the terminal / berth representative.

In the bunker area:

- Telephones should comply with the requirements for explosion-proof construction.
- Mobile phones and pagers should not be used unless approved for such use by a competent authority.
- Damaged units, even though they may be capable of operation, should not be used.
- The use of portable electrical equipment and wandering leads is not allowed during liquefied natural gas (LNG) bunkering and the equipment should be excluded from the zone.
- Telephone cables in use in the ship/shore communication system should preferably be routed outside the bunker area. Wherever this is not feasible, the cable should be so positioned and protected that no danger arises from its use.
- Unless the master, in consultation with the bunker station operator and terminal / berth representative, has established the conditions under which the installation may be used safely, fixed VHF/UHF and AIS equipment should be switched off or on low power (1 watt or less) and the ship's main radio station should not be used while the ship is stationary at the terminal / berth, except for receiving purposes. The main transmitting aerials should be disconnected and earthed.
- Portable VHF/UHF sets should be of a safe type which is approved by a competent authority.
- VHF radio-telephone sets may only operate in the internationally agreed wave bands.
- Satellite communications equipment may be used normally, unless advised otherwise.
- The ship's radar installation should not be used unless the master, in consultation with the bunker station operator and the terminal / berth representative, has established the conditions under which the installation may be used safely.
- Window type air conditioning units should be disconnected from their power supply.

For inland navigation in the bunker area, the requirements as per 9.3.1.52.3, 9.3.2.52.3 and 9.3.3.52.3 of the ADN 2021 edition shall be applied mutatis mutandis to inland navigation vessels using liquefied natural gas as a fuel:

On the one hand electrical equipment used during bunkering operation and which is located outside the bunkering station shall be at least of the "limited explosion risk" type.

On the other hand, this requirement does not apply to:

- a) to the radiotelephone installations fitted in the accommodation and in the wheelhouse;
- b) to the portable and permanent telephone installations in the accommodation and in the wheelhouse;
- c) Inland AIS equipment (Automatic Identification Systems) installed in accommodation and in the wheelhouse, if no part of an electronic equipment antenna is located within the bunkering unit and if no part of an AIS device VHF antenna is located within a radius of 2 m of a bunkering unit.

15. All required firefighting equipment is ready for immediate use.

For this item, the involved parties only check and sign for their own responsibilities.

Firefighting equipment on board should be correctly positioned and ready for immediate use.

Adequate and suitable units of fixed or portable equipment should be stationed conform ship's operational documents.

The ship's fixed fire-fighting systems should be pressurised or be available at short notice

For seagoing vessels a set of fire control plans should be permanently stored in a prominently marked weather-tight enclosure outside the deckhouse for the assistance of shore side firefighting personnel. A crew list should also be included in this enclosure.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 8.11(1)(a) and the requirements of the ES-TRIN, in particular Annex 8, Chapter 3.

If applicable both ship and shore should ensure that their respective fire-fighting systems can be inter-connected in a quick and easy way utilising, if necessary, the international shore fire connection.

Underneath the items in part A of the planning stage checklist, a register form is included for the registration of the responsible representatives involved in the planning.

PART B: Liquefied Natural Gas (LNG) Transfer Checklist
(This part must be completed before actual transfer operations start)

16. Part A was used in preparation prior to the bunker operation, in accordance with the recommendation in the foreword.

This part of the checklist can be used as a guideline for exchanging information and for discussing safety aspects before bunkering with liquefied natural gas (LNG). It is recommended that this part of the checklist be completed when placing the bunker order.

For this item, the parties involved only check if Part A is used for their own planning.

17. Present weather and wave conditions are within the agreed limits.

There are numerous factors that will help determine whether liquefied natural gas (LNG) bunker operations should continue. Discussion between the ship's master, the liquefied natural gas (LNG) bunker station operator and if applicable the terminal / berth representative should identify limiting factors which could include:

- the wind speed/direction and the effect on the bunker connections.
- the wind speed/direction and the effect on mooring integrity.
- the wind speed/direction and the effect on gangways.
- the swell effects at exposed locations on mooring integrity or gangway safety.

Such limitations should be clearly understood by all parties. The criteria for stopping bunkering, disconnecting hoses or arms and vacating the berth should be written in the 'Remarks' column of the checklist.

The bunker operations should be suspended on the approach of an electrical storm.

In case of a strong gale warning or deteriorating weather conditions emergency towing pennants should be prepared and a proper look out to the mooring lines is required.

18. The liquefied natural gas (LNG) receiving ship is securely moored. Regulations with regards to mooring arrangements are observed. Sufficient fendering is in place.

In answering this question, due regard should be given to the need for adequate fendering arrangements. The ship should remain adequately secured in her moorings. Alongside piers or quays, ranging of the ship should be prevented by keeping all mooring lines taut. Attention should be given to the movement of the ship caused by wind, currents, tides or passing ships and the operation in progress.

Wire ropes and fibre ropes should not be used together in the same direction (i.e. as breast lines, spring lines, head or stern lines) because of the difference in their elastic properties.

Once moored, ships fitted with automatic tension winches should not use such winches in the automatic mode. Irrespective of the mooring method used, the emergency release operation in case of an emergency should be agreed upon, taking into account the possible risks involved.

Anchors not in use should be properly secured.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 15.07(5)(a) and the requirements of the ES-TRIN, in particular Article 13.02(3)(a).

19. There is a safe means of access between the ship and shore, including a safe emergency escape route between ship and shore.

The access must be placed as far as possible from the liquefied natural gas (LNG) bunkering manifolds. The means of access to the ship should be safe and may consist of an appropriate gangway or accommodation ladder. Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 8.11(1)(b) and the requirements of the ES-TRIN, in particular Article 13.02(3)(d).

Particular attention to safe access should be given where the difference in level between the point of access on the vessel and the jetty or quay is large, or is likely to become large.

When shore access facilities are not available and a ship's gangway is used, there should be an adequate landing area on the berth so as to provide the gangway with a sufficient clear run of space and so maintain safe and convenient access to the ship at all states of tide and changes in the ship's freeboard.

A lifebuoy should be available on board the ship near the gangway or accommodation ladder. Vessels navigating on the Rhine shall be subject to the ES-TRIN, in particular Article 13.08(1).

The access should be safely and properly illuminated during darkness.

Persons who have no legitimate business on board, or who do not have the master's permission, should be refused access to the ship.

The liquefied natural gas (LNG) bunker station operator or if applicable the terminal / berth representative should control access to the jetty or berth in agreement with the ship's master. For vessels navigating on the Rhine, the requirements of the RPR, in particular Article 15.07(4) states that *"the only individuals permitted to be in the bunker area are the crew members of the receiving ship, bunkering facility personnel or individuals who have obtained authorisation from the competent authority."*

In addition to the means of access, a safe and quick emergency escape route should be available both on board and ashore. On board the ship, it may consist of a lifeboat ready for immediate use, preferably near the accommodation of the ship.

20. All required firefighting equipment is ready for immediate use.

For this item, the involved parties only check and sign for their own responsibilities.

Firefighting equipment on board should be correctly positioned and ready for immediate use.

Adequate and suitable units of fixed or portable equipment should be stationed conform ship's operational documents. The fire-fighting systems should be pressurised or be available at short notice

For seagoing vessels a set of fire control plans should be permanently stored in a prominently marked weather-tight enclosure outside the deckhouse for the assistance of shore side firefighting personnel. A crew list should also be included in this enclosure.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 8.11(1)(a) and the requirements of the ES-TRIN, in particular Annex 8, Chapter 3.

The liquefied natural gas (LNG) bunker station mandatory firefighting equipment should be correctly positioned and ready for immediate use.

If applicable both ship and shore should ensure that their respective fire-fighting systems can be inter-connected in a quick and easy way utilising, if necessary, the international shore fire connection.

If applicable mobile firefighting equipment on the shore should be correctly positioned and ready for immediate use.

21. The liquefied natural gas (LNG) bunker operations area is sufficiently illuminated.

The terminal / berth should be safely and properly illuminated during darkness.

22. The ship is able to move under its own power in a safe and non-obstructed direction.

For this item, the involved parties only check and sign for their own responsibilities.

The ship should be able to move under its own power at short notice, unless the ship has been granted permission to immobilise by the Competent Authority.

23. Adequate supervision of the bunker operations is in place both on the ship and at the bunker station and an effective watch is being kept at all time.

The liquefied natural gas (LNG) bunker operation should be under constant control and supervision on the ship and at the liquefied natural gas (LNG) bunker station by the ship's master and liquefied natural gas (LNG) bunker station operator. Supervision should be aimed at preventing the development of hazardous situations.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 15.06(2)(c) and (d) and Article 15.07(7).

However, if such a situation arises, the ship's master and liquefied natural gas (LNG) bunker station operator, as well as controlling personnel, should have adequate knowledge and the means available to take corrective action.

All personnel that are involved in the liquefied natural gas (LNG) bunker operation should be familiar with the dangers of the substances handled. At all times during the ship's stay at the terminal / berth, a sufficient number of personnel should be present on board the ship and near the liquefied natural gas (LNG) bunker station to deal with an emergency.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 4a.01(1) and (2).

24. An effective means of communication between the ship's master and the bunker station operator has been established and tested. The communication language has been agreed upon.

Communication should be maintained in the most efficient way between the ship's master and the liquefied natural gas (LNG) bunker station operator.

For sea-going vessels, when telephones are used, the telephone both on board and ashore should be continuously manned by a person who can immediately contact his respective supervisor. Additionally, the supervisor should have a facility to override all calls. When radio telephony (RT)/VHF systems are used, the units should preferably be portable and carried by the supervisor or a person who can get in touch with his respective supervisor immediately.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 15.06(2)(b).

Where fixed systems are used, the guidelines for telephones should apply.

The selected primary and back-up systems of communication should be recorded on the checklist and necessary information on telephone numbers and/or channels to be used should be exchanged and recorded.

The telephone and portable RT/VHF systems should be of an appropriate explosion-proof type.

25. The emergency stop signal and shutdown procedures have been agreed upon, tested, and explained to all personnel involved. Emergency procedures and plans and the contact numbers are known to the persons in charge.

The agreed signal to be used in the event of an emergency arising ashore or on board should be clearly understood by shore and ship personnel and the bunker station operator.

An emergency shutdown procedure should be agreed upon between ship and the liquefied natural gas (LNG) bunker station and should be formally recorded and signed by both the ship's master and liquefied natural gas (LNG) bunker station operator.

The agreement should state the circumstances in which operations have to be stopped immediately. Due regard should be given to the possible introduction of dangers associated with the emergency shutdown procedure.

Vessels navigating on the Rhine shall be subject to the requirements of ES-TRIN, in particular Article 30.03.

26. The predetermined restricted area has been established. Appropriate signs mark this area on both bunker station and ship.

The risk assessment for bunkering of the ship with liquefied natural gas (LNG) determines the safety clearance and restricted bunker area.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 1.01(ae), Article 8.11(3) and Article 15.07(4). The bunker area is defined by the RPR as *"the area situated within a radius of 20 metres of the bunkering manifold"*.

If applicable bunker area requirements from the liquefied natural gas (LNG) bunker station operator, terminal / berth representative and competent authorities should be taken into account and incorporated.

The requirements for the restricted bunker area around the liquefied natural gas (LNG) bunker location on board of the ship, on the bunker station and on the shore should be established and clearly marked.

27. The restricted area is free of other ships, unauthorized persons, objects and ignition sources.

Prior to operations all unauthorised persons should be directed to leave the marked bunker area. Unauthorised objects or ignition sources should be removed from the zone. During bunker operations this should be re-checked at regular intervals.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 1.01(ae), Article 8.11(3) and Article 15.07(4).

28. External doors, portholes and accommodation ventilation inlets are closed as per operational documentation.

External doors, portholes and windows of the accommodation should be closed during liquefied natural gas (LNG) bunker operations when required in the operational documentation of the ship. These doors should be clearly marked as being required to be closed during such operations, but at no time should they be locked.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 8.11(2).

This requirement does not prevent reasonable access to spaces during operations, but doors should not be left open unattended.

29. The gas detection equipment has been operationally tested and found to be in good working order.

The equipment provided should be capable of measuring natural gas.

Suitable equipment should be available to calibrate the gas detection and measuring equipment.

A bump test (quick test on proper working) or calibration should be carried out before the operation commences.

Span gas should be available to enable calibration of gas detection equipment. Fixed gas detection equipment should be calibrated for natural gas prior to commencement of operations. The alarm function should have been tested and the details of the last test should be exchanged.

Portable gas detection instruments, suitable and calibrated for natural gas, capable of measuring flammable levels, should be available.

Vessels navigating on the Rhine shall be subject to the ES-TRIN, in particular Annex 8(2.8).

30. Material Safety Data Sheets (MSDS) for the liquefied natural gas (LNG) fuel are available.

MSDS should be available on request to the liquefied natural gas (LNG) fuelledship, terminal / berth and liquefied natural gas (LNG) bunker station.

As a minimum, such information sheets should provide the constituents of the product by chemical name, name in common usage, UN number and the maximum concentration of any toxic components, expressed as a percentage by volume or as ppm, as appropriate.

31. Regulations with regards to ignition sources are observed.

These regulations include, but are not limited to, the smoking ban and provisions concerning naked flames, mobile telephones, pagers, VHF and UHF equipment and radars.

Vessels navigating on the Rhine shall be subject to the requirements of the RPR, in particular Article 8.11(3), which states that “*while bunkering with liquefied natural gas (LNG) is in progress, the skipper shall be required at all times to ensure that a smoking ban on board and within the bunkering area is observed. The smoking ban also applies to electronic cigarettes and other similar devices. The smoking ban does not apply in accommodation and the wheelhouse provided that their windows, doors, skylights and hatches are closed.*”

Unprotected and naked flames include flame, generation of sparks, unprotected electric light or any surface the temperature of which is equal to or greater than the minimum ignition temperature of the products handled during the operations.

There are no open fires and naked lights in the bunker area.

In the bunker area:

- Battery operated hand torches (flashlights) should be of a safe type which is approved by a competent authority. Telephones comply with the requirements for explosion-proof construction.
- Mobile phones and pagers are not used unless approved for such use by a competent authority.
- Damaged units, even though they may be capable of operation, are not used.
- The use of portable electrical equipment and wandering leads is not allowed during liquefied natural gas (LNG) bunkering and the equipment should be excluded from the zone.
- Telephone cables in use in the ship/shore communication system are routed outside the bunker area. Wherever this is not feasible, the cable is positioned and protected in such way that no danger arises from its use.
- Unless the master, in consultation with the bunker station operator and **terminal / berth** representative, has established the conditions under which the installation may be used safely, fixed VHF/UHF and AIS equipment should be switched off or on low power (1 watt or less) and the ship's main radio station should not be used while the ship is stationary at the terminal / berth, except for receiving purposes. The main transmitting aerials should be disconnected and earthed.
- Portable VHF/UHF sets are of a safe type that is approved by a competent authority.
- VHF radio-telephone sets will only operate in the internationally agreed wave bands.
- Satellite communications equipment may be used normally, unless advised otherwise.
- The ship's radar installation is not in use, unless the master, in consultation with the bunker station operator and the terminal / berth representative, has established the conditions under which the installation may be used safely.
- Window type air conditioning units are disconnected from their power supply.

For inland navigation within the bunkering area, the requirements as per 9.3.1.52.3, 9.3.2.52.3 and 9.3.3.52.3 of the ADN (2021 edition) shall apply mutatis mutandis to inland navigation vessels using liquefied natural gas as a fuel.

On the one hand electrical equipment used outside the bunkering unit during the bunkering operations must at a minimum be of the “at limited risk of explosion” type.

On the other hand, this requirement does not apply to:

- a) to the radiotelephone installations fitted in the accommodation and in the wheelhouse;
- b) to the portable and permanent telephone installations in the accommodation and in the wheelhouse;
- c) to Inland AIS equipment (automatic identification systems) installed in accommodation and in the wheelhouse, if no part of an electronic equipment antenna is located within the bunkering unit and if no part of an AIS device VJF antenna is located within a radius of 2 m of a bunkering unit.

32. Appropriate and sufficient suitable protective clothing and equipment is ready for immediate use.

Suitable protective equipment, eye protection and protective clothing appropriate to the specific dangers of liquefied natural gas (LNG), should be available in sufficient quantity for operational personnel, both on board and ashore for the bunker station operator.

Storage places for this equipment on board of the ship should be protected from the weather and be clearly marked.

Personnel required to use a breathing apparatus during operations or emergency response should be trained in its safe use. Untrained personnel and personnel with facial hair that might potentially impair the proper functioning of a breathing apparatus should not be selected for activities involving the use of this type of apparatus.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ESTRIN, in particular Annex 8(5.2.7)

33. Personnel involved in the connection and disconnection of the bunker hoses and personnel in the direct vicinity of these operations make use of sufficient and appropriate protective clothing and equipment.

All personnel directly involved in the operation should utilise appropriate equipment and clothing whenever the situation requires.

34. A (powered) emergency release coupling ((P)ERC) is installed and is ready for immediate use.

If applicable an emergency release coupling is installed and ready for immediate use. This (P)ERC can be activated by ESD or by forces on, or movements of the bunker connection outside a predetermined range.

The (P)ERC should be of a dry-disconnect type, during the emergency break the line will be closed by a valve on both sides of the coupling. After an emergency release of the coupling, the system must be checked, and after solving the problem that caused the release, the coupling can be reinstalled. A freefall of the coupling after an emergency release should be avoided.

35. The water spray system has been tested and is ready for immediate use.

Water spray systems should be regularly tested. Details of the last tests should be exchanged. During operations the systems should be kept ready for immediate use.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8(3.4)

36. Spill containment arrangements are of an appropriate material and volume, in position, and empty.

The ship's bunkering manifolds should ideally be provided with fixed drip trays suitable for liquefied natural gas (LNG). In the absence of fixed containment, suitable portable drip trays should be used.

All drip trays should be emptied in an appropriate manner whenever necessary.

In all cases liquefied natural gas (LNG) must be prevented to affect the deck in case of a spill. This can, for example, be achieved by using a low temperature resistance gutter, suitable drip trays or pouring water on deck. When liquefied natural gas (LNG) is handled the scuppers may be kept open, provided that an ample supply of water is available at all times in the vicinity of the bunkering manifolds.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8(2.5.1)

37. Hull and deck protection system is in place and ready for immediate use.

When a hull or deck protection is required in the ship's operational documentation, it shall be used conform the operational documentation.

38. Bunker pumps and compressors are in good working order.

Agreement in writing should be reached on the maximum allowable working pressure in the liquefied natural gas (LNG) bunker line system during operations.

For inland navigation vessels, the bunkering typically does not require bunker pumps and compressors.

39. All control valves are well maintained and in good working order.

All ship and liquefied natural gas (LNG) bunker station transfer system control valves and their position-indicating systems should be regularly tested. Details of the last tests should be exchanged.

40. Bunker system gauges, high level alarms and high-pressure alarms are operational, correctly set and in good working order.

Ship and liquefied natural gas (LNG) bunker station transfer system gauges and alarms should be regularly checked to ensure they are in good working order.

In cases where it is possible to set alarms to different levels, the alarm should be set to the required level.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 15.07(7)(b) and (c).

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8(5.2).

41. The ship's bunker tanks are protected against inadvertent overfilling at all times, tank content is constantly monitored and alarms are correctly set.

Owing to the reliance placed on gauging systems for liquefied natural gas (LNG) bunker operations, it is important that such systems are fully operational and that back-up is provided in the form of an independent overfill alarm arrangement. The alarm should provide audible and visual indication and should be set at a level which will enable operations to be shut down prior to the tank being overfilled. Under normal operations, the bunker tank should not be filled higher than the level at which the overfill alarm is set.

Individual overfill alarms located on the tank should be tested to ensure their proper operation prior to commencing bunkering unless the system is provided with an electronic self-testing capability which monitors the condition of the alarm circuitry and sensor and confirms the instrument set point.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 15.07(7)(a)(b) and (c).

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8(5.2).

42. All control, monitoring and safety devices on the liquefied natural gas (LNG) installations are checked, tested and found to be in good working order.

Automatic shutdown systems are designed to shut the liquid valves and trip the bunker pumps if the liquid level or pressure in the bunker tank should rise above the maximum permitted level. The level must be accurately set and the operation of the device should be tested before bunker operations commence. If the ship and liquefied natural gas (LNG) bunker station shutdown systems are to be inter-connected, then their operation must be checked before liquefied natural gas (LNG) transfer begins.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8 Chapter 5.

43. Pressure control equipment and boil off or re-liquefaction equipment is operational and in good working order.

Pressure control is one of the most critical processes during LNG bunker operations. It is important that such systems are fully operational and that back up is provided in case of a failure of the primary system.

There are many pressure control systems: spray lines in the top of the tank, vapour return, re-liquefaction, Compressed Natural Gas storage or vapour processing. The used pressure control system should be exchanged and be agreed upon. It should be verified that re-liquefaction and boil off control systems, if required, are functioning correctly prior to commencement of operations.

The pressure alarms should provide audible and visual indication and should be set at a level which will enable operations to be shut down prior to the opening of the PRV valves to avoid natural gas emission. Under normal operations, the pressure in the bunker tank should not exceed the pressure limits in the ship's operational documentation.

Individual high and low pressure alarms should be tested at the tank to ensure their proper operation prior to commencing bunkering unless the system is provided with an electronic self-testing capability which monitors the condition of the alarm circuitry and sensor and confirms the instrument set point.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8 Chapter 5.

43a The vapour connections are properly connected and supported

If applicable, a vapour return connection between the ship and bunker station has to be treated equal to the LNG connection. So also including a dry-disconnect type coupling and electrical isolating facilities.

44. Both on the ship and in the bunker station the ESDs, automatic valves or similar devices have been tested, have found to be in good working order, and are ready for use. The closing rates of the ESDs have been exchanged.

Automatic shutdown valves may be fitted in the ship and the systems of the liquefied natural gas (LNG) bunker station. Among other parameters, the action of these valves can be automatically initiated by a certain level being reached in the tank being loaded, either on board or ashore.

The closing rate of any automatic valves should be known and this information should be exchanged. Where automatic valves are fitted and used, the transfer rate should be so adjusted that a pressure surge evolving from the automatic closure of any such valve does not exceed the safe working pressure of either the liquefied natural gas (LNG) bunker system.

A written agreement should be made between the ship and bunker station operator indicating whether the transfer rate will be adjusted or alternative systems will be used. The safe transfer rate should be noted in the agreement.

Where possible, ship and bunker station emergency shutdown systems should be tested before commencing the liquefied natural gas (LNG) bunkering.

45. The liquefied natural gas (LNG) bunker line has been checked. Unused connections are closed, blanked and fully bolted.

Before connection, both on the ship and on the bunker station, the bunker systems must be isolated and empty, checked and found to be safe to remove blank flanges.

Both ship and bunker station liquefied natural gas (LNG) bunker systems should be isolated from other ship and bunker station systems.

Unused bunkering manifold connections should be closed and blanked. Blank flanges should be fully bolted and other types of fittings, if used, properly secured.

46. Liquefied natural gas (LNG) bunker hoses, fixed pipelines and bunkering manifolds are in good condition, properly rigged, supported, properly connected, leak tested and certified for the liquefied natural gas (LNG) transfer.

Hoses should be in a good condition and properly fitted and rigged so as to prevent strain and stress beyond design limitations.

All flange connections should be fully bolted and any other types of connections should be properly secured. It should be ensured that the hoses and pipelines are constructed of a material suitable for the substance to be handled, taking into account its temperature and the maximum operating pressure. Liquefied natural gas (LNG) bunker hoses should be indelibly marked so as to allow the identification of the products for which they are suitable, specified maximum working pressure, the test pressure and last date of testing at this pressure, and, if used at temperatures other than ambient, maximum and minimum service temperatures.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8(2.8.5).

47. The bunker connections between the ship and the bunker station are provided with dry-disconnect type couplings.

The liquefied natural gas (LNG) bunker connection should be provided with means to avoid release of liquefied natural gas (LNG) or natural gas during regular disconnection after the bunkering.

If applicable, a vapour return connection between the ship and bunker station has to be treated equal to the LNG connection. So also including a dry-disconnect type coupling and electrical isolating facilities.

These means should provide protection against:

- Spill or emission due to unexpected and uncontrolled release of product from the bunker system during disconnecting in case the bunkering system is not properly emptied after use.
- Injury to personnel due to pressure in the system suddenly being released in an uncontrolled manner during disconnecting.

48. The bunker connections between the ship and the bunker station have adequate electrical insulating means in place.

Unless measures are taken to break the continuous electrical path between ship and bunker station pipework provided by the hoses, stray electric currents can cause electric sparks at the flange faces when hoses are being connected and disconnected.

The passage of these currents is usually prevented by an insulating flange inserted at the ship line to the bunkering manifold and/or in the line of the bunker station. Alternatively, the electrical discontinuity may be provided by the inclusion of one length of electrically discontinuous hose in each hose string.

It should be ascertained that the means of electrical discontinuity are in place, that they are in good condition and are not being by-passed by contact with an electrically conductive material.

If applicable, a vapour return connection between the ship and bunker station has to be treated equal to the LNG connection. So also including a dry-disconnect type coupling and electrical isolating facilities

49. Dry-type couplings in the bunker connections are in place, have been visually inspected for functioning and found to be in a good working order.

To mitigate on an event which approaches the limits of the designed parameters of the bunker connection, means should be in place to ensure that the mechanical integrity of the bunker connections is not compromised.

These means should provide protection against:

- Spill or emission due to unexpected and uncontrolled release of product from the bunker system due to overstretching the bunker connection.
- Injury to personnel due to pressure in the system suddenly being released in an uncontrolled manner.

The dry-disconnect type couplings will break due to forces on or movements of the bunker connection outside a predetermined range. The coupling should be of a dry-disconnect type, during the emergency break the line will be closed by a valve on both sides of the coupling. After the emergency break of the coupling, and when the problem that caused the break is solved, the broken parts should be replaced. A freefall of the coupling after an emergency break should be avoided.

If applicable, a vapour return connection between the ship and bunker station has to be treated equal to the LNG connection. So also including a dry-disconnect type coupling and electrical isolating facilities

50. The ship's emergency fire control plans are located externally.

For seagoing vessels a set of fire control plans should be permanently stored in a prominently marked weather-tight enclosure outside the deckhouse for the assistance of shore side firefighting personnel. A crew list should also be included in this enclosure.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Article 30.03.

51. An International Shore Connection has been provided.

If applicable both ship and shore should ensure that their respective fire-fighting systems can be inter-connected in a quick and easy way utilising, if necessary, the international shore fire connection.

Inland navigation vessels do not need to fulfil this requirement.

52. Competent authorities have been informed that liquefied natural gas (LNG) bunker operations are commencing and have been requested to inform other vessels in the vicinity.

When local regulations or the port byelaws enforce the notification of vessels in the direct vicinity, these ships have to be informed of the liquefied natural gas (LNG) bunker operations. When the involved parties are not obliged to inform ships in the vicinity, they can, upon reporting the commence of the liquefied natural gas (LNG) bunker operations, advise the competent authority to do so.

PART C: Liquefied Natural Gas (LNG) Transfer Data

In order to agree upon the quantity of liquefied natural gas (LNG) that is to be transferred, parties should agree upon a 'Physical Quantity Unit'; e.g. cubic meters, tonnes.

Agreed starting temperatures and pressures

Parties should agree upon the transfer data and the condition of the liquefied natural gas (LNG) and atmosphere in the liquefied natural gas (LNG) bunker station tank and ship's bunker tanks.

Agreed bunker operations

Parties should agree upon the liquefied natural gas (LNG) bunker procedure.

Agreed maximums and minimums

Parties should agree upon all maximum and minimum liquefied natural gas (LNG) pressures and fuelling limits.

Vessels in possession of an inspection certificate shall be subject to the requirements of the ES-TRIN, in particular Annex 8(2.9)

Restrictions in LNG bunker operations

Any particular restriction or precaution to the ship or the bunker station should be noted separately, so all involved personnel is aware of the limitations and precautions before the actual transfer of LNG is started.

Simultaneous bunkering operations of other fuels or liquids during LNG bunker operations is prohibited.

Underneath the items in part B and C of the bunker checklist, a register form is included for the registration of the responsible representatives involved in the execution of the bunkering.

Part D: After Liquefied Natural Gas (LNG) Transfer Checklist

Underneath the items in part D of the bunker checklist, a register form is included for the registration of the responsible representatives involved after completing the bunkering activities.

53. Bunker hoses, fixed pipelines and bunkering manifolds have been purged and are ready for disconnection.

Before the bunker connection is disconnected, it must be ensured that no liquid is left in the bunker system.

Vessels navigating on the Rhine shall be subject to RPR requirements, in particular Article 15.07(9)(a). They envisage that the bunkering lines (from the bunkering manifold to the storage tank) will have to be completely emptied after bunkering. The emptying operation will be according to operational documentation.

If applicable, a vapour return connection between the ship and bunker station has to be treated equal to the LNG connection. So also including a dry-disconnect type coupling and electrical isolating facilities, including flushing and degassing of the connections.

The pressure in the bunker connection should be released into the ship's bunker tank or into the tank of the liquefied natural gas (LNG) bunker station as per ship's operational documentation.

54. Remotely and manually controlled valves are closed and ready for disconnection.

Before the bunker connection is disconnected, it must be ensured that the bunkering manifold valves are closed, or are operated as per ship's operational documentation.

55. After disconnection the restricted area has been deactivated. Appropriate signs have been removed.

After the disconnection and securing of the) bunker connection, the restricted bunker area can be deactivated and the signs can be removed. The status of the bunker area can be restored to the status required in the ship's operational documentation.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 15.07(8).

56. The terminal / berth representative has been informed of the completion of liquefied natural gas (LNG) bunker operations.

When required, the terminal / berth representative shall be informed of the completion of liquefied natural gas (LNG) bunkering operations.

57. Competent authorities have been notified that liquefied natural gas (LNG) bunker operations have been completed and have been requested to inform other vessels in the vicinity.

The competent authorities shall be informed of the completion of liquefied natural gas (LNG) bunkering operations.

When local regulations or the port byelaws enforce the notification of vessels in the direct vicinity, these ships have to be informed of the completion of liquefied natural gas (LNG) bunker operations. When the involved parties are not obliged to inform ships in the vicinity, they can, upon reporting the completion of the liquefied natural gas (LNG) bunker operations, advise the port authority to do so.

Vessels navigating on the Rhine shall be subject to the RPR, in particular Article 15.07(9).

58. If applicable, near misses and incidents have been reported to competent authorities.

The competent authorities must be informed of near misses and incidents directly when such an event has occurred.

Abbreviations and definitions

ESD	Emergency Shut Down Device.
Leak tested	Procedure to check the integrity of the liquefied natural gas (LNG) bunker line up.
Line up	The system of all pipes, hoses, bunker arms, connections and valves that are positioned and used for a liquefied natural gas (LNG) bunker transfer.
(P)ERC	(Powered) Emergency Release Coupling.
Physical Quantity Unit (PQU)	Unit for the quantity to bunker, agreed in advance and before commencing bunkering.
Liquefied natural gas (LNG) Bunker station	Understood to be the "bunkering facility" as construed by Articles 15.06 and 15.07 of the RPR
Purging	To flush or pressurise a LNG-line up with Nitrogen to leak test, dry and inert the line up before bunkering or to empty, and gas free the line up before disconnecting.
Rel.	Relative, in this document used to agree the mentioned pressures are relative (overpressure) and not absolute.
Liquefied natural gas (LNG) bunkering system	The arrangement for the bunkering of liquefied natural gas (LNG) on board (bunkering station and bunkering piping)
Bunker area	The area within a radius of 20 metres around the bunkering manifold. Article 1.01 (ae) of the RPR.
Terminal / berth	Any location where the bunker location is and in which bunkering operations take place.
Topping up	The last phase of the liquefied natural gas (LNG) bunkering where the maximum filling percentage is nearly reached. During this phase the bunker rate is reduced.
