Commercial and Operations Manual (COM)

Alexandroupolis INGS

Contents

Issue and Update Control

This manual is provided with a system of issue and update control. Controlling documents ensures that:

- Documents conform to a standard format.
- Amendments are conducted by relevant personnel.
- Each document or update to a document is approved before issue.
- A history of updates is maintained.
- Updates are issued to all registered holders of documents.
- Sections are removed from circulation when obsolete.

Document control is achieved using the footer provided on every page and the issue and update table below.

The left-hand corner of each footer shows the document status and the date of issue. The right-hand corner of each footer shows the page number of the document.

Details of each section are given in the first column of the Issue and Update control table. The table thus forms a matrix into which the dates of issue of the original document and any subsequent updated sections are located.

The information and guidance contained herein is produced for the assistance of certificated officers who by virtue of such certification are deemed competent to operate the Vessel to which such information and guidance refers.

Any conflict arising between the information and guidance provided herein and the professional judgement of such competent officers must be immediately resolved by reference to the Company Technical Operations Office.

This manual was produced by:

STS Marine Solutions

For Any new issue or update contact:

1 The Cloisters,

Sunderland

SR2 7BD

UK

E-Mail: enquiries@STSMS.com

Modification/correction records

Item	Issue 1	Issue 2	Issue3	Issue 4

Item	Issue 1	Issue 2	Issue3	Issue 4

Introduction

General

The purpose of this manual is to provide the Vessel officers and Terminal Users with additional information not otherwise onboard. It is to be used in conjunction with existing plans and instruction books already on board, and in no way supersedes them.

In addition to the information on the equipment and related systems, the equipment manual provided by each vendor contains safety precautions and procedures to be observed in emergencies and after incidents.

The content of this manual is designed to cover through from pre-arrival of a discharge Vessel through to post operations requirements, including a section on contractual terminal operational requirements.

Terminal Operator may amend the COM from time to time for the purpose of one or more of the following:

(i) Conforming it to applicable International Standards;
(ii) Conforming it to changes in Applicable Law;
(iii) Adjusting it to technical modifications of the Terminal;
(iv) Improving operations of the Terminal; and
(v) Any other amendment deemed necessary by the Terminal Operator, acting as a Reasonable and Prudent Operator.

Safe Operation

The safety of the vessel is reliant on the care and attention of all on board. Most safety precautions are detailed in the various manuals available on board. However, records show that even experienced operators sometimes neglect safety precautions through over-familiarity. To prevent this the following basic rules must be always remembered:

- Never continue to operate any machinery or equipment which appear potentially unsafe or dangerous and always report such a condition immediately.
- Make a point of testing all safety equipment and devices regularly. Always test safety trips before starting any equipment.
- Never ignore any unusual or suspicious circumstances, no matter how trivial. Small symptoms often appear before a major failure occurs.
- Never underestimate the fire hazard of petroleum products, whether fuel oil or cargo vapour.
- Never start a machine remotely from the cargo and engine control room without confirming visually that the machine can operate satisfactorily.

In the design of equipment, protection devices have been included to ensure that, as far as possible, in the event of a fault occurring, whether on the part of the equipment or the operator, the equipment concerned will cease to function without danger to personnel or damage to the machine. If any of these safety devices are bypassed, overridden, or neglected, then the operation of any machinery in this condition is potentially dangerous.

Notices

The following notices occur throughout this manual.

WARNING
Warnings are given to draw the reader's attention to the operation where DANGER TO LIFE OR LIMB MAY OCCUR.

CAUTION
Cautions are given to draw the reader's attention to operations where DAMAGE TO EQUIPMENT MAY OCCUR.

Note: Notes are given to draw the reader's attention to points of interest or to supply supplementary information.

Abbreviations

“ASL” Above mean Sea Level

“CCR” Cargo Control Room FSRU and LNG Carrier

“E-HPU” Electric- Hydraulic Power Unit

“ERC” Emergency Release Coupling

“ESD” Emergency Shut Down

“ETA” Estimated Time of Arrival

“FO SSL” Fibre Optic Ship/Shore Link

“FAS” Fall Arrest System

“FSRU” Floating Storage and Regasification Unit

“IMO” International Maritime Organisation

“JPO” Joint Plan of Operations

“LNG” Liquified Natural Gas

“NG” Natural Gas in its vapour form**.**

“POAC” Person in Overall Advisory Control

“RCM” Restricted Catenary Mooring

“SDP” Short Distance Piece

“STS” Ship to Ship

“TAC” Terminal Access Code

“TUA” Terminal User Agreement

“VSD” Vessel Separation Detector

Glossary

“All Fast” means, in respect of any LNG Cargo, the time when the LNG Carrier delivering such LNG Cargo is safely moored with all mooring lines tied up to the berth to the satisfaction of the master of such LNG Carrier

“Annual Plan” means the annual plan that is prepared by the Terminal Operator in advance of the next Contract Year, setting out, inter alia, the LNG Cargo Slot Confirmed Schedule, which will include the confirmed LNG Cargo Arrival Window of each LNG Cargo for each Long-Term User, and the agreed Daily Planned Send Out for each Day of the Contract Year for each Long-Term User.

“Daughter Vessel” means the visiting LNG Carrier or LNG Barge

“E-HPU” Electrically powered hydraulic power unit and is part of the KLAW STS Equipment

“Emergency Release Coupling” or “ERC” means a double closure valve fitted in the transfer system and is designed to enable the Vessels to separate in an emergency.

“Emergency shutdown System” or “ESD” ESD system executes a staged shutdown of the Vessel pumps and valves in the event of an emergency.

ESD1 shuts down the cargo transfer operation in a quick controlled manner by closing the shutdown valves and stopping the transfer pump and other relevant equipment.

ESD2 shuts down the transfer operation (ESD1) and uncouples the transfer system via the ERCs.

“Fall Arrest System” or FAS” Component of the KLAW STS equipment located inside a saddle, designed to slow the falling of the transfer hose in an ESD2 event.

“Floating Storage and Regasification Unit” or “FSRU” means ALEXANDROUPOLIS Vessel, permanently moored on location for the purpose of storage and regasification of LNG prior to send out to onshore reception facilities.

“Joint Plan of Operation” or “JPO” is the operational-specific plan that includes, as appropriate, references to manoeuvring, approach, mooring, transfer, and specific operation information.

“LNG” gas in its liquid state at or below its boiling point at or near atmospheric pressure

“**LNG Cargo**” means a cargo of LNG transported in and LNG Carrier

“**LNG Carrier**” an approved LNG Vessel, which is used to deliver an LNG Cargo

“Mooring Master” is a person who is designated to assist the ship’s master in the mooring and unmooring of the Vessels.

“Notice of Readiness” or **“NOR”** means the notice that User shall cause the master of an LNG vessel or its agent to give to Terminal Operator confirming the LNG Carrier is ready to proceed to berth and ready to transfer cargo

“Pilot Boarding Station” means the location within the vicinity of the Terminal at which pilots appointed by the Port Authority customarily board the LNG Carrier as determined by the Port Authority.

“Person in overall advisory control” or POAC” Master of FSRU to be in overall advisory control of the STS operation.

“Spot Cargo Agreement” or “SCA” means the agreement to be entered into by a company that intends to use the Spot Cargo Service

“Ship to Ship” or “STS” means operation and transfer of cargo with a Vessel double banked.

“**Terminal Operator**” means Gastrade S.A

“**User**” means any company or person that uses the Service or part of the Service at the Terminal

“VSD” Vessel separation detector and is part of the KLAW STS Equipment.

“**Vessel Operator**” means Operator of LNG Carrier

Part 1: PRINCIPAL PARTICULARS

1.1 Principal particulars of the ALEXANDROUPOLIS FSRU

Vessels Name:	ALEXANDROUPOLIS
Shipbuilder:	Hanjin Heavy Industries Co. Ltd. - Busan South Korea
Yard number:	N193
IMO No:	9390185
Keel Laid:	2009
Launched:	2010
Delivered:	2010.06
Flag:	Greek
Official number:	12853 (Flag Register No.)
Port of registration:	Piraeus
Call sign:	ZCEK7
MMSI No:	310670000
Type of ship:	Offshore FSRU
Gross tonnage:	100374 (Existing) - TBC
Net tonnage:	30113 (Existing) - TBC
Classification:	DNV
Class notation:	OI Ship Shaped LNG Storage Installation, REGAS, POSMOOR, UWILD

Length overall:	288.60 m
Length BP:	276.00 m
Breadth moulded:	44.00 m
Depth design (MLD):	26.20 m
Design draught:	11.50 m
Scantling draught:	12.50 m
Ballast draught:	10.1 m (Normal Ballast Departure)
Cargo capacity:	153,594.82 m^3
Fuel oil capacity:	732.84 m^3
Marine diesel oil:	259.20 m^3
Marine gas oil:	142.95 m^3

Loadline	Draught	Freeboard	Displacement	Deadweight
	Meters	Meters	Tonnes	Tonnes
Tropical (FW)	11.8865	14.3135	116,636.41	83382.21
Fresh	12.1445	14.0555	116,636.41	83382.21
Tropical	12.1625	14.0375	116,636.41	83382.21
Summer	12.4205	13.7795	116,636.41	83382.21
Winter	12.1625	14.0375	116,636.41	83382.21

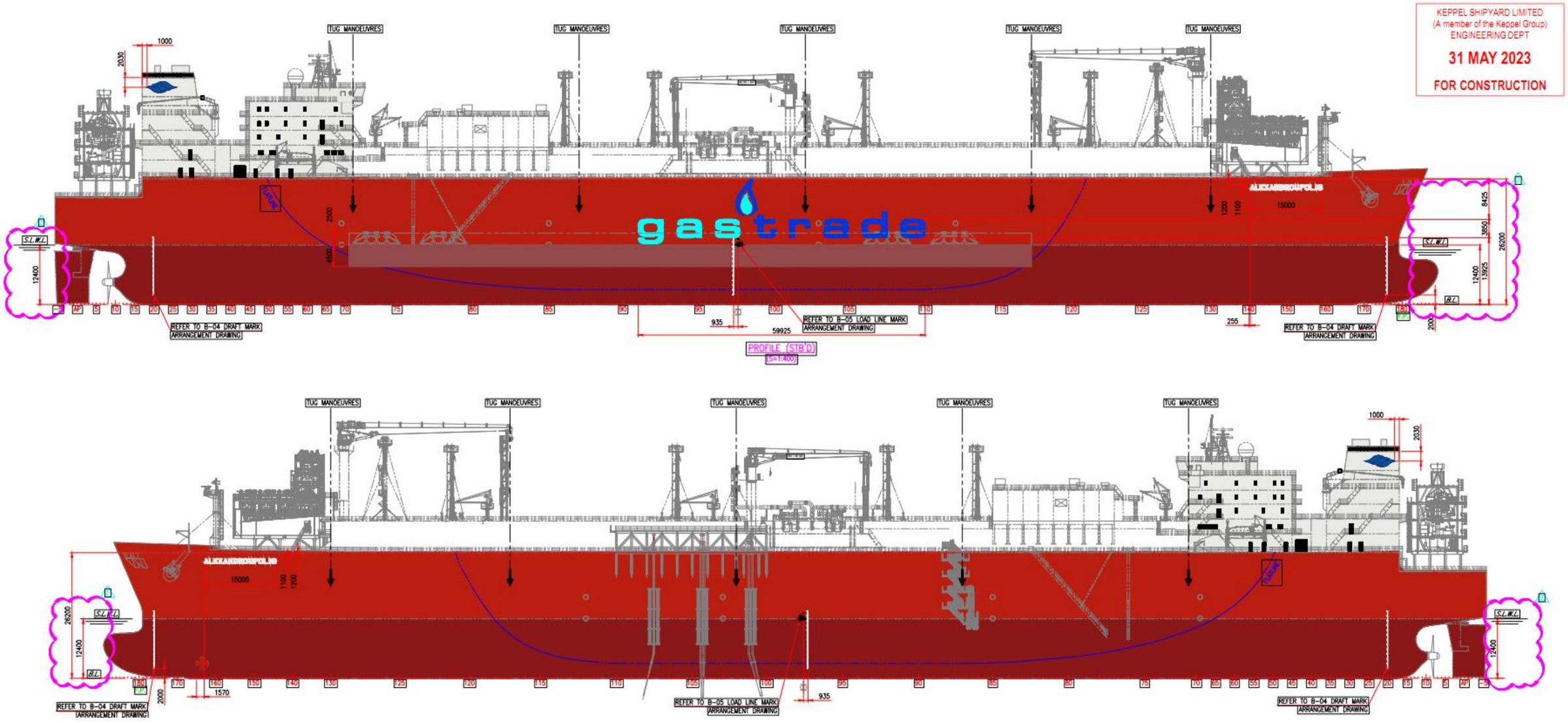
Cargo Tanks

Type: GTT Mark III

Sloshing limits for FSRU Terminal

Tank	Capacity (100%) at specified temperature	Capacity at max permissible filling (99.5%)	Lower Sloshing (2.75m)	Upper Sloshing (70% tank height)
	Cu. mtrs	Cu. mtrs	Cu. mtrs	Cu. mtrs
1	24,434.88	24,312.71	1,913.94	16,751.72
2	43,065.83	42,850.50	4,049.79	32,001.68
3	43,047.54	42,432.30	4,050.87	32,024.65
4	43,046.57	42,831.33	4,050.10	32,015.77
Total	153,594.82	152,826.85		

1.2 General Arrangement



1.3 Geographic Location

ALEXANDROUPOLIS is stationed 17.6km Southwest from the port Alexandroupolis and 10 km from the nearest coast of Makri. The approx. water depth is 40m.

Location	40.76ºN, 25.71ºE
Time zone	UTC+2 (EET)
Summer (DST)	UTC+3 (EEST)

FSRU Location Europe.

FSRU Location Alexandroupolis.

1.3.1 Navigational Charts

The position of the terminal is recorded on the nautical charts and publications after the completion of its installation and related clearance by the Administrator/Manager and the Maritime Authority/Hellenic Coast Guard to the Hellenic Navy Hydrographic Service, as follows:

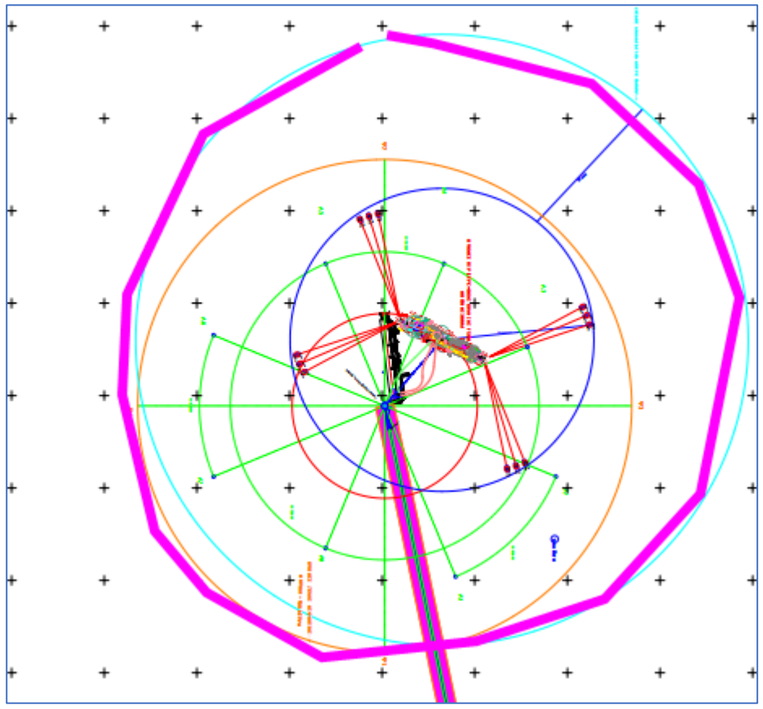
- Nautical Charts & Publications of the Hellenic Navy Hydrographic Service (HNHS): XEE-109, 2, 4, 41, 42, 43, 47, 32, 33, 322, 3221, 322/1

Corresponding charts are also issued by the British Admiralty. Covering requirements from the above Agencies for electronic maps (ECDIS) as well.

- British Admiralty Nautical Chart 1086
- British Admiralty Nautical Chart 1636

1.3.2 Exclusion Zone

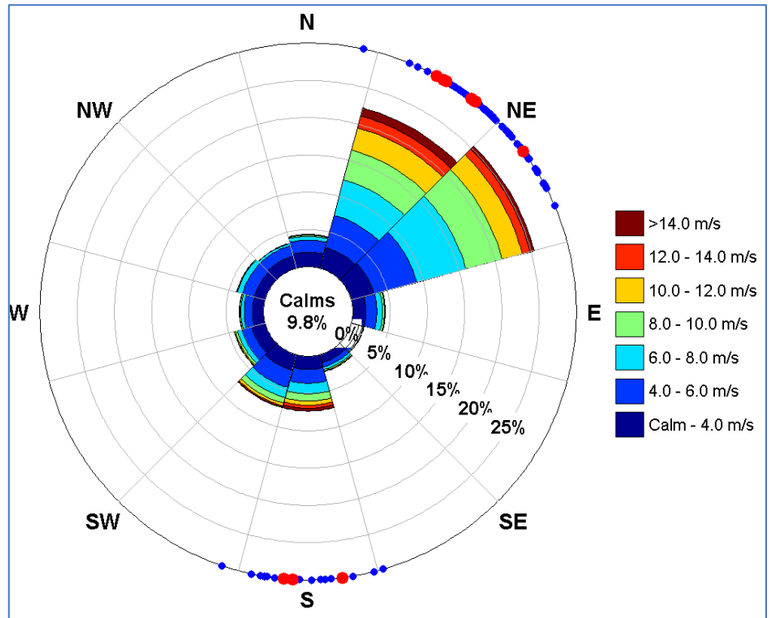
The exclusion zone expands 500m outside the (blue) circular area including the mooring lines of the spread mooring and the FSRU (cyan circular area).



1.4 Weather.

A met ocean study has been conducted by BMT to support the design of the ALEXANDROUPOLIS FSRU development and associated pipeline in the Northern Aegean Sea.

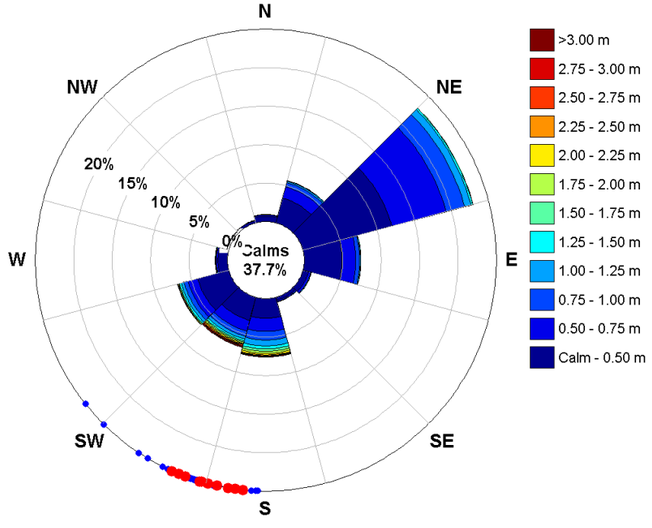
Winds typically come from the northeast (15-75º) in this region and can reach strengths greater than 20m/s from this direction as well as from the south. Winds are noticeably stronger in the winter months (Dec – Feb) compared to the summer (Jun-Aug). Overall, hourly mean wind speeds at 10m ASL are below 10m/s approximately 87% of the time.



Note upper bin extends to maximum observed value of 23.8 m/s
Calms Threshold (ignored in directional analyses) defined as < 2.00 m/s
Red dots on outer edge represent directions associated with top 10 Events
Blue dots on outer edge represent directions associated with of top 0.1% of Events

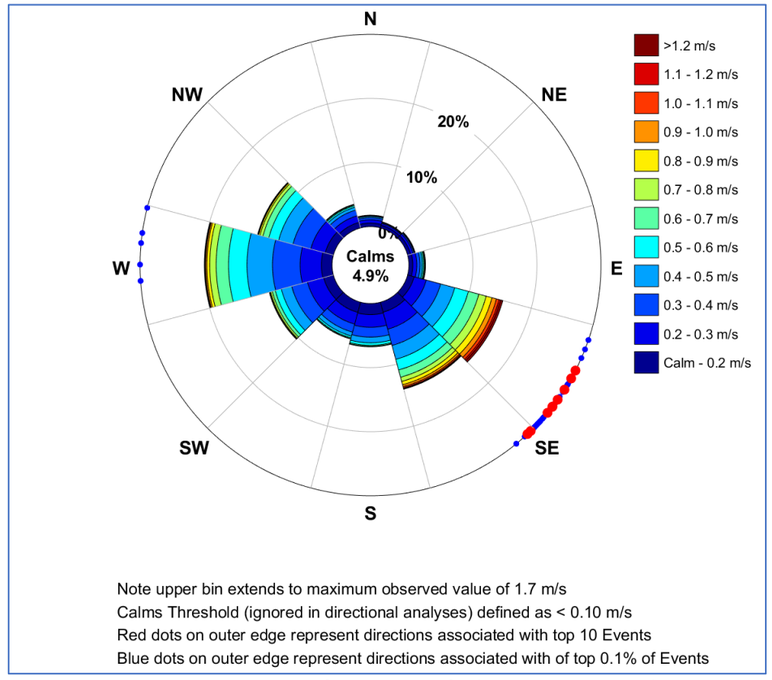
Wind rose at 10m ASL for the FSRU Location. Note directions are from.

Similar to the winds, the prevailing wave direction is from the east-northeast (45-105º). However, due to the limited fetch the waves do not exceed 1.75m in height from this sector. From the south, there is a certain amount of wave sheltering from the outer islands, but still there are pathways for transmission of offshore wave energy. Waves from the south can exceed 4m. Overall, waves are below Hs 1.5m approximately 97% of the time.



Note upper bin extends to maximum observed value of 4.6 m
Calms Threshold (ignored in directional analyses) defined as < 0.25 m
Red dots on outer edge represent directions associated with top 10 Events
Blue dots on outer edge represent directions associated with of top 0.1% of Events

Wave rose for the FSRU Location. Note directions are from



Note upper bin extends to maximum observed value of 1.7 m/s
Calms Threshold (ignored in directional analyses) defined as < 0.10 m/s
Red dots on outer edge represent directions associated with top 10 Events
Blue dots on outer edge represent directions associated with of top 0.1% of Events

Near-surface current rose for the FSRU Location. Note directions are to

Further detailed information can be found in Metocean Report RP_A17025_03_r3

Prevailing near-surface currents occur in either of two predominant directions, towards the SE and to the W. The ESE currents are associated with the regionally significant Samothráki Plateau anticyclonic gyre, which occurs most frequently and strongly during the spring and summer periods. Westerly currents are generally associated with the local wind forcing and are therefore most apparent near the surface. Surface currents are below 1.1m/s approximately 99% of the time.

The northern Aegean Sea water column is influenced by relatively low salinity inflows from the Black Sea and river catchments. The resulting water column stratification can have a strong influence on wind-induced current profiles. There is evidence in the model hindcast of the potential for extreme flow conditions driven by wind-induced baroclinic instabilities (internal waves). Due to these complex interactions the modelled current speed statistical distribution has a ‘long tail’, with rare (extreme) events exhibiting much higher magnitudes than the prevailing conditions.

Omnidirectional extreme conditions for the FSRU location are summarised below. Directional and monthly extremes are available within the main body of the report.

	Return Period (years)				
Variable	1	10	50	100	1,000
1-hour wind speed at 10m ASL [m/s]	19.59	22.49	24.24	24.93	27.08
10min wind speed at 10m ASL [m/s]	21.18	24.44	26.42	27.21	29.66
1min wind speed at 10m ASL. [m/s]	23.23	26.95	29.22	30.14	32.98
3sec gust at 10m ASL [m/s]	25.89	30.21	23.87	33.95	37.30
Significant wave height [m]	3.41	4.21	4.64	4.81	5.31
Peak wave period associated with Hs [s]	7.23	8.03	8.44	8.69	9.57
Mean Zero-crossing wave period [s]	5.93	6.60	6.93	7.05	7.73
Maximum wave height [m]	6.56	7.82	8.60	8.91	9.93
Wave period associated with Hmax [s]	6.70	7.44	7.82	8.05	8.86
Crest height [m]	4.09	4.90	5.42	5.63	6.31
Total Surface Current [m/s]	1.47	1.75	1.92	2.07	2.30
Green water Level [m]	4.51	5.42	5.99	6.22	6.98

Part 2: Pre-Operations

2.1 Language

The common language for communication both written and spoken in relation to operations at ALEXANDROUPOLIS s will be English, and in line with the Standard Marine Communication Phrases (IMO).

2.2 Compatibility

All LNG carrier Vessels must be evaluated for compatibility prior to being scheduled for discharge at the ALEXANDROUPOLIS. The compatibility assessment will be undertaken to confirm the suitability of the LNG carrier for the planned operation and to identify any aspects that may require specific management. The Terminal Operator will retain a list of LNG Carriers approved for the use at the terminal.

To approve a Vessel for operations, a Ship-to-Ship Compatibility Study will be completed, and a meeting might be held between the representatives of the LNGc Vessel Operator and FSRU Operator. The meeting shall, unless otherwise agreed, be conducted at Gastrade S.A offices to evaluate the compatibility of the LNG Carrier with the Terminal's facilities and shall examine and prepare a mooring plan arrangement and examine berth, ship-shore interfaces, LNG offloading, safety, and communications items in relation to the LNG Carrier and the Terminal. Where required this meeting can be held remotely. Prior to the compatibility meeting, the User shall provide in writing to Gastrade S.A the information labelled "LNG Carrier Compatibility Information Provision Requirements".

2.2.1 Documents

For a Vessel to be evaluated for compatibility with the Terminal it must first provide the information requested in VSL-D-029a At Sea Ship to Ship Transfer Pre-Fixture Information

Additional documentation to be provided.

- Vessel Particular Questionnaire (VPQ) Less than 6 Months Old.
- General Arrangement Drawing.
- Mooring Arrangement Drawings.
- Gas form C.
- Trim and Stability.
- Sister Ship Certificate.
- Cargo system GA diagram and cargo pump capacity curves.
- Class Status Report less than two (2) month old.
- SIRE inspection report less than six (6) months old.
- Complete Optimoor file (actual Optimoor ship file) or similar.
- Cargo manifold arrangement plan drawing showing dimensions.
- Drawing/specification of Short Distance Pieces (spool pieces) and cargo manifold strainers.
- LNGC Emergency Procedures Manual per ISM code.
- A Tanker Management Self-Assessment (TMSA) less than one-year-old.
- Information regarding squat curves, pilot cards, and manoeuvrability characteristics.

As soon as reasonably practical, but in no event later than fourteen (14) days after the later of either receipt of all the information from the User required, or the ship-to-ship compatibility meeting, Gastrade S.A shall notify the User in writing whether the proposed LNG Carrier meets the compatibility requirements necessary for use of such LNG Carrier by the User for delivery of LNG at the Terminal.

Should an LNG Carrier fail materially to be compatible with the FSRU ALEXANDROUPOLIS Operating Requirements, then such LNG Carrier shall no longer be deemed to be an Approved LNG Carrier. Gastrade S.A shall promptly provide to User a written report describing the reason. The User shall not employ such LNG Carrier until it has been modified to be so compatible and has again received written confirmation from Gastrade S.A that such LNG Carrier is an Approved LNG Carrier.

Relevant correspondence with the Maritime Administration is required in order to approve the compatibility of the STS operations check lists with national legislation (General Port Regulation N° 18 [Gov.Gaz.12, Vol.B'/1999] as amended, supplemented and valid).

2.2.2 Optimoor

Prior to the approval of a visiting LNG carrier during the compatibility process, Gastrade shall conduct a Dynamic Optimoor study by 3rd party vendor, showing the interaction of the FSRU ALEXANDROUPOLIS and the LNG Carrier.

Operation	General environment direction		Wind speed		Sig Wave height	Comment
	Rel. to FSRU	Rel to North	(KTS)	(m/s)	(m)	
Vessel Berthing	*	*	*	*	*	Shall be evaluated by operation master. Less sever than Loading
Loading	Head on ± 30°	205° ± 30°	33.4	17.2	2.0	Covering the 1-year return period environmental conditions
	Following ± 30°	25° ± 30°	38.1	19.6	0.6-1.5	
	Beam PT ± 30°	115° ± 30°	31.1	16.0	0.9-1.3	
	Beam Stbd ± 30°	295° ± 30°	21.0	10.8	0.6-1.1	
Hose disconnection	*	*	*	*	*	Equal or higher than Loading
MV depart	*	*	*	*	*	All year spread moored
DV Depart	*	*	*	*	*	Less severe than hose disconnection

The environmental conditions evaluated for each study are as follows. Each simulation will be for 3 hours and a 1 hour mean 25 knot NPD (Norwegian Petroleum Directorate) wind spectrum.

Case	Vessel combination	Winds knots/Dir	Waves Hs (m) / Tz (s)/ Dir	Swell Hs (m) / Tz)/Dir
1	FSRU (B) Guest (L)	25kts /270	1.0m/ 5 sec / 315	1.5m / 5.0sec /315
2	FSRU (B) Guest (L)	25kts/270	1.0m/ 5 sec /315	1.5m / 5.0 secs / 225
3	FSRU (B) Guest (L)	25kts/270	1.5m/ 5 sec/ 270	1.0m / 5.0 secs / 167
4	FSRU (L) Guest(B)	25kts/270	1.0m/ 5 sec / 315	1.5m / 5.0sec /315
5	FSRU (L) Guest(B)	25kts/270	1.0m/ 5 sec /315	1.5m / 5.0 secs / 225
6	FSRU (L) Guest(B)	25kts/270	1.5m/ 5 secs/ 270	1.0m / 5 secs / 167

2.3 Qualified Officers and Crew

Each Vessel calling at the facility shall maintain a compliment of officers and crew trained and qualified in compliance with the following:

- The applicable requirements of the STCW Convention.
- Suitably qualified in the handling of LNG cargoes, equipment, and mooring/unmooring operations.
- Suitably qualified to respond to accidental LNG spills, gaseous natural gas releases and fires while discharging cargoes at the terminal.

In addition, the LNGC Crew shall assist in the connection process of the Spool pieces, Hose saddles and STS hoses.

2.4 Statutory and Regulatory Compliance

Vessels calling at the Terminal must be maintained in compliance with applicable International Conventions and Classification Society requirements.

Vessel Masters should be prepared to present valid certificates indicating compliance with statutory and class requirements. Vessels calling must comply with applicable TERMINAL ACCESS CODE (TAC) and the TERMINAL USER AGREEMENT (TUA)

2.5 Pre-Arrival Information Exchange

Notifications that are to be made when calling at ALEXANDROUPOLIS, along with the information that is to be included.

All notices detailed below should be sent to the following email addresses:

Gastrade S.A:

ΑΛΕΧΑΝΔΡΟΘΠΟΛΙΣ:¨sscs@gaslogltd.com;'alx@gaslogserv.com

2.5.1 Departure Notice

No later than one (1) month prior to the LNG Cargo Arrival Window the User shall inform Gastrade S.A. any information relating to the delivery of the LNG Cargo if different from the information in the Annual Plan or the Spot Cargo Agreement.

If, after issuing the Departure Notice, the User anticipates a change, by way of either increase or decrease, of more than the Allowable Volume Tolerance measured in m^3, which is plus or minus 2%, in the LNG Cargo Volume, or of more than the Allowable Energy Tolerance as measured in kWh, which is plus or minus 2%, in the LNG Cargo Energy Content for a particular LNG Cargo, the User shall promptly provide notice thereof to Gastrade S.A and include in such notice User's new estimate of the LNG Cargo Volume or LNG Cargo Energy Content

2.5.2 First Notice

To be sent five (5) days before the departure of the LNG Carrier from the Loading Port.

AA – Ship's name & call sign.

BB – Expected loading date & time.

CC – Expected quantity (expressed in kWh) and volume (expressed in Cubic Meters M^3)

DD – Estimated Time of Arrival ETA and estimated arrival draught at ALEXANDROUPOLIS Pilot boarding station.

EE – Any known deficiencies affecting port performance.

2.5.3 Second notice

To be sent on departure from load port.

AA – Ship's name & call sign

BB – Estimated Time of Arrival ETA

CC – The quantity loaded (expressed in kWh) and volume (expressed in Cubic Meters M^3)

2.5.4 Third Notice

To be sent forty-eight (48) hours prior to the ETA set forth in the First Notice.

AA – Ship's name & call sign

BB – Confirming or amending ETA.

CC – Average cargo temperature

DD – The cargo tank vapor space pressure, in millibars Absolute, in each of the ship's cargo tanks.

EE – Confirm the following have been tested and/or are fully operational:

1. Navigation, mooring, safety & engine systems

2. Cargo system & boil off control systems

3. Gas detection systems

4. ESD system, alarms, and interlocks

5. Cargo tank high- and low-level alarms

6. High- & Low-Pressure alarms

7. Remotely operated valves

FF – Cargo tanks/lines are free of oxygen.

GG – No tank leakage

HH – Marine Security Level

If thereafter such ETA deviates more than three (3) hours from that advised in the Third notice, then the Vessel Master must promptly advise the Terminal Operator of the corrected ETA.

2.5.5 Forth Notice

To be sent twenty-four (24) hours prior to the ETA set forth in the Second Notice.

AA – Ship's name & call sign

BB – Confirming or amending ETA.

If thereafter such ETA deviates more than one (1) hours from that advised in the Third Notice, then the Vessel Master must promptly advise the Terminal Operator of the corrected ETA.

2.5.6 Fifth Notice

To be sent six (6) hours prior to the ETA set forth in the Third Notice

AA – Ship's name & call sign

BB – Confirming or amending ETA.

CC – Notice of Readiness

If thereafter such ETA deviates more than one (1) hours from that advised in the Third notice, then the Vessel Master must promptly advise the Terminal Operator of the corrected ETA.

2.5.7 Notice Of Readiness

The issuance of the Notice of Readiness for an LNG Carrier is subject to:

(i) any applicable restrictions, including any night-time transit restrictions, imposed by Governmental Authorities or Pilots, or night-time berthing restrictions imposed pursuant to the TAC;

(ii) such LNG Carrier has received all relevant port and security clearances (except those clearances which will be received after such LNG Carrier leaves the Pilot Boarding Station pursuant to applicable port procedures);

(iii) such LNG Carrier is ready to proceed to berth;

(iv) such LNG Carrier is ready to transfer cargo.

A Notice of Readiness shall become effective as follows:

(i) for an LNG Carrier arriving at the Pilot Boarding Station at any time before 07:00 hours on the day of the LNG Cargo Arrival Window allocated to such LNG Carrier, a Notice of Readiness shall be deemed effective at 07:00 hours on the day of the LNG Cargo Arrival Window; or

(ii) for an LNG Carrier arriving at the Pilot Boarding Station at any time during the LNG Cargo Arrival Window allocated to such LNG Carrier, a Notice of Readiness shall become effective at the time of its issuance; or

(iii) for an LNG Carrier which was required to leave the berth for reasons that would have justified an extension to LNG Unloading Window and then returned to the berth, a Notice of Readiness shall become effective upon Terminal Operator's notice to the LNG Carrier that it is ready to again receive the LNG Carrier at the LNG unloading berth*;*

The NOR is tendered by the LNG Carrier's Master and shall:

- Be Signed by the Master of the LNG Carrier ; and
- State the time and date when it was tendered ; and
- Be Addressed to the FSRU Master, in copy to the FSRU O&M Operator.

Upon receipt of a valid NOR, the FSRU Master shall provide the LNG Carrier with instructions for berthing at the Terminal.

Part 3: STS Operations

3.1 Communication

General communications will be via VHF channel 17 with back up communications via ships UHF radio channel 1. A UHF radio along with a spare battery and battery charger is to be provided to the LNG Carrier by the ALEXANDROUPOLIS once all fast.

Both Vessels engaged in STS operations shall maintain a continuous listening watch on VHF channels 12 and 16 during their stay at the ALEXANDROUPOLIS.

Additionally, the following services can be found on these frequencies.

Channel	Frequency (MHz)	Description
06	156.300 - 156.300	Inter Ship Safety
08	156.400 - 156.400	Reserved for Pilots & Tugs
09	156.450 - 156.450	Reserved for Pilot
12	156.600 - 156.600	Port Operations
16	156.800 - 156.800	International Distress, Safety and Calling
	450.3875 - 460.3875	Berthing Aid System

3.1.1 Emergency Contacts.

Port Authority

ALEXANDROUPOLI – Central Port Authority
Address: EMPORIOU 7 - ARKADIOUPOLEOS, ZIP 68100
Phone: 2551356200
Email: alexandroupoli@hcg.gr

Hellenic Joint Rescue Coordination Centre (JRCC)

Address: Akti Vasiliadi, Gate E2, Postal Code: 18510, PiraeusPhone: +30210-4112500, +30210-4101116-9, +30210-4220772, +302131371126, +302131371325

Email: jrccpgr@hcg.gr

Greek Mission Control Centre (GRMCC)

Address: Akti Vasiliadi, Gate E2, Postal Code: 18510, Piraeus
Phone: +302131371627, +30210 4082621 - 622 - 688, +30210 4633067 - 463, +30210 4177621, +30210 4175771

Email:

ISPS Security

Address:
Phone:
Email:

Pollution incident

Address:
Phone:
Email:

Maritime traffic control (VTS)

Address:
Phone:
Email:

3.2 Operational Checklist

Form	Description
VSL-D-029a	At Sea Ship to Ship Transfer Pre-Fixture Information (for each ship) (Between ship operator/charterer and organiser)
VSL-D-029b	At Sea Ship to Ship Transfer – Before Operations Commence
VSL-D-029c	At Sea Ship to Ship Transfer – Before Run-in and Mooring
VSL-D-029d	At Sea Ship to Ship Transfer – Before Cargo Transfer
VSL-G-009	Ship/Shore Safety checklists
VSL-D-029e	At Sea Ship to Ship Transfer – Before Unmooring

Before mooring operations commence the FSRU and LNG Carrier should confirm with each other that all items on Form VSL-D-029b and VSL-D-029c have been checked and found correct. VSL-D-029d should be completed before the commencement of the LNG cargo transfer. VSL-D-029e should be completed at the end of the LNG cargo transfer and before unmooring.

The checklists have been developed to address factors relevant to STS operation in line with the Ship-to-Ship Transfer guide. These questions are supplementary to those contained in the standard pretransfer ship/shore safety checklist which should also be completed before commencement of the cargo transfer.

3.3 Port Navigation - Marine Operations

3.3.1 Pilot Services

Pilot Services will be provided by the competent State Agency (Navigation Agency of the Ministry of Maritime Affairs and Insular Policy).

The use of Pilots is compulsory for LNG/C and LNG barge to be berthed to the FSRU. The available Pilot services is standby 24 hours per day. The request for a

Pilot shall be done by the LNG/C agent with at least 72 hours of ETA at the anchorage and 3 hours before the estimated time of unberthing from the FSRU. The Pilot communication will be monitored via VHF Channel….. (to be determined as 3.1 above)

The Pilot Boarding Station is at:

LATITUDE: ___ S

LONGITUDE: ___ W

Pilot is advisor to the bridge team of the LNG/C (or LNG Barge), while the Master remains in command and is responsible for the safe navigation.

Any abnormalities and defects to the following which impacts the visiting vessel to berth, unberth, remain alongside or navigate shall be reported to the Port authority and the FSRU O&M Operator.

- Mooring Systems;
- Propulsion System;
- Steering Gear;
- Position Monitoring system;

If the visiting vessel Master decides not to follow the Pilot Instructions then the event including the reasons shall be reported immediately by her Master to the agent who shall forward this information to the FSRU O&M Operator and Port Authority.

3.3.2 Tugboat Services (Including standby Tug)

One (1) Standby Tug with Fire Fighting capabilities (Fire-fighting FiFi Class 1 notation) will patrol the Terminal on a 24/7 basis and while any vessel berthing.

One (1) and pilot shall be assigned to escort the incoming vessel from the Pilot Boarding Station to the Terminal/ anchorage and vice versa.

A minimum of four (4) tugs is required for the berthing and unberthing operations. Any individual tug shall have a bollard pull (BP) of 80 tons.

The tugs are equipped with VHF for continuous communication between the incoming vessel and the Terminal. Tugs shall maintain a 24-hour listening watch at channel XYZ in case of emergency.

If during manoeuvring, there is a radio communication failure between the tugs and the vessel then the operation should be aborted.

During the STS transfer the visiting vessel shall conduct a communication check with the Standby Tug on an hourly basis and inform the FSRU Terminal for any communication failure. Official communication language between visiting vessel and tugs is English.

3.3.3 Arrival and Approach

To be completed on receipt of information

3.3.4 Fender Systems

The Fendering system can absorb energy for LNG Barges and LNG/C up to 180k size.

Vessel should berth as parallel as possible with the FSRU parallel body contacting the fenders simultaneously.

Maximum berthing speed shall not exceed XYZ m/sec.

Primary Fenders: The FSRU has four (4) Jumbo Pneumatic Fenders 4,5 meter diameter and 9.0 meter long, wrapped in a tire net (4.922m with tire net). Fender internal pressure is 50kPa.

The primary fenders will be rigged on the Starboard side (as per ***4485-MM-JD-435-005_R04 Fender Mooring Arrangement Plan)*** in such a way that the smallest parallel body of which ever vessel FSRU or LNG carrier is covered throughout the transfer operation considering the change in draft of both vessels. Secondary fenders will be suspended on the starboard side and at the fore/aft limits of the parallel body.

Secondary Fenders: The FSRU has two (2) Baby Pneumatic Fenders 2,0 meter diameter and 3.0 meter long, wrapped in a tire net (2.343m with tire net). Fender internal pressure is 50kPa.

Between operation fenders will remain secured alongside to the FSRU at all times depending on weather conditions.

All fenders are ISO 17357 compliant.

The above fender arrangement is based on typical mooring configurations. The Compatibility Study shall review the fender configuration and determine if different number and/or re-alignment is necessary or acceptable.

3.3.5 Vessel Systems

Vessel systems necessary to the safe operation of the Vessel at the Terminal must be maintained in accordance with the Vessel Owner's policies. Any equipment that is not fully operational and which may affect operations at the facility shall be reported to the to the terminal and to the Maritime Authority/Port State Control Office by the Vessel Master prior to arrival, or if the system becomes non-operational whilst at the terminal, a report shall be made as soon as reasonably practicable thereafter.

3.3.6 Navigation Equipment

Vessels entering and berthing shall comply with navigational equipment requirements for a Vessel entering Greek waters and support the safe navigation of Vessels within the Port.

Other navigation equipment requirements include a VHF Digital Selective Calling Radio, Depth Sounder, a Differential Global Positioning System (DGPS) and other navigation and control equipment acceptable by international standards for a Vessel of her class.

3.3.7 Illumination

Any Vessel delivering cargo is required to have the capability to fully illuminate its topside on-deck working surfaces once moored. The deck of the Vessel shall be illuminated continuously from before sunset, to after sunrise and during any periods of reduced visibility while the Vessel is moored. The deck of the Vessel may be illuminated at the Master's discretion, while the Vessel is navigating into or out of the mooring areas, or during any other period of normal navigation events within the Port, providing the Vessel remains in compliance with the International Convention for the Prevention of Collisions at Sea (COLREGS 72).

3.3.8 Watch Standing Requirements

Each Vessel, while transiting into or out from the Port shall maintain the required watch standing and look out procedures as accepted per industry standard and in compliance with Port State and IMO requirements.

The Vessel shall maintain an Engine Room Watch such that the Vessel can be made ready to unmoor and depart within 60 minutes.

3.3.9 Readiness of Firefighting Equipment

Firefighting equipment should be ready for immediate use on both Vessels. Dry powder monitors on each ship should be pointed towards the cargo manifold in use and left in a suitable condition for hands-off operation. Additional firefighting equipment should be immediately available for use on deck. External (offship) Firefighting support as described in the approved Towing and External (offship) Firefighting Support Regulations in FSRU "ALEXANDROUPOLIS".

3.3.10 Anti-pollution

Adequate anti-pollution measures should be in place.

The LNG Carrier should be able to cease discharge of LNG immediately upon detection of an immediate threat of pollution from the following:

- Transfer hose leak, hose split or other damage.
- Tank overflow on either ship.
- The ships in immediate danger of pulling apart.
- Any event which could potentially result in polluting the environment.

In such cases, the emergency stop of the pump should be activated if the normal means of quickly slowing and stopping the pumps is not available. In case of pollution incident, O&M Operator procedures and the Facility Contingency Plan (FCP) shall be followed.

3.3.11 Engine Readiness

Whilst alongside the main engines and related auxiliaries shall be kept in a state of readiness such that the LNG Carrier can leave under her own power in an emergency. No repairs/maintenance shall be allowed while alongside.

In the case of a Steamship, this means that the turning gear be engaged, main steam stop valve closed and condenser vacuum maintained, corresponding with the engine manufacturer's operating instructions. warming up of the Main Turbine can and only commence once the STS hoses have been disconnected. Verbal message shall be given by the FSRU to the LNGC once this is completed and permission is given to disengage the Turning Gear

In the case of Dual or Tri Fuelled Diesel Electric Propulsion, sufficient power must always be available to allow the Vessel to leave the berth safely should the need arise.

For Vessels with two main engines, one main engine can be immobilised for maintenance. The second main engine must remain fully operational and ready for use. In the case where one main engine is to be immobilised the Master must request permission from the ALEXANDROUPOLIS for this at least 48 hours prior to the scheduled arrival of the Vessel. The request should include:

- A detailed scope of work.
- The expected duration of the work.
- A task risk assessment.
- Confirmation that the second Main Engine will always remain fully operational throughout the period of maintenance.

Whilst alongside, repairs and maintenance to the LNG Carrier's machinery and equipment shall be restricted to those items, which do not impair or limit the use of:

(a) The fire detection or fire-fighting capability,

(b) The safe and efficient handling of the cargo,

(c) The propulsion system or manoeuvrability of the tanker, (Unless twin engine)

(d) The integrity of the mooring system.

(e) The safe operation of electrical equipment in gas dangerous zones.

Any repair or maintenance while LNGC is at anchor or alongside is not carried out without prior notification of the Maritime Authority and the Terminal.

3.3.12 Accommodation Openings

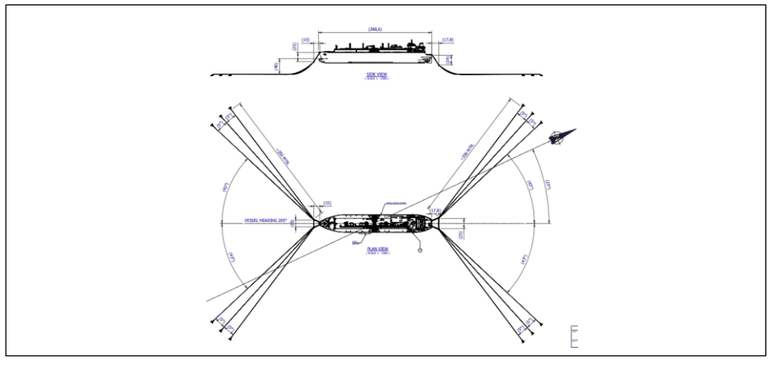
All access doors to the accommodation should normally be kept closed during cargo transfer operations. The Vessels Masters should designate the access doors that are to be used for personnel transit. Where possible, only doors remote from the main deck cargo area should be used. All doors opened for personnel transit should be closed immediately after use.

3.3.13 Hot Work

No hot work shall be allowed while the STS is in progress on either the FSRU or the LNGC.

3.4 Mooring/Unmooring

The ALEXANDROUPOLIS is orientated on a heading of 205°N (SSW) and held in position by a restricted catenary mooring (RCM) system, or spread mooring system, where four set of three mooring lines are deployed.

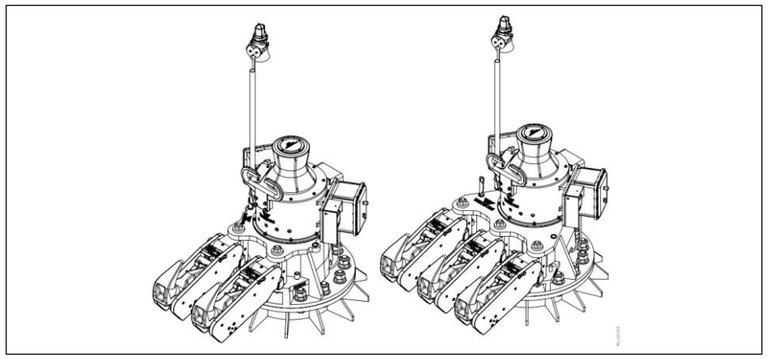


Mooring should only commence following the confirmation and completion of checklists VSL-D-029b and VSL-D-029c

Bow and stern thrusters should be utilised where available however consideration should be given on the effect of these on the ALEXANDROUPOLIS.

The Mooring Plan adopted for a particular STS operation will depend on the size and characteristics of the LNG Carrier. The suitability of the Mooring Plan will be agreed and proven through the Mooring Analysis completed during the Vessel Compatibility stage.

Mooring Operations should be managed to ensure prompt and efficient line handling.



Note: Both Vessels should be prepared to abort, if necessary, any manoeuvring operations. The International Code for Preventing Collisions at Sea must be complied with.

The use of suitable rope messengers typically of 40mm diameter should be employed to bring the LNG Carrier mooring lines onboard placing the eye of the mooring tail on the corresponding hook.

The first lines sent from the LNG carrier will usually be the spring lines followed by the head and stern lines. The spring lines should be utilised to aid the alignment of the Vessels vapour manifolds.

All Fast will be declared at the time when the LNG Carrier is safely moored with all mooring lines tied up to the ALEXANDROUPLIS to the satisfaction of the LNG Carrier Master.

Upon completion of the mooring operation the quick release hooks are to be made ready in the correct mode for rapid casting off of the lines should it become necessary.

Attention should be given to all moorings throughout the operation to avoid excessive or uneven line tension. Adjustment to the moorings should only be made under the guidance of the Mooring Master or POAC and when agreed between both Vessels.

At the end of the cargo operation and prior to the unmooring operation checklist VSL-D-029e should be completed and agreed between the ALEXANDROUPLIS and the LNG Carrier.

A Toolbox talk shall be carried out by the Mooring Master and shall include the LNG Carriers Captain, duty officer and forward and aft mooring teams where applicable.

In the agreed sequence, generally from out to in leaving the spring lines to last, the mooring lines will be slackened back prior to the activation of the release hooks.

Further details of the Mooring and Unmooring Operation will be shared in the specific Joint Plan of Operation (JPO) issued before each STS and will detail the Mooring and Unmooring sequence.

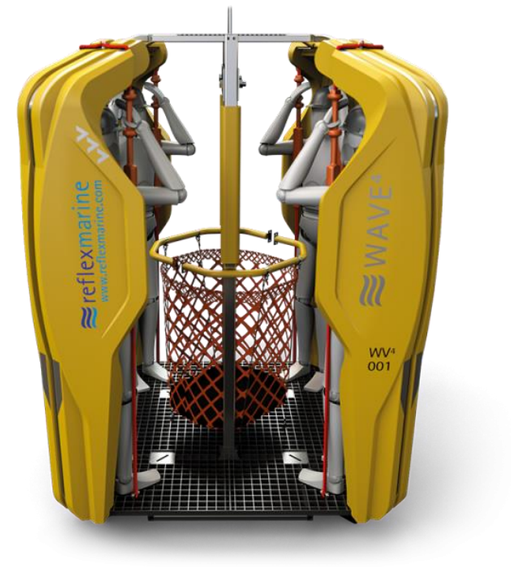
3.5 Personnel Transfer

<u>Normal Boarding Operations:</u>

The FSRU terminal is fitted with a permanent boat landing platform on the Port Side and aft of the Riser's Porch. The boat landing platform is used for personnel transfer during normal operations of the terminal at the offshore site.

<u>STS Operations:</u>

The FSRU Terminal is fitted with an offshore Hose Handling Crane certified for personnel transfer. The crane is fitted to the starboard side of the FSRU terminal forward of the LNG manifold. The FSRU is fitted with a WAVE-4 device that will handle the transfer of personnel from the visiting vessel to the FSRU Terminal and vice versa.



The FSRU crane operator shall be trained and certified for lifting personnel, in compliance with FSRU Management Safety Procedures.

The FSRU shall appoint a Person in charge who shall manage the transfer operation and ensure that all personnel are briefed prior to boarding. The Person in charge cannot be the crane operator and cannot ride the WAVE device.

Prior the first Personnel Transfer on to the LNG/C the Person in charge shall agree the safe landing area with the LNG/C. The LNG/C shall have at least one crew member available to tender the personnel transfer.

Personnel lifting operation shall commence after confirmation that the LNG/C is securely moored – “All Fast” – following permission by the FSRU Master or FSRU Chief Officer.

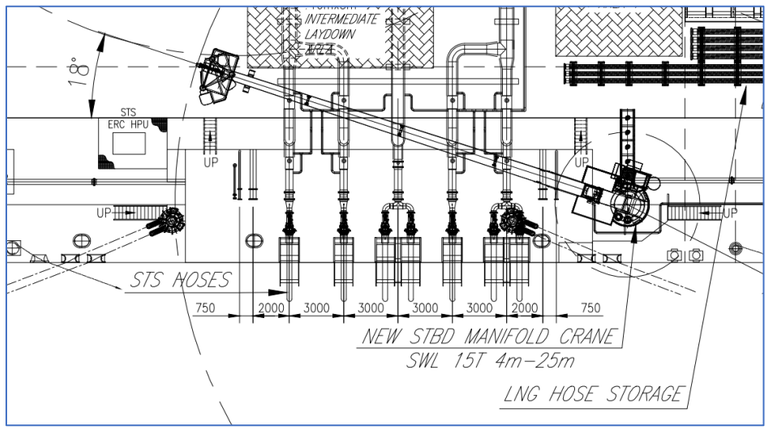
Personnel transfer shall comply with the safety weather limitations as per SMS Management System.

3.6 STS Transfer equipment overview

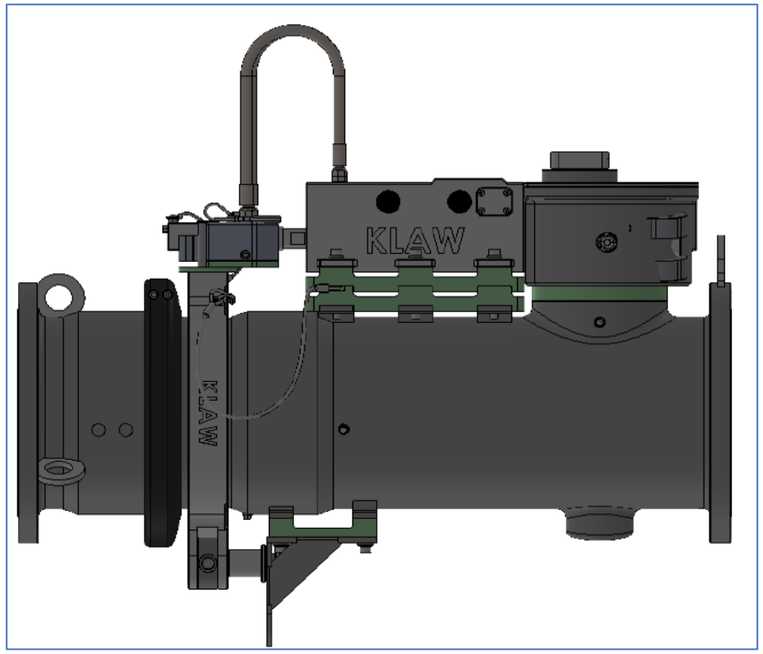
Item	Description	Quantity
1	EHPU-80-2-Z E-HPU power and control system - 1 x Electrical HPU 1oo2 - Suitable for up to 8x10" ERC - for SIL2 rated system	1
2	10" ERC's Emergency Release Coupling (5L+2V) - inclusive of CCV valve for Liquid Line - for SIL2 rated system	7
3	VSD002 Vessel Separation Detector	2
4	Hose Saddles for FSRU - DOUBLE hose for L&V Hose Saddles for FSRU - SINGLE hose for L Fall arrest System	2 3 7
5	Hose Saddles for LNG Carrier - DOUBLE hose for L&V Hose Saddles for LNG Carrier - SINGLE hose for L	2 3
6	Reducer 16” to 2 x 10” for FSRU – Y-piece for L&V Reducer 16” to 2x 10” for FSRU – Straight conical for L	2 3
7	Reducer 16” to 10” for LNG Carrier – Y-piece for L&V Reducer 16” to 10” for LNG Carrier – Straight conical for L	2 3
8	10" Cryogenic Composite Hoses x 18 m long	8
9	10" Cryo FC quick connect/disconnect coupler	7

3.6.1 EHPU

The HPU of the ERC is installed aft of the LNG manifold on the Starboard Side of the FSRU Terminal.



3.6.2 ERC’s



KLAW 10” ERC

The KLAW Emergency Release Coupling (ERC) is a collar release type ERC with a flip-flap valve mechanism.

In the event of an ESD2 signal from the VSD (or an HPU manual override) the HPU will initiate the activation of the connected ERCs.

An ERC’s is positioned between the manifold of the ALEXANDROUPOLIS and a transfer hose. They function as a safe point of disconnection within the LNG hose transfer system. This ensures that the risk of spillage, any threat of personnel injury and damage to the ship are minimised.

The ERC has been designed to accommodate the cryogenic conditions of LNG. When not in use, the system returns to an ambient temperature.

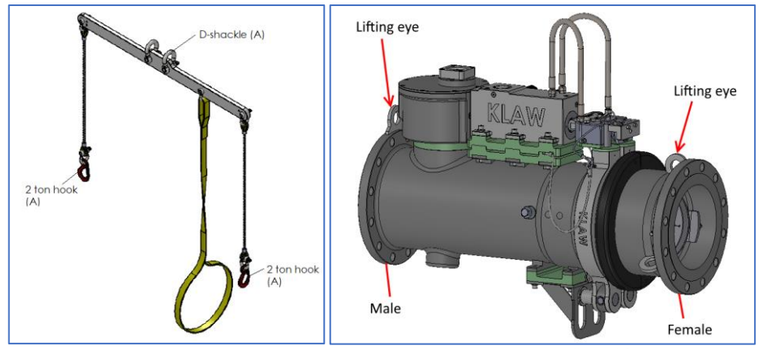
The EHPU enables release on demand allowing for testing and reset of the valve as well as full activation.

On activation the ERC Flip-Flap valves close prior to actual separation. This shuts off the upstream and downstream LNG and Vapour flows each side of the ERC male and female halves. This instant closure has the advantage of minimal spillage and fast disconnection.

During the transfer period, the ERC hydraulic cylinder and the collar release mechanism at the top of the unit must remain ice free. This is achieved by the constant circulation of oil provided by the EHPU. To aid in preventing of ice formation, Epoxy insulation is installed between the hydraulic cylinder and the ERC body, and the Actuation clamp and Collar Assembly

3.6.3 ERC Lifting Bar

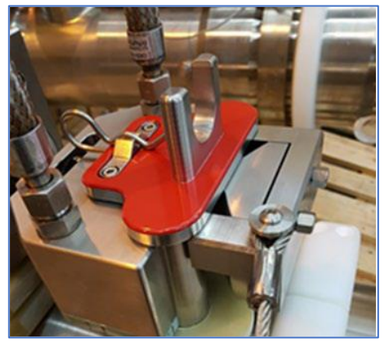
The lifting spreader bar is for the safe lifting of the ERC’s. The bar is attached to a suitable crane or lifting appliance with a D-shackle and lifting accessory and attached via the two tonne hooks to the dedicated lifting eyes of the ERC.

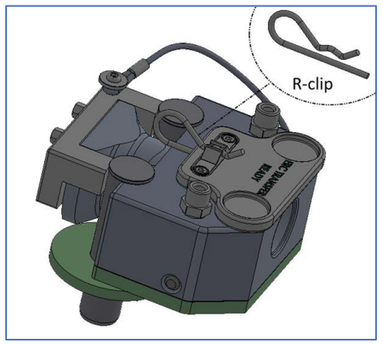


KLAW 10” ERC lifting arrangements.

Transport and Transfer Modes

Outside of a transfer, or during testing the ERC must be put into transport mode. In transport mode the actuation slide must be positioned so that the RED side with the pins is facing up and away from the clamp.



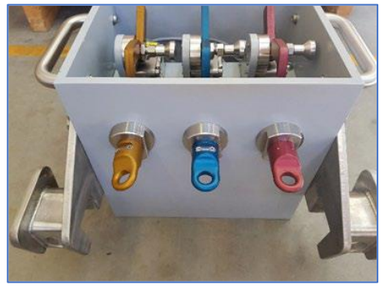


KLAW 10” Actuation side

CAUTION
During transfer the ERC must be put into transfer mode otherwise the ERC will not operate for ESD activation.

In transfer mode the actuation slide must be positioned so that the green embossed text ERC TRANSFER READY is facing up and the pin is inserted in the clamp.

3.6.4 Vessel Separation Detector or VSD



KLAW Vessel Separation detector VSD

The Vessel Separation Detector (VSD) identifies Vessel separation, prompting the system to into and automatic emergency release at the ESD2 set point.

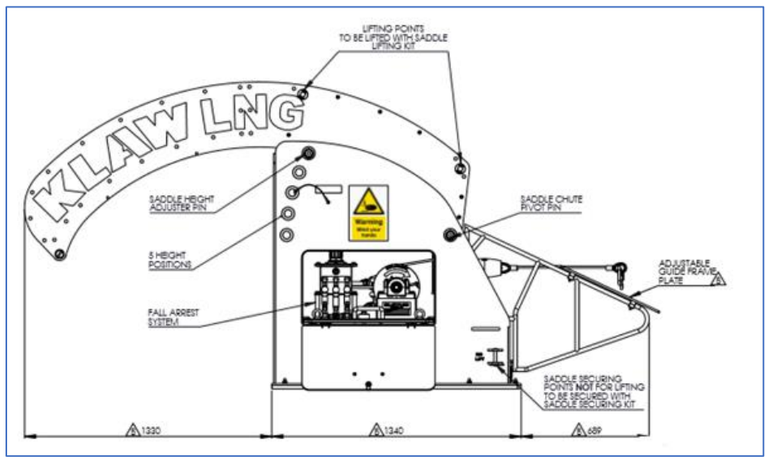
2 VSD units are fitted to the manifold fishplate, one forward and the other aft, which protects against uneven drift off. The VSD wires, which mimic the movement of the transfer hoses, are secured to the LNG Carrier at a suitable point.

The VSD wire length is designed to be shorter than the hoses, preventing damage to both hoses and manifold. The VSD Wire Length is an outcome the Optimoor Study performed and is set up by the FSRU Operator prior to STS Operations The VSD provides an electrical signal to the EHPU for the following:

- Drift Alarm – Pre ESD1
- ESD1 – prior to ESD2
- ESD1 and ESD2 simultaneously

When the Vessels drift apart the wire becomes taught and with a pull of 400N it activates the VSD system

3.6.5 Saddles



KLAW 10 Adjustable Saddle

KLAW LNG Adjustable Saddles are designed to support the weight of the cryogenic hoses, mitigating any bending and lateral stresses during an STS transfer. Additionally, the saddles protect and ensure correct connection and disconnection of the cryogenic hoses.

Double saddles are for use with the liquid and vapour lines which are used in connection with a Y-piece reducer, single saddles are used for single hose connection on the remaining liquid lines.

The Fall Arrest System (FAS) equipment is located within the saddle. This is accessed through the hinged storage hatch.

Saddles without a FAS are provided for use on the LNG Carrier.

The aluminium saddles support the transfer hoses when passing over the railing of the ship. They can be secured to the manifold platform via bolting arrangement or secured to the fishplate using anchors and ballast weight. The chute that the hose rests on can be adjusted to five different heights and so allowing STS transfer with a variety of ship configurations.

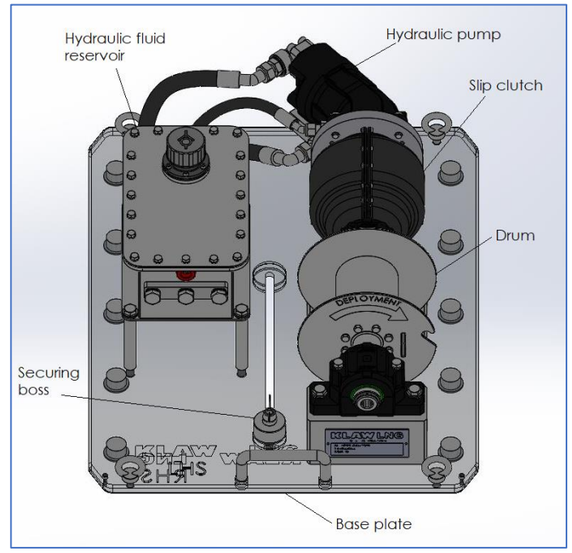
The PTFE lined hose chutes minimise friction and insulate against transfer of electrical charge from Vessel to Vessel.

3.6.6 Fall Arrest System

The FAS is mounted on the inside of the saddles located on the ALEXANDROUPOLIS. It is an adjustable, self-contained, hydraulic system with the purpose of controlling the speed at which the transfer hose descends between the two Vessels after disconnection in the event of an ESD2 activation.

As the hose starts to descend the rope unwinds from the rope drum. This motion drives the hydraulic motor, which circulates hydraulic fluid through the hydraulic circuit and the flow control valve. The valves have been pre-set to ensure the correct speed of descent and in an event of over-pressurisation relieves excess pressure to mitigate against a dangerous scenario.

The rope unwinds fully from the drum then unhooks safely and falls away and into the water. This process minimises the potential damage to the Vessels or the transfer system. If the hydraulic motor becomes jammed a slip clutch acts as a failsafe and ensures the drum continues to rotate at a safe speed



KLAW Fall Arrest System

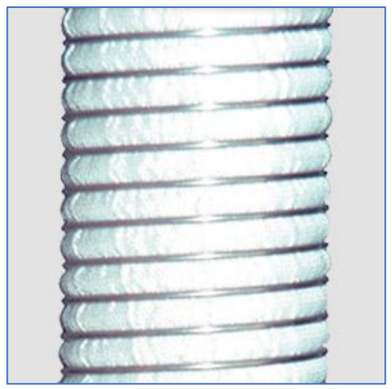
3.6.7 Hoses

Multi-LNG White STS Composite Hoses are specially designed for Ship-to-Ship Operations where LNG at a temperature of -164°C will be transhipped. Multi-LNG White hoses are also suitable for vapour return. Hoses are 10” diameter and 18m long with ANSI 150lb raised face floating flanges each end.

Maximum flow rate through each hose is 2250m^3/hr.

Hydrostatic test is conducted on the cryogenic hoses each year. The test must be conducted by either the manufacturer or a third party which is trained in hydrostatic testing to the following standards: ISO 1402:2009, NPR 5527

Once testing has been completed a test certificate should be made available for the FSRU and LNGc



Gutteling Multi-LNG White Hose

A hose is connected to the female end of the ERC with the use of an electrical insulation gasket set. The opposite end of the hose which will be passed to the visiting LNG Carrier is connected to a manual quick connect disconnect unit known as a “Cryo FC”.

Hoses are tested according to XYZ

CAUTION
Hoses must only be managed using suitably rated hose bun to ensure the minimum bend radius is maintained

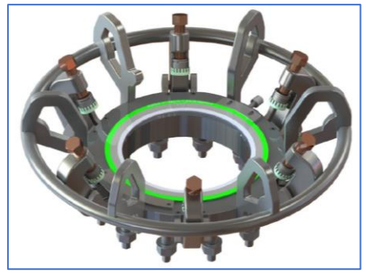
3.6.8 Manifold Reducers.

To allow the installation of the ERC’s and the hoses to the visiting LNGC, the system is supplied with 16” to 10” reducers. There are 2pc “Y” reducers for installation on the vapour and one liquid manifold and 3pc conical reducers for the remaining liquid lines of both vessel.

To provide sufficient space between the ERC, the transfer hoses, and the saddles onboard the ALEXANDROUPOLIS, the SDP’s are removed and the reducers installed direct onto the manifold. Manifold filters are also to remain in place.

The visiting LNGc will not be required to remove their SDP’s and will install the reducers prior to the connection of hoses

3.6.9 Cryo FC Manual QCDC



KLAW Cryo FC

The Cryo FC is a clamp based quick connect/disconnect device utilized to connect the hose to any conventional bolted flange joint, including the manifold reducer.

The Cryo FC will be bolted to the floating flange of the hose in a pre-set position so that when the hose end is transferred to the LNG Carrier the flange engagement plate is at 12 O/clock (+/- 30º)

The mating face gasket is held in place by a retention plate and thumb screw, allowing a hands-free installation.

3.6.10 Ship /shore link

Primary Means of communication shall be Fibre Optic Cable

The optical fibre ship/shore link (FO SSL) comprising 4 channels of multiplexed communication data and emergency shutdown signals of ship to shore and shore to ship where the ALEXANDROPOLIS is designated the shore.

The signal to be transmitted between the ship station and the shore station.

ALEXANDROUPOLIS Side		Direction	Ship side	Channel No.
Audio signal	Tension monitor signal	→	Tension monitor signal	CH1
	Interphone audio signal (hot line telephone)	↔	Interphone audio signal (hot line telephone)	CH2
	Public Telephone audio signal	↔	Public Telephone audio signal	CH3
	Internal telephone audio signal	↔	Internal telephone audio signal	CH4
Dry connect signal	ESD (single Contact) signal	→	ESD (single Contact) signal	1 Point
	ESD (double contact) signal	←	ESD (double contact) signal	1 Point

The secondary back up communication will be the 37 pin Pyle National connection will be provided by the FSRU.

Pyle Pin Configuration if required.

Pyle Pin Configuration		Mother Vessel	Daughter Vessel
5-6	Hot Line Telephone	Hot Line	Hot Line
13-14	ESD Ship to Shore	ESD Ship to Shore	ESD Shore to Ship
15-16	ESD Shore to Ship	ESD Shore to Ship	ESD Ship to Shore
17-18	Continuity Check	Continuity	Continuity

3.7 STS Transfer Equipment Operation

3.7.1 Pre-Transfer checks

Checks before Starting HPU

Checks After Starting the HPU

3.7.2 Proof Checks

Pre-transfer Test Procedure

Test Mode 1 – Accumulator and Circulation system

Test Mode 2 – Manual release ESD1 and ESD2 with ERC activation

Test Mode 3 – VSD Drift pre alarm

Test mode 4 – VSD ESD-1

Test mode 5 – VES ESD-2 with ERC activation

Test Mode 6 – Back up Air (ESD-1)

Test Mode 7 – Integral heating system (if supplied)

3.8 Procedures Alongside

All operations for the LNG Loading are monitored and controlled from the CCR. The loading of LNG cargo and simultaneous de-ballasting are conducted as per the Cargo Operations Manual Loading procedures, supplemented by the following additional information.

Throughout the cargo transfer operations both Vessels should station a responsible person near to the cargo manifold area to observe the hoses and to check for leaks.

The responsible person on both Vessels should periodically check the following throughout the cargo transfer, report and take remedial action:

- For any leakage from the equipment and system.
- That there is no leakage into cargo tanks not scheduled to be loaded.
- If there is any excessive pressure in piping and hoses
- The mooring arrangements.
- The condition of hoses and their support arrangements.
- The condition of transfer equipment including the E-HPU and ERC’s
- Tank ullages and quantity transferred.

Both Vessels should cool down their cargo lines on board in time to commence transfer.

3.8.1 Transfer of STS equipment

Fibre Optical ESD cable will be provided by the FSRU. Once cable has been connected signals and communications should be checked.

None-fall arrest saddles and reducers will be transferred using the FSRU crane to the LNG carrier manifold. Reducers will then be installed as per the agreed manifold connections in line with the JPO, utilising new gaskets made available from the LNG Carrier.

Saddles are to be secured to the manifold using the securing Kit and filled with water ballast.

3.8.2 Hose Handling

The handling of the cargo hose will be conducted using the LNG Carrier crane which eliminates any movement between the Vessels.

The hoses will be lifted from the FSRU and manoeuvred close to the front edge of the corresponding saddle on the LNG Carrier.

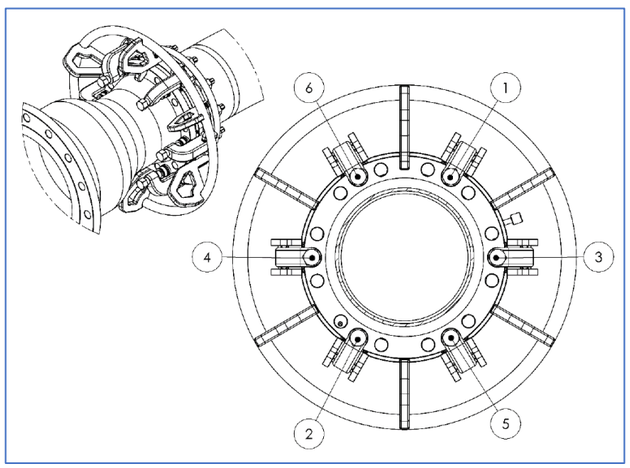
A large web strop, wrapped twice around the hose and chain block secured to the LNG manifold, will prevent the hose running over the saddle allowing it to bend towards the manifold.

The crane should be lowered slowly allowing the removal of the blanking flange from the Cryo FC. Once removed a new gasket will be installed and secured in place using the retention plate thumb screw of the Cryo FC.

The flange connector and hose will then be manoeuvred directly above the flange with a presentation angle of 25°-30°. The flange engagement plate must be set at the 12 o/clock position +/-30°, with the clamp bolts in the fully open position. Carefully lower the flange connector ensuring that there is adequate clearance between the manifold flange and gasket, the position of which can be adjusted using the crane and slackening the chain block.

When the flange engagement plate is fully located the flange connector can continue to be lowered. The flange alignment plates will centralise the manifold flange. When the hose bun lifting strop becomes loose the flange connector will be fully located.

Once in location the clamps should be swung into position and tightened. It is recommended that 2 clamps are simultaneously tightened using a pair of torque wrenches in the advised sequence (1&2, 3&4, 5&6).



KLAW Cryo FC bolting sequence

A pre-set torque of 100Nm should be applied at all clamp positions and then a final torque of 250Nm (for metal spiral wound gaskets).

Once installed, the hose bun, strop and chain block should be removed from the hose.

3.8.3 Water Deluge Systems (water curtain & bath)

The Fire Main shall always remain pressurized on both the FSRU and the LNGC.

Both the vessels shall have a water deluge beneath the cargo manifold, which is designed to protect the trunk slope or cargo tank weather cover. The water from the deluge collects in a bath under the cargo manifold to protect the main deck in case of LNG release.

The water bath shall be constructed by the LNGC using wooden planks (or fixed design) secured in place forward and aft of the cargo manifold.

Before line cooldown commences the hull water curtain and water deluge beneath the cargo manifold on both vessels shall be started.

3.8.4 Manifold Restriction Access During Operations

Once the LNG Carrier is berthed alongside, access to the cargo manifold area is restricted to authorized vessels personnel only: Chief Officer, cargo engineer, deck officer on watch, Bosun and Abs on watch.

Restrictions that limit the number of personnel and the duration of there is enforced to minimize the exposure of all individuals entering the manifold restricted area.

Easily removable plastic chain or barricade tape with placard “Danger – Barricade area – Do not enter without authorization” should be used for restriction barrier.

CAUTION
Restriction barriers (tape or chain) shall be removed to prevent tripping hazards when persons are inside the restricted area

3.8.5 Pressure testing

Nitrogen is used to raise the pressure in the liquid lines to 5.0 bar and 1.0 bar in the vapour line. The pressure is to be maintained while a leak test is carried out on the manifolds and hoses.

Once the leak test is complete the pressure can be released to the atmosphere and the atmosphere of the hose tested.

Purging is considered complete once the oxygen content is less than 5% by volume.

All hoses shall be depressurized to 0.5 – 1.0 bar after the test.

3.8.6 ESD Testing.

Both Vessels should test their ESD system not more than 48 hours before the transfer operation and the tests should be documented and recorded.

ESD testing will be completed under warm conditions. The first test will be initiated from the FSRU to the LNG Carrier, the second test will be initiated from LNG Carrier to FSRU.

No Cold ESD testing will be conducted, following the completion of cooldown a cold stroke test of the manifold ESD valves will be conducted prior to commencement of cargo transfer.

3.8.7 Cooldown

The cooldown of the STS equipment and hoses is conducted using the LNG carrier spray pump. The STS checklist and the ship/shore safety checks will have been completed and the opening custody transfer initiated on both Vessels.

The spray pump will be lined up through the manifold cooldown valves on both Vessels. Maximum flow rate will be 50m^3/hr.

Cooldown is complete when the manifold, STS equipment and hoses fall below -100°c and frosting occurs on the system. This will take approximately 60 minutes but may vary. Once the transfer system is cooled down, the spray pump can be stopped, and the double shut valves opened and the Cold Stroke test of the ESD valves can now be conducted.

3.8.8 Cargo and BOG Management

The vapor manifold should be opened on both Vessels as soon as operationally practicable unless the FSRU tank pressures are lower than the LNG Carrier.

When both Vessels are ready and lined up for cargo transfer the LNG carrier will start their first pump at the requested rate of the FSRU. Once cargo transfer has been established the LNG carrier at the request of the FSRU will ramp up to full rate whilst closely monitoring the vapour pressure of both Vessels.

Full loading rate will be determined by

- Maximum pressure at the LNG carrier manifold (5bar)
  “or”
- Combined maximum flow rate of the hoses (5 liquid hoses equals max rate of 11,250 m^3/hr)
  “or”
- Allowable FSRU vapour header pressure of 350 m.barg;

Throughout the transfer operation at each whole hour, both Vessels will communicate and advise the status of the transfer.

- Quantity discharged/loaded.
- Quantity on board.
- Discharge/loading rate (average last hour).
- Vapour header pressure.
- Est Time to ramp down (Vessel dependant on either full discharge or fully loaded as agreed at the opening safety meeting).
- Manifold pressure (LNG carrier).

CAUTION

If the cargo tank pressure continues to increase with all BOG gas consumption measure in use (fuel gas burning / GCU / regasification boiler/ Recondenser) then the transfer rate should be reduced or stopped until vapour pressure can be controlled.

During the transfer, ballasting operations should be carried out to maintain the trim and list of both Vessels. Listing of either Vessel should be avoided except for proper tank draining.

3.8.9 End of Cargo

Each tank filling valve should be adjusted as the tank approaches full capacity in line with the cargo loading plan.

CAUTION

Extreme and very high-level alarms and shutdowns are emergency devices only and should on no account be used as part of the normal topping-off operation.

Before topping off each cargo tank, the LNG carrier should be requested to reduce their discharge rate and continue to reduce their discharge rate when topping off each of the subsequent tanks.

When the tank is at its required filling level the corresponding filling valve should be closed. If it is convenient, finish loading by tank No.4 for ease of line draining and purging.

The transfer is stopped when the final cargo tank reaches a capacity according to the cargo plan minus the allowance for the line draining.

3.8.10 Draining and Purging

CAUTION

Incorrect draining and purging of the cargo hoses can cause damage due to effects of Rapid Phase Transition, pressure peaks and high gas flow velocities.

To aid the liquid free and purging process of the transfer hoses, sea water spray should be directed to the “U” bend of each liquid hose.

Hoses are to be made liquid free in two stages, firstly by initial displacement followed by pressure and release. Draining and purging will take placed from the LNG Carrier to the FSRU

For the initial displacement, the double shut valves will be closed on the LNG Carrier and nitrogen applied through the manifold connection on the LNG Carrier. The nitrogen will displace the LNG towards the FSRU. Once the nitrogen reaches the bottom of the hose this process is no longer effective.

Following the initial displacement, the ESD valves on both Vessels can be closed and the pressure in the hose raised to 3.5-4.5 bar. Once at pressure the FSRU ESD bypass valve is opened. The release of pressure causes the expansion of the nitrogen creating a piston effect on the liquid, carrying the LNG toward the FSRU.

This process is to be completed 3-4 times before checking the line for the presence of liquid.

One pressure and release cycle may be required from the FSRU to the LNG Carrier to clear any trapped liquid at the manifold.

Purging the hoses will be conducted from the LNG Carrier to the FSRU. Nitrogen will be applied at the manifold connection and raised to 1-1.5 bar. The pressure will be maintained, and flow established by the opening of the cool down valve and spay valve to the FSRU tanks.

Methane content of the hoses are to be checked prior to disconnection. Hoses are classed as purged when methane content is below 2% by volume.

3.8.11 Disconnection

Hose bun should be reinstalled on the hose to ensure that the flange connector, when suspended will have a disconnection angle of 25^{o}-30^{o}.

The hose should be prevented from slipping over the saddle in reverse of the installation procedure before applying a small amount of lift by the LNG Carrier crane, to take the hose weight away from the flange connector.

The clamp bolts can be loosened, and the clamps swung back to the open position allowing the flange assembly to be disconnected. When the flange connection is clear of the manifold and in a suitable position the blanking flange can be reinstalled.

Once the hoses have been recovered, nitrogen should be applied to continually purge the hose, ensuring the methane content is not allowed to raise as it is released from the fibres of the hose. The hose should be maintained under a nitrogen blanket of 0.5 bar to prevent the ingress of moisture when not in use.

3.8.12 Transfer of STS equipment.

All equipment to be returned to the FSRU prior to the departure of the LNG Carrier.

CAUTION

Water ballast must be drained from the saddles before lifting and returning to the FSRU

3.9 Roll-Over Effects.

Roll-over is a spontaneous rapid mixing of LNG which occurs in large tanks because of density inversion, stratification develops when the liquid layer adjacent to a liquid surface becomes denser than the layers beneath, due to boil-off of lighter fractions from the cargo. The unstable situation relieves itself with sudden mixing, which the name ‘roll-over’ describes.

Roll-over can occur when boil off rates which are greater than normal and cause an increase in pressure in the cargo tanks. If the cargo is stored for any length of time the boil-off gas is removed, evaporation can cause a slight increase in density and a reduction of temperature near the surface. The liquid at the top of the tank is therefore marginally heavier than the liquid in the lower levels, once stratification has developed, roll-over can occur.

Roll-over may happen on Vessels that have been stationary for extended period with a large volume of LNG in a tank(s). If such circumstances are foreseen, the tank contents should be circulated by the cargo pumps to prevent stratification occurring, reducing the risk of roll-over.

Roll-over can also occur if a similar or compatible cargo of different densities are loaded into the same tank.

Part 4: FSRU Operations

4.1 Nomination Management

Retained – To be updated

4.2 Philosophy for Equipment Rotation

Specifically, the design of the LNG regasification system must meet nominal send-out of up to 530 MMscfd with one spare regasification train installed, allowing for up to 795 MMscfd total (peak) installed regasification capacity.

This must also be considered in conjunction with the ESIA requirement to install 50% open / closed loop configuration to meet annualized nominal load basis. As per ESIA requirements, LNG regasification system must be designed for 50% base load send-out capacity using closed loop and 50% using open loop on an annualized basis

4.3 Heel and Retention Management

Retained – To be updated

4.4 Terminal Information Exchange

Retained – To be updated

4.5 Maintenance Requests

Whilst on station, the FSRU's main engines and related auxiliaries shall be kept in a state of readiness such that the FSRU can practise the N+1 design philosophy during operations.

Scheduled Maintenance

The FSRU O&M Operator shall have the right during any Contract Year to curtail or temporarily discontinue the operation of the Unit, in whole or in part, in order to carry out planned maintenance or modification work provided that Scheduled Maintenance will not interfere with any scheduled LNG receipts or scheduled Gas deliveries and shall use reasonable endeavours to ensure that no curtailment or interruption of the LNG re-gasification service shall be required.

The FSRU O&M Operator shall, prior to 31 May of each Contract Year send a notice to the Owner to propose dates, times and durations for such Scheduled Maintenance during the following Contract Year.

The Owner shall up to 60 Days prior to the start of each Contract Year have the right to propose alternative dates, times and durations during which Scheduled Maintenance shall take place.

Unscheduled Maintenance

In addition to Scheduled Maintenance, the FSRU O&M Operator shall have the right to perform unscheduled maintenance activities by giving as much advanced notice to the Owner as reasonably practicable of any unscheduled maintenance that it intends to carry out. The Contractor shall use reasonable efforts to avoid any Unscheduled Maintenance interfering with any scheduled LNG receipts or Gas deliveries.

4.6 Cargo Management

Sloshing

Membrane type cargo tanks can be damaged because of the cargo sloshing inside the tanks. Each vessel shall be operated within the specified limits established by the respective Classification Society.

In the event that a cargo transfer shall be suspended, each visiting vessel shall have a contingency plan to consolidate cargo prior departure.

The cargo transfer and storage plan shall be followed throughout the various stages of the unloading sequence.

Vessel stability criteria shall be met throughout the cargo transfer operation by following the approved ballast plan for the vessel.

Tank Pressure Management

The FSRU Terminal has a no-venting policy. Venting it utilized nly in Emergency situations.

Both the FSRU and LNG/C (or LNG Barge) is responsible for their own gas management.

Part 5: Emergency Procedures

5.1 Emergency Signal

An emergency on the FSRU will be indicated by seven (7) short one (1) long blast on the ships whistle.

The emergency signal onboard the LNG Carrier will be agreed at the opening STS Transfer Meeting.

5.2 Incidents Onboard the LNG Carrier

The LNG Carrier is considered a self-contained unit, fully equipped to deal with major fires and other emergencies on board and capable of providing the initial response to most incidents.

The type of incident that can occur on board the LNG Carrier berthed alongside the FSRU can in some instances have a significant impact on the integrity of the FSRU and the safety of its personnel.

Incidents with the potential to develop into a major event are:

- Fire/Explosion.
- Pollution through cargo and/or bunker fuel spills.
- Uncontrolled release of cargo vapour.

Other examples of incidents, which will require a response to minimize the outcome, or to avoid escalation into a significant event, are:

- Mechanical failure (affecting cargo operations).
- Man overboard.
- Accident (medical emergency).
- Failure of the carrier's moorings.

The following section deals with the specific immediate actions to be taken by the principal parties in the event of incidents. Subsequent actions to be taken will depend on how the particular incident develops and how well it is managed.

Action by FSRU:

- Initiate Emergency Shut Down; stop cargo operations.
- Implement Emergency Response Procedure.
- Start log of events.
- Tug (upon arrival/stand-by) to start fire pumps and assist as directed.
- Establish line of communications with LNG Carrier.
- Coordinate with Port for marine resources and support.

Action by LNG Carrier with Emergency:

- Initiate Emergency Shutdown Procedures: ensure all manifold(s) and tank valves are closed.
- Mobilize on board fire-fighting response.
- Establish communications with FSRU Control Room and advise nature & location of incident.
- Prepare to disconnect cargo hoses.

Tugs & Pilots:

- Tug (stand-by) to start fire pump and assist as directed by FSRU Master and/or Harbour Master.
- Duty Tug Masters to establish communications with Harbour Master.
- Remaining tugs to be mobilize and assist as directed.
- Prepare to remove the LNG Carrier from the FSRU under direction of the Mooring Master, Port Pilot, and agreement of Harbour Master.

5.3 Steering, Main Engine or Power Failure on Approach

Should a failure occur during the approach phase this should be considered an emergency. If the LNG Carrier is the fully functional Vessel, it should be manoeuvred to a safe distance.

The Mooring Master will:

- Advise the Master to abort the approach.
- Inform and coordinate tugs.
- Manoeuvre the LNG Carrier to a safe distance.
- Ensure that operations are not commenced until the issue is rectified, with any tests are carried out and written assurances are given to confirm this.

5.4 Failure of Primary or Secondary Fenders on Approach

The Mooring Master will:

- Advise the Master of the LNG carrier to abort the approach.
- Manoeuvre the Vessels to a safe distance apart.
- Inform and coordinate tugs.
- Adjust the heading control of the FSRU to place the remaining primary fenders in a lee.
- If possible, keep any loose fenders in sight and if not possible, try to estimate direction and rate of drift.
- Recover lost fender if possible.
- Ensure that operations are not resumed until the Vessels are correctly fendered.

5.5 Failure of Primary or Secondary Fenders While Moored

Action by FSRU:

- Initiate emergency shutdown procedures: ensure all manifold(s) and tank valves are closed.
- Start log of events
- Inform Mooring Master.
- Inform and coordinate tugs, (upon arrival/stand-by), to be utilized to control the situation.
- Prepare and separate the Vessels under the guidance of the Mooring Master.
- Adjust the heading control of the FSRU to place the remaining primary fenders in a lee.
- If possible, keep any loose fenders in sight and if not possible, try to estimate direction and rate of drift.
- Recover lost fender if possible.
- Ensure that operations are not resumed until the Vessels are correctly fendered.

Action by LNG Carrier:

- Initiate emergency shutdown procedures: ensure all manifold(s) and tank valves are closed.
- Start log of events.
- Inform Mooring Master.
- Prepare and separate the Vessels under the guidance of the Mooring Master.

Action by Tugs:

- Tug prepares to stand by to assist.

5.6 Failure of Mooring Lines

A single mooring line failure is an abnormal situation and should be assessed with the potential for multiple mooring line failure which escalates to an emergency situation.

Single line failure

Action by FSRU:

- Initiate controlled or emergency shutdown procedures: ensure all manifold(s) and tank valves are closed.
- Start log of events
- Inform Mooring Master.
- Inform and coordinate tugs, (upon arrival/stand-by), to be utilized to control the situation.
- Assess the situation to identify the cause of the mooring line failure.
- If this is expected to lead to multiple line failure, advise that this should be treated as an emergency and respond as per the multiple mooring line failure.
- If the situation is stable and no further lines are under significant stress or chance of parting, then the mooring line can be replaced.

Action by LNG Carrier:

- Initiate controlled or emergency shutdown procedures: ensure all manifold(s) and tank valves are closed.
- Start log of events

- Inform Mooring Master.
- Assess the situation to identify the cause of the mooring line failure.
- If this is expected to lead to multiple line failure, advise that this should be treated as an emergency and respond as per the multiple mooring line failure.
- If the situation is stable and no further lines are under significant stress or chance of parting, then the mooring line can be replaced.

Action by Tugs:

- Tug prepares to stand by to assist.
- Confirm to Harbour Master and FSRU Control Room when standing by.
- Other tugs to prepare for standby to assist.

Multiple Mooring line failure

Action by FSRU:

- Initiate emergency shutdown procedures: ensure all manifold(s) and tank valves are closed.
- Start log of events.
- Inform Mooring Master.
- Disconnect hoses, either via Manual activation of ERC's or as per normal disconnection procedure should time permit.
- Inform and coordinate tugs, (upon arrival/stand-by), to be utilized to control the situation.
- Commence unmooring,

Action by LNG Carrier:

- Initiate emergency shutdown procedures: ensure all manifold(s) and tank valves are closed.
- Start log of events.
- Inform Mooring Master.
- Disconnect hoses, either via Manual activation of ERC's or as per normal disconnection procedure should time permit.
- Commence manoeuvring the Vessels to minimize the loads on the remaining moorings.
- Commence unmooring, and manoeuvre LNG Carrier clear of the FSRU.

Action by Tugs:

- Tug prepares to stand by to assist.
- Confirm to Harbour Master and FSRU Control Room when standing by.
- Other tugs to prepare for standby to assist.

5.7 Oil Spill

Specific action taken in the event of an oil spill will depend on the nature, type and amount of the product spilled. The following general rules should be adhered to, to ensure a fast and efficient response at the same time minimizing the environmental impact.

- For all spills, regardless of the product involved, a total ban on smoking on board is to be imposed on the Vessels (FSRU/LNG Carrier) concerned.
- All other sources of ignition should be isolated/secured.
- All loading or cargo related operations are to be stopped and cargo tank valves closed.
- All oil spills, regardless of amount involved, are reportable events The ALEXANDROUPOLIS will automatically advise the authorities of any oil spills emanating from the LNG Carrier or from itself.

On no account must dispersants be deployed (whether approved for use or otherwise) by either LNG Carrier or the FSRU, without the express permission of the Authority in charge of the incident.

Action by FSRU:

- Initiate emergency shutdown of cargo operations.
- Impose total smoking ban on board and secure all sources of ignition.
- Commence log of events.
- Isolate source of pollution and take whatever steps necessary to prevent or minimize further pollution.
- Initiate Oil Spill Response Procedure and Emergency Response.
- Initiate clean up if contained on board.
- Consult with appropriate authority to deploy adsorbent materials into the water.

Action by LNG Carrier:

- Initiate emergency shutdown procedures ensure all manifold and tank valves are closed.
- Establish communications with FSRU CCR.
- Isolate source of pollution and take whatever steps necessary to prevent or minimize further pollution.
- Impose total smoking ban on board and secure all sources of ignition.
- Mobilize on board pollution response plan.
- Initiate clean up if contained on board.

Action by Tugs:

- Tug prepares to stand by to assist and stands off upwind until nature and type of spill has been established.
- Confirm to Harbour Master and FSRU Control Room when standing by.
- Other tugs to prepare for standby to assist.

5.8 Uncontrolled Release of LNG/NG

Action by FSRU:

- Initiate emergency shut down on LNG (if applicable)
- Impose total smoking ban on board and secure all sources of ignition.
- Commence log of events.
- Operate fire monitors if applicable.
- Initiate Emergency Response Plan.
- Establish communications with LNG Carrier and advise nature and location of spill.

Action By LNG Carrier:

- Initiate emergency shut down.
- Establish communications with FSRU and advise nature and location of spill.
- Impose total smoking ban on board and secure all sources of ignition.
- Mobilize ship emergency response plan.

Action by Tugs & Pilot:

- Stand-by tug to activate firefighting and deluge systems and stand well clear upwind and await instruction from FSRU.
- Secure all ignition sources and impose total smoking ban.
- Remaining tugs to mobilize and stand offshore.

5.9 Hose Recovery Following ESD2 Event

After an emergency release of the hoses, LNG is trapped between the closed ESD manifold valves and the split parts of the ERC's attached to each Vessel. Manifold pressure should be monitored on both Vessels and relieved to the cargo tanks. Cargo manifold and cargo line safety valves will release any excessive pressure back to ullage, but these should not be the primary path to trapped pressure in the hose.

The LNG headers and cargo inventory should be drained back to tank following the normal end of cargo procedures.

Hull protection water curtain should be opened full flow and the water spray directed on the hoses to increase vaporization of the LNG within. Careful attention to liquid manifold pressure is necessary to avoid vaporization creating high internal pressures.

A continuous water spray by means of the wash down hoses should be directed on the hoses in order to accelerate the evaporation rate of the LNG trapped inside the hoses. This will increase the pressure in the hoses, the manifold ESD and bypass valves should be opened to avoid over-pressurization.

The hoses can be confirmed liquid free when icing is no longer present on the ERC coupling at the end of the hose and the hose pressure does not increase when the manifold valves are closed.

Purging of the STS hoses connected to the vapor manifold should already be started during liquid freeing of the hoses which are connected to the liquid manifold(s).

Once the liquid transfer hoses are liquid free, nitrogen pressurizing of the liquid manifolds commences. Pressure inside the hoses will be raised up to 4 – 5 bar and is released to the cargo tanks.

Purging of the STS hoses after an emergency release is expected to take a considerable amount of time, as nitrogen is introduced and released on the same side of the hose only dilution of the atmosphere inside the hose occurs.

Regular readings of LEL should be taken to monitor the purging progress. Operational guidelines define purging to be completed once < 2% by volume is achieved.

The STS hoses should be disconnected from the LNG Carrier manifold and temporarily stowed on the deck. Care should be taken to protect the ERC male half from damage.

The Fall arrest ropes attached to each male side of the ERC can be removed as the hose is recovered and it becomes accessible.

The parted Drift alarm, ESD1 and ESD2 cables should be recovered by hand.

In a post ESD-2 recovery operation, the causal factors to the initiating event will generally direct the method of returning the STS equipment from the LNG Carrier to the ALEXANDROUPOLIS or onshore. This could be directly between the Vessels if the Vessels return alongside each other or by a launch/LSV.

Coordination of suitable transport boxes for the cargo hoses, ERC half and associated equipment from the ALEXANDROUPOLIS can be arranged depending on the cause of the ESD-2.

5.10 Security Breach

Any security incidents on board the ALEXANDROUPOLIS must be reported to the ALEXANDROUPOLIS Port Control with all ISPS Code related items in accordance with the ALEXANDROUPOLIS ISPS Manual requirements.

References

Ship to Ship Transfer Guide for Petroleum, Chemicals and Liquified Gases (OCIMF)(SIGTTO)(CDI)(ICS)

Liquified Gas Handling Principles on Ships and In Terminals (SIGTTO)

The International Code for the Construction and Equipment of Ship Carrying Liquified Gases in Bulk (IGC Code) (IMO)

Standard Marine Communication Phrases (IMO)

International Convention for the Prevention of Collisions at Sea (COLREGS 72).

Guidelines for the Handling, Storage, Use, Maintenance and Testing of STS hoses (OCIMF)

Marine Terminal Information Booklet, guidelines, and recommendations (OCIMF)

BMT Metocean Study, Alexandroupolis, Greece, RP_A17025_03_r3 issued 10 Oct 2019

List of Supporting Documents

Form

VSL-D-029a	At Sea Ship to Ship Transfer Pre-Fixture Information (for each ship) (Between ship operator/charterer and organiser)
VSL-D-029b	At Sea Ship to Ship Transfer – Before Operations Commence
VSL-D-029c	At Sea Ship to Ship Transfer – Before Run-in and Mooring
VSL-D-029d	At Sea Ship to Ship Transfer – Before Cargo Transfer
VSL-D-029e	At Sea Ship to Ship Transfer – Before Unmooring
VSL-G-009	Ship Shore Safety Checklist
	Compatibility Spreadsheets and Checklists,
	Checklist 1,
	Ship to Ship Compatibility Questionnaire SSCQ,
	Operational Checklists,
	Ship/Shore Checklist