Towing and External (offship) Firefighting Support Regulations in FSRU "ALEXANDROUPOLIS"

Procedures and Guidelines

Document Control Information
Policy Information

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01/24-01	**20/11/2024**	**Compatibility with MoM**	**Passadis Nikolaos**	

Accountable Owner
The Accountable Owner for this Policy.

Accountable Owner	Title	Geographical Location
GASTRADE S.A.		Kifissias Ave.197 & Anavryton 40-42 Maroussi Attica

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DISTRIBUTION

The "Towing Regulation in FSRU "ALEXANDROUPOLIS- Towage Procedures- Guidelines and External (offship) Firefighting Support", or any changes or amendments will be distributed as follows:

1. Hellenic Coast Guard/Maritime Authority/Harbour Master (Responsible Authority for controlling the implementation of the Regulation by the obliged parties)
2. Alexandroupolis Fire Sevice
3.. Alexandroupolis' Port Authority (O.L.A. S.A.)
4.. FSRU Master
5.. Terminal Manager
6.. Pilots and Tug Masters
7.. Marine Agents
8.. GASTRADE HQ's
9.. GASLOG

One PDF copy will be posted on the company website (www.gastrade.gr) and one PDF copy shall be incorporated in the Terminal's Marine Operation Manual (M.O.M.) as an External Document.

AMENDMENTS

Proposed amendments are to be sent to the Document Owner, who will maintain a record of changes in accordance with a Control of Documents and Records Procedure.

DOCUMENTS AND RECORDS

The definition of documents and records is defined below:

- Documents: Documents may be in any form or type of medium such as paper, magnetic, electronic, photos and templates. They are designed to capture information on activities or results.
- Records: Records provide evidence that activities have been performed or results have been achieved. They always record the past.

REFERENCE DOCUMENTS

Document Title
IMO Resolutions and Guidelines
SOLAS Conventions
Port Marine Safety Code (PMSC)
GCC Safety Regulations for Non-Conventional Ships
European Tug Owners Association' Guidelines for Safe Harbour Towage Operations
Dan Pilot- Pilotage pre-planning guide Part 2 - Harbour Pilotage 2nd edition 2020
Dan Pilot- Pilotage pre-planning guide Part 3 - Ship to Ship operations 2nd edition 2020
IMO RESOLUTION A.765(18) adopted on 4 November 1993- GUIDELINES ON THE SAFETY OF TOWED SHIPS AND OTHER FLOATING OBJECTS INCLUDING INSTALLATIONS, STRUCTURES AND PLATFORMS AT SEA
JOINT ETA-EMPA GUIDELINES ON DESIGN AND LAYOUT OF HARBOUR TOWAGE EQUIPMENT
LOSS PREVENTION Tugs and Tows – A Practical Safety and Operational Guide- Shipowners' Club
EUROPEAN TUGOWNERS ASSOCIATION GUIDELINES FOR SAFE HARBOUR TOWAGE OPERATIONS- February 2015
DNV Towing Recommendations
National Workboat Association: The Use of Workboats for Towage - Good Practice Guide (December 2016)
IMO MSC Circular 1175 Guidance on Shipboard Towing and Mooring Equipment;
Private Maritime Law Code (Gov.Gaz. 29 Vol A'/2023)
Public Maritime Law Code (Legislative Decree 187/1973)
Presidential Decree 379/1996 (Gov.Gaz.250 Vol. A')
Presidential Decree 83/2022 (Gov.Gaz.229 Vol. A')
IMDG Code
International Safety Guide for oil tankers and terminals (ISGOTT)
EMSA Development of vessel design requirements to enter and operate in dangerous atmospheres- Technical Report- January 2012
Ministerial Decision No: 2133.1/76490/2018 (Gov. Gaz.4931 Vol.B')
Ministerial Decision No: 2133.2/76756/2023 (Gov. Gaz.6355 Vol. B'/06-11-2023) Validation of the Special Regulation of the Port of Alexandroupolis number 18 "Determination of anchorage in the sea area southwest of the entrance to the port of Alexandroupolis"
UK STANDARD CONDITIONS FOR TOWAGE AND OTHER SERVICES (REVISED 1986)
Doc. No. P0038635-H4 Rev. 02 – 12 /2023 Provision of Training and Familiarization for Pilots to handle LNG Carries Maneuvers at Alexandroupolis FSRU - Report

Other relevant documents for STS operations
Shipboard oil pollution Emergency plan (SOPEP)

International Safety Guide for oil tankers and terminals (ISGOTT)
OCIMF ship to Ship Transfer Guide (OCIMF) STS Guide
International Regulation for preventing Collisions at Sea (COLREGS)
International Code of Signals
International Ship and Port Facilities Security (ISPS) Code
International Convention on Standards of training, Certification and watch keeping for Seafarers (STCW)
International Chamber of shipping Bridge Procedures guide
International Chamber of shipping "peril at sea and salvage- A guide for masters
International Maritime organization, "Manual on oil pollution, Section I, Prevention", revised 1983
OCIMF "Mooring Equipment Guidelines 4th Edition MEG4"
The Code of Safe Working Practices for Merchant Seaman (CSWP)
Ship to Ship (STS) Transfer of Cargo: Latest Developments and Operational Risk Assessment SPOUDAI Journal of Economics and Business, Vol. 63 (2013), Issue 3-4, pp. 172-180- Nikolaos P. Ventikos, Dimitrios I. Stavrou
General Port Regulation No 18 (Ministerial Decision 3131.1/01/99 Gov. Gaz. 12 Vol.B' 18-01-99)
Special Port Regulation No 19 "Regulation of operational issues of the floating unit of the Independent Natural Gas System (I.N.G.S.) of Alexandroupolis" (Gov.Gaz. B'1044/2024)

USEFUL LINKS

European Tugowners Association (eurotugowners.com)

British Tugowners Association – Representing Harbour Towage in the UK

The Workboat Association - Home

https://www.rivieramm.com/international-tug-and-salvage

https://gcaptain.com/fire-safety-ships-terminals/

https://empa-pilots.eu/

https://www.segeln.co.at/media/pdf/smcp.pdf

https://www.greektugowners.gr/

https://www.elinyae.gr/

https://www.hcg.gr/el/

https://www.ynanp.gr/el/

http://shipsbusiness.com/P-&-I-Insurance.html

https://www.sigtto.org/

https://www.pianc.org/publications/marcom/wg153b

CHAPTER I

TOWING REGULATION

1. INTRODUCTION

This document is intended to portray tug's operational safety issues for the attention of all those concerned, mainly Pilots, Masters of vessels being assisted, their bridge teams and mooring parties.

In Chapter One, the "Towage Regulations" are intended to provide generic and specific guidance to ship masters, pilots and tug crews engaged in tug assisted navigation and also scope for using tugs as a means of reducing navigational risk within "FSRU Alexandroupolis" limits. Owners, charterers, towage operators and agents of vessels are also recommended to make themselves familiar with the content of these procedures and guidelines.

These Procedures and Guidelines have been produced with safety in mind and to meet the requirements of National and International laws and legislations. This document sets out the requirements for towage operations and lays down the criteria for permitting Towage Operators who seek out to provide towage service within "FSRU Alexandroupolis".

In Chapter Two, the External (offship) Firefighting Support provides generic guidelines, regarding the requirements set by the Presidential Decree 83/2022 (Of.Gaz.229 Vol. A') on the firefighting capability of the tugs that support the terminal.

The Regulation is subject to review as soon as reasonably practicable in the event of the occurrence of any incident, or series of incidents, related to this activity, or in any case of a change or update of the legislation, or following documented suggestions from the stakeholders, or recommendations from the Maritime Authority; and in any case at intervals, NOT LATER THAN TWO (2) YEARS from the date of issue.

This regulation and guidelines shall be incorporated into the Terminal's Marine Operation Manual (M.O.M.) as an External Document.

2. THE FACILITY

2.1 FSRU Alexandroupolis main particulars

Main parameters	FSRU Alexandroupoli
Length OA [m]	288.6

Length PP [m]	276.0
Breadth (moulded) [m]	44.0
Depth (moulded) [m]	26.8
Draft (full load) [m]	11.76
Displacement (full load) [t]	109,343
Storage capacity of LNG [m^3]	153,500
Nominal regasification and send out capacity [bcm/annum]	5.5

2.2 Location

Alexandroupolis FSRU (the "Terminal") is located approximately 17,6 km offshore to the south west of the town of Alexandroupolis, which is located on the North east coastline of Greece (as shown in the figures 2.1) in WGS84 : **Latitude: 40°45'40.91"N and Longitude: 025°42'50.19"E**. (HGRS87 : X=644519,250 and Y=4513393,860).

No shallow water or a depth restriction affects the approach of LNG carriers (approximately depth of 40m at the point of FSRU amidships).

Figures 2.1 FSRU Location

2.3 Restricted Areas and Safety Zones

A 500 meter radius "Exclusion Zone" exists around the Terminal's outer limits in which fishing and any waste disposal or pollution (as ruled by MARPOL convention and/or national and local rules) are prohibited and navigation is restricted. Access to the Exclusion Zone is restricted exclusively to LNG Carriers calling at the Terminal, mooring and service support vessels, either

working for or authorized by the Terminal and Maritime Authority, as well as those vessels associated with law enforcement agencies.

The extent of the exclusion zone is defined by a circle with a radius of 992 meters (or 0,53nm), centered at the amidships FSRU in coordinates (WGS84): Lat: 40°45'40.91"N, Long: 025°42'50.19"E.

The Exclusion Zone is monitored and controlled by a dedicated guard-vessel.

Vessels are allowed to anchor in the designated anchorage area, southwest of the port entrance of Alexandroupolis, which is enclosed between the coordinates:

A) Lat= 40° 49' 12'' N, Long= 025° 49' 21'' E

B) Lat= 40° 49' 12'' N, Long= 025° 52' 20'' E

C) Lat= 40° 47' 30'' N, Long= 025° 52' 20'' E

D) Lat= 40° 47' 30'' N, Long= 025° 49' 21'' E

The provisions and the terms of the anchorage determined by the Special Regulation of the Port of Alexandroupolis No. 18 "Determination of anchorage in the sea area southwest of the entrance to the port of Alexandroupolis" [Ministerial Decision No: 2133.2/76756/2023 (Gov. Gaz. B'6355/06-11-2023)].
(https://www.gastrade.gr/wp-content/uploads/2023/11/REGULATION-FOR-ANCHORAGE.pdf)

The Marine Agent, the shipowner or the legal representative of a LNGC, is obliged to inform Alexandroupolis Maritime Authority at least twenty-four (24) hours before the ETA of the ship at the anchorage (or within a reasonable period of time after its departure from the previous port, if the duration of the voyage is less than 24 hours), describing the reason of the approach.

2.4 Berthing (Alongside) Approval Parameters

The Terminal is designed in compliance with the International Standards to provide a berth for any LNG Carrier compliant with the Conditions of Use.
For more information refer to Section 2.5 of Marine Operation Manual (M.O.M.).

2.5 Terminal Hours of Operation

Subject to the prevailing and expected sea and weather conditions, and at the full discretion of both the Masters of FSRU and LNG/C and STS Superintendent:

- Berthing operations follows relevant criteria of corresponding Section 6.10 of Marine Operation Manual (M.O.M.);
- off-loading operations at the Terminal from LNG Carriers may be conducted at any hour of the day or night;

- unberthing of LNG Carriers from the Terminal may be conducted at any hour of the day or night.

Note: the above may also be subject to the availability of Pilot(s) and support vessels to assist the LNG Carrier, save where permitted otherwise by the Maritime Authorities.

2.6 Mooring Arrangements

The proposed mooring plan will establish (every time before the berthing alongside process) during the Compatibility Study Process which includes details of the number and position of mooring lines to be used consistent with OCIMF "Mooring Equipment Guidelines 4th Edition MEG4".
During the Compatibility Study Process, the proposed mooring plan for the LNG Carrier needs to consider the requirement to protect the mooring lines from abrasion with the LNG Carrier's hull, fairleads and chocks.
All mooring lines must be deployed on mooring winch drums and be capable of effectively mooring the LNG Carrier.
All LNGC mooring lines used for mooring shall be fitted with similar breaking strength and manufactured with same material. Synthetic mooring lines shall meet the requirements of OCIMF's publication "Guidelines on the Use of Synthetic Fiber Ropes as Mooring Lines on Large Carriers".

The minimum mooring line requirements (indicative and not restrictive to the Compatibility Study Process) for LNG Carriers are indicated in ANNEX "E".

12 Certification and inspection data of LNG Carrier's and Tugs' mooring lines/tails/winch brakes should be available on board and provided by the Masters to the Terminal Representative at any request.

For more information refer to Section 7.3 of Marine Operation Manual (M.O.M.).

2.7 Fender Arrangements

Four Yokohama fenders with dimension approx. 4.5 m x 9.0 m are attached to the FSRU. The fenders have a protecting layer of rubber tires surrounding them, so that the total diameter is approximately 5.0 m. The side-by-side fenders are required to have less than 60% compression, i.e., the maximum allowable fender load is 5,757 kN (586 ton) for Yokohama fender with 50 kPa gauge pressure.

For more information refer to Section 2.6 of Marine Operation Manual (M.O.M.).

2.8 FSRU Anchoring Arrangements- Positioning System

The FSRU is moored to seabed using a "Restricted Catenary Mooring (RCM)" system designed by CAN Systems. **The FSRU heading is 205° relative to North**. LNGCs are moored to FSRU using LNGC mooring lines, and fenders being moored to the FSRU protect the hull sides of the two vessels. The FSRU spread mooring system consists of 2 x 4 mooring lines, 3 x 4 anchor

lines and restrictor systems, where 2 x 4 mooring lines (upper lines) are from FSRU bow/stern fairleads to restrictor plate and 3 x 3 anchor lines are between the restrictor plates and the forward or stern anchors.

Figure 2.2 – FSRU Restricted Catenary Mooring-RCM

FSRU mooring/anchor lines are numbered in increasing order from the bow port corner to the stern port corner in clockwise. Offloading of LNG via the FSRU flexible hoses from LNG carriers is performed with the **LNGCs moored alongside Starboard side of the FSRU**, with the FSRU moored to seabed via the Restricted Catenary Mooring (RCM) - spread mooring system.

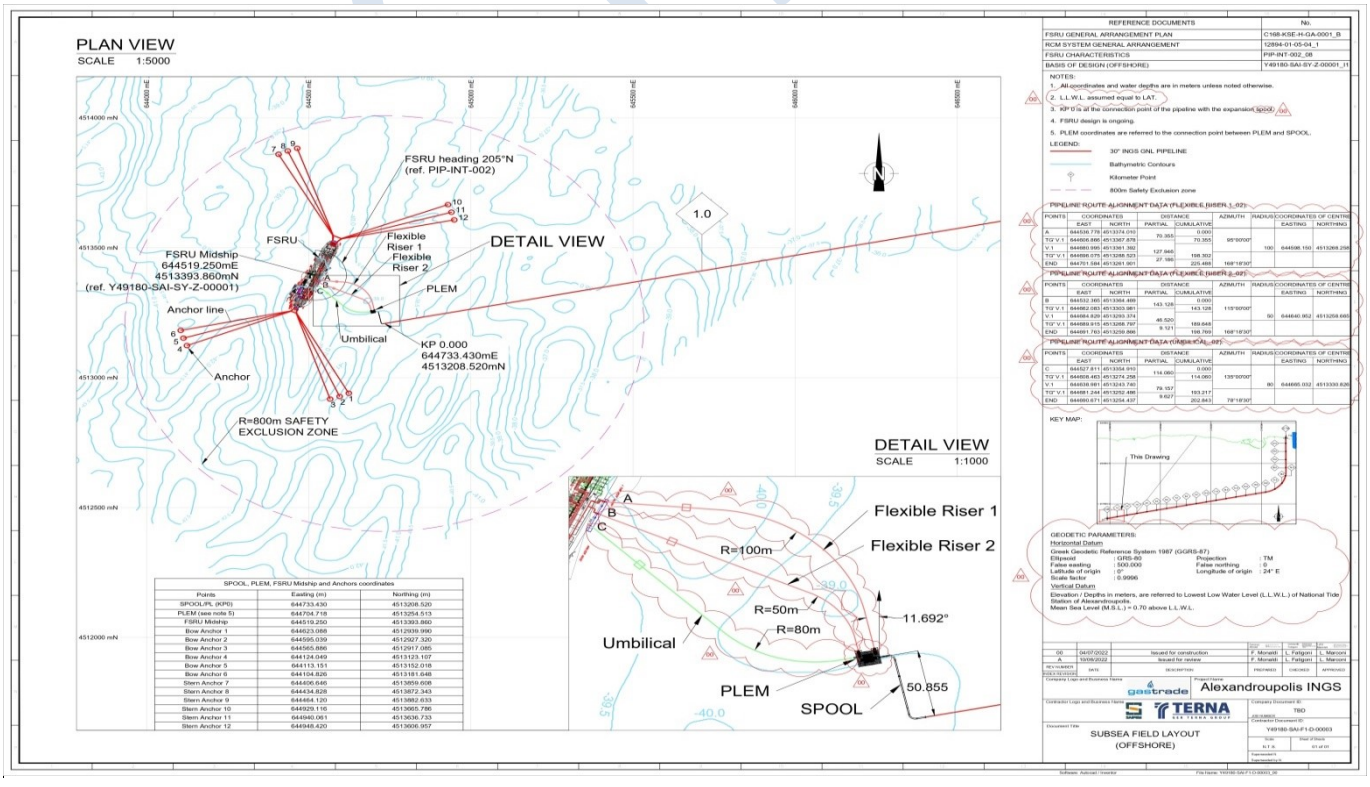


Figure 2.3 – FSRU General Anchoring Arrangement

Mid-anchors at each FSRU corner geographical coordinates

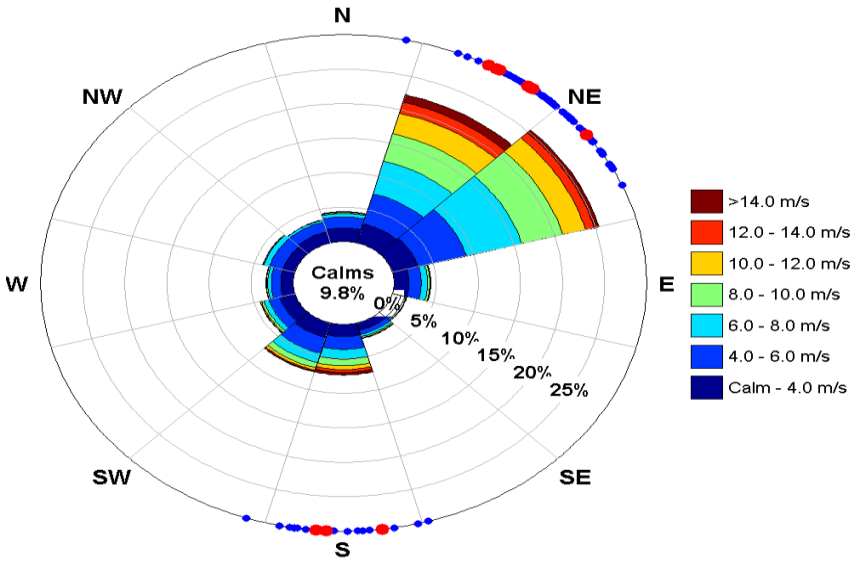
Anchor no.	Latitude N (WGS84) [degrees, minutes, seconds]	Longitude E (WGS84) [degrees, minutes, seconds]
Anchor B2	40°45'26"	25°42'53"
Anchor B5	40°45'33"	25°42'33"
Anchor B8	40°45'56"	25°42'47"
Anchor B11	40°45'48"	25°43'8"

Extreme care is required on the anchor chains and wires, and it is recommended to maintain a peripheral safe distance of at least 250 meters when approaching or unberthing the FSRU.

For additional information refer to Annex "1" of Marine Operation Manual (M.O.M.)

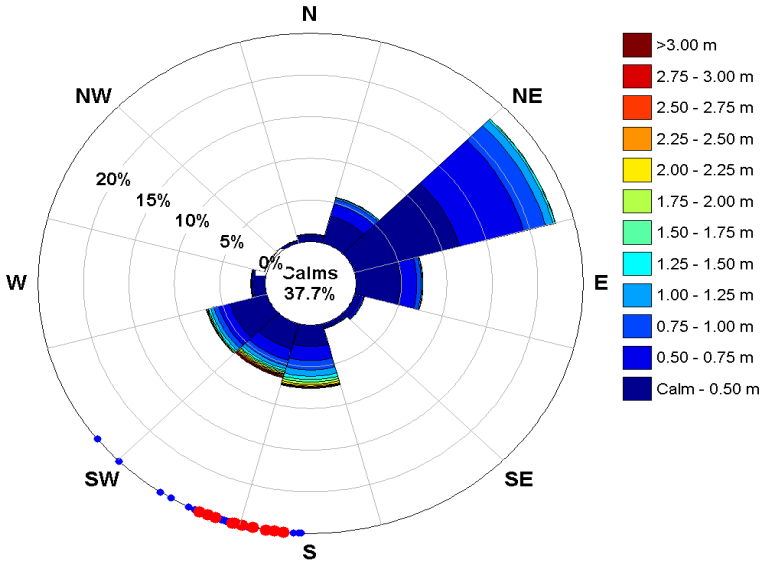
3. ENVIRONMENTAL CONDITIONS

Two different studies, "Metocean Study, Alexandroupolis (Final Metocean Report)" and "Navigation Simulation Study" analyzed all the basic meteorological data of the sea area and provide the necessary information for towing operations and Ship to Ship- STS (or Side by Side-SBS) mooring procedures. Generally the basic environmental data are presented in the graphs below.



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

Figure 3a: Wind rose at 10m a.s.l for the FSRU Location. Note directions are from.



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

Figure 3b: Wave rose for the FSRU location. Note directions are from.

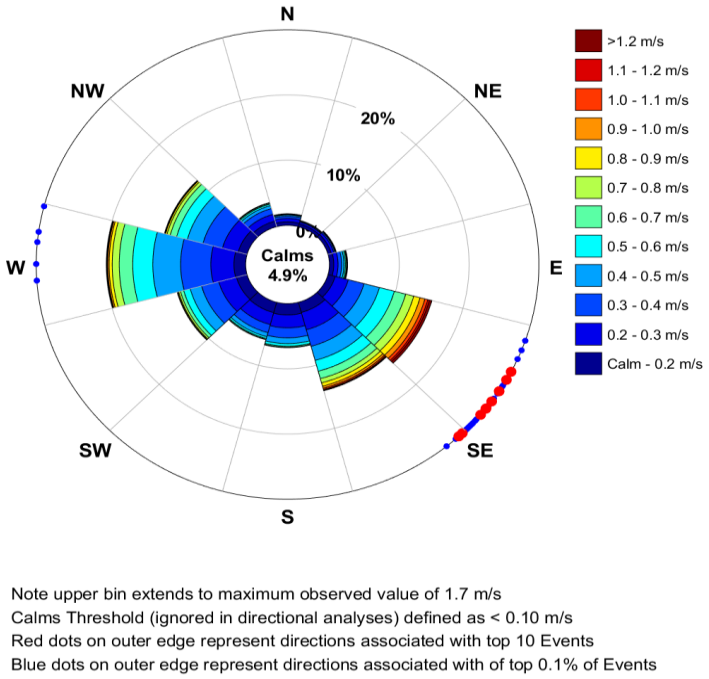


Figure 3c: Near-surface current roses for the FSRU Location. Note directions are to.

4. TOWAGE

4.1 Availability, Specifications and Requirements

Terminal has contracted support to provide towing operations. The tugboats available meet all the requirements of national and international legislation, particularly in the areas of stability, towing capacity, equipment, crew training and the existence of the necessary certificates and manuals.

Number of Tugs is also required to remain in close proximity to the LNG Carrier throughout its stay at the Terminal so as to:

- maintain a security watch
- be available to render prompt assistance in case of:
  - early departure requirements
  - emergency situations (including providing firefighting support and antipollution operations)

The minimum number and power of Tugs required by the Maritime Authorities and the relative study are indicated in the following table:

LNG Carrier DWT	Number of Tugs – berthing	Minimum Number of Tugs – unberthing
All LNG Carriers	**4 x ≥ 70t bollard pull**	**2 x ≥ 70t bollard pull**

The Maritime Authority requires that minimum of **2 x ≥ 70t bollard pull** Tugs be on stand-by whilst the LNG Carrier is alongside. The equipment for stand-by tugs, meets the minimum standards and requirements for firefighting operations.

The Maritime Authority at all times retains control over the requirements as to number and bollard pull of Tugs.

In case of exceptional conditions that may endanger the ship and the crew, is at the LNGC master's discretion to determine the number of tugboats required and their pulling power, beyond what is provided above.

Presidential Decree 83/2022 (Vol.A'229), lays down all necessary details regarding the construction, equipment, certification etc. of tugboats. The ship-owners, the management companies and the masters of the tugs are made liable for the observance of the provisions of the institutional framework.

4.2 Terminal's Safety

Regardless of the above mooring and unmooring procedures, a tugboat ≥ **70t bollard pull** remains on standby near the FSRU to cover emergency and safety needs when ship-to-ship operations are not being carried out.

The standby tug can also perform the duties of a guard vessel at the same time.

4.3 Specifications

All available tugboats must meet all the requirements set by Presidential Decree 83/2022 (Off.Gaz. Vol.A'229), regarding:

- **Technical specifications of towing equipment and safety devices**
- **Control and inspection program**
- **Design, construction and structural strength**
- **Bollard Pull calculation and certifications**
- **Stability**
- **Contingency and Risk Assessments Plans**
- **Safety conditions and Measures for Towing**
- **Safe Towing Procedures Manual**
- **Safety Management Systems**
- **Fire Fighting Capability and Equipment**
- **Oil spill fighting and recovery equipment and materials**

Any deviation or violation from the provisions of this regulation or/and the national or international legislation (under the responsibility of the ship-owning company or the management company and the masters of the tugs), must be reported immediately to the person in charge of the terminal, the pilot and the Maritime Authority (Coast Guard). Regardless of the penal,

administrative and disciplinary sanctions imposed by the Maritime Authority, the contractual relationship between the parties is also reviewed under the imposed of the stipulated clauses.

5. COMMUNICATIONS

5.1 Communication Information

All communications between the Terminal and LNG Carrier and Ship's Agents shall be conducted in the English language.

Communication is a very significant part of the operation, and as previously mentioned it is important to use closed loop communication in order to eliminate faults and misunderstandings. In addition, we refer to and recommend using SMCP IMO Standard Marine Communication Phrases (SMCP)

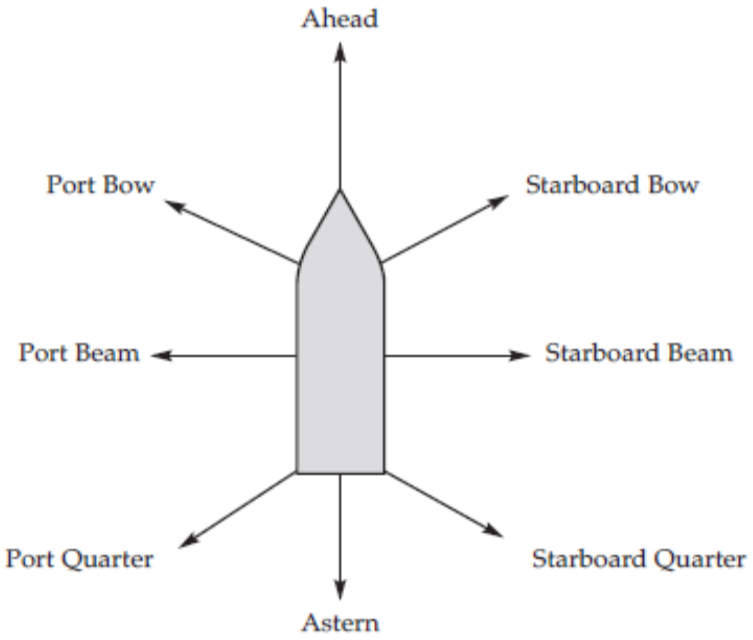
https://www.segeln.co.at/media/pdf/smcp.pdf

ITEM	DESCRIPTION
Terminal details	International Call Sign: SVDS5 IMO number: 9390185 MMSI: 241838000
Terminal email	alx@gaslogserv.com
Terminal Telephone	VSAT: +30 2111990100 Iridium Certus: +881 677 116 704 (Master) Iridium Certus: +881 677 113 476 (CCR) FBB: +870 773 256 229 Mob: +30 6980335661 (Master)
GASTRADE e-mail	info@gastrade.gr
GASTRADE Telephone	+30 211 4118170-171
Maritime Authority/Coast Guard	VHF on ch.12,16 E-mail: alexandroupoli@hcg.gr Telephone: 25513 56200-215 Emergency tel. response: 108
OLYMPIA RADIO	VHF on ch.16
Alexandroupolis Pilot	VHF on ch.10, 14
GASTRADE AXD Port Captain	E-mail: axd.portservice@gastrade.gr Telephone: +30 697 228 3605 (24/7)
SVITZER HELLAS MARITIME Port Manager	E-mail: christos.pagidis@svitzer.com Mob.Tel: +30 694 500 7016

Communications are to be established as early as possible and confirmed by all parties. A clear, concise and closed loop format confirming all instructions can catch any miscommunication before incorrect application. All communication should be short and precise to avoid confusion and include the name of the vessel/tug called. The name of the tug to which the order applies should be called first followed by the command and tug masters should repeat all orders to ensure that they have been understood.

To avoid confusion, pilots will ask for tug power and directional requirements as follows:

- The power required will be indicated as a force in tons or engine power and
- The direction of pull will be indicated as in the diagrams below.



If hand signals are used they should comply with industry standards.

5.1.1 LNGC Master

In addition to the standard information passed to the Pilot, it is recommended that the marine Agent on behalf of the Master or/and Terminal's Manager provide the Pilot with a deck General Arrangement showing the layout and safe working load (SWL) of the mooring fittings, where known, and inform him: Which fairleads, bollards and strong points etc. can be used for towing; The SWL of this equipment; Areas of hull strengthened or suitable for pushing by tugs and relevant identification marks employed. This information is needed due to variations in ship construction and the appropriate area frequently being out of line with the fairlead; and any special features (i.e. controllable pitch propellers, thrusters etc.).

5.1.2 Pilots

The Pilot should advise the LNGC's Master:

- The tug rendezvous time and position;
- The number of tugs and the mode of towage;
- The planned (optimum) ship speed when connecting to the tug's lines;
- Whether the ship's or the tug's line are recommended for use;
- The type of tugs to be used and their bollard pull(s);
- If escorting, the maximum towline forces that the tug may generate at escort speeds;
- Maximum planned speed for the passage;

- The method by which the ship's crew should take on board and release the tug's tow line;
- That on release, the tug's gear should be lowered back always under control;
- Areas of the transit posing particular risks with respect to the possible use of the tug;
- Intentions with regard to use and positioning of the tug(s) for berthing manoeuvres;
- Intentions with regard to use of the tug(s) in an emergency (escort operations);
- Primary and secondary VHF channels for use in the operation; and
- Safe abort location, if applicable.

5.1.3 Pilot/ Tug Master

The Pilot and Tug Master should, as a minimum, discuss the following issues:

- The SWL of the vessel's bollards, fairleads, strong points etc. to be used for towing. (Failure to provide this information could result in broken equipment);
- The tug hook up point, taking into account the prevailing weather and sea conditions, or escorting operation (if appropriate) and berthing;
- The planned (optimum) ship speed when connecting to the tug's lines;
- If active escorting, the start point of the escorted passage;
- The maximum speed of the tug;
- Passage details while accompanied by the tug(s), particularly details of any swing manoeuvre, release position and sequence of release;
- Berthing details in their entirety, including tug positioning around the vessel's hull and the vessels required position alongside FSRU;
- Any significant weather forecast/anticipated;
- Intended and emergency use of ships anchors;
- Any unusual items regarding the particular vessel as gleaned from the Master/Pilot exchange;
- If appropriate, any shallow water or bank effect areas where significant surges may be experienced that might add to the tug loads;
- The Tug Master should advise the Pilot immediately if there is any reduction in the tug's operational characteristics such as ability to manoeuvre, deliver bollard pull or any other operational and relevant defects which could affect its capabilities.; and
- When confirming that the tug is fast and ready to assist, the Tug Master should also confirm both the tug's name and her position on the vessel.

5.1.4 Pilot/Tow Master

In addition to items listed 5.1.1 and 5.1.2, the Tow Master and the Pilot must establish the following:

- Methods of communication;
- Clear understanding of responsibilities.

5.1.5 Raising of Concerns During Operation

The Tug Master should immediately inform the Pilot/Master of any concerns that he may have as to the safety of his tug and crew. The Pilot and Tug Master should take immediate action to ensure the safety of both the tug and assisted vessel; if necessary they should abort the operation as soon as it is safe to do so.

5.2 Good Planning

Majority of the communication about the planned operation should be carried out early and during a safe period before the operation. The outlined plan will include the intended manoeuvre, specific tug placement, the function of each tug, any vessel limitations or relevant defects, any particular aspects which may be non-routine, and the SWL of ships bollards. At this point the tug can highlight any limitations that may be encountered for the pilot to consider and balance.
Once the operation is underway communication should be kept clear, concise and to essential content only.

Tow plan

Planning and preparation before a tow commences might include:

- Assessing the size and type of vessels or barges to be towed and any limitations of the tow.
- Confirmation that the tug is of suitable; size, manning, sea-keeping, horse power (HP) and bollard pull (BP).
- Tow wire and towing equipment is suitable for the planned tow.
- Route to be taken and passage planned, including safe transit through areas of high traffic density.
- Noting any areas of reduced depth, tidal limitations and currents expected during the voyage. A list of bridges with maximum and minimum height; tide height for each arch to be passed under showing the bridge's maximum air-drafts.
- Weather forecasts to include outlook for at least 48 hours.
- Confirmation of sufficient fuel, water, spares on board.
- Navigational information and warnings.
- Recommended speeds to comply with river regulations.
- Connection and disconnection arrangements.
- Stability of the tug and towed unit.
- Emergency contingency plans.

Preparations on board the tug

It is essential that checks should be completed on board the tug and vessel or barge to be towed, which should include:

- All water/weather tight openings are securely closed with signs indicating that they should remain closed for the duration of the voyage. It is a reality that tugs have capsized

as a result of doors and ports being left open when in difficulty, e.g. girting. down flooding is a real danger to small tugs.

- Life-saving and fire-fighting appliances must always be operational.
- Navigational equipment, wheelhouse whistles, horns, shapes for day signals and communication gear are fully operational.
- All critical machinery prior to commencing a towing operation should be confirmed as operational – this would include; main engine, steering gear and towing equipment (winches, wires) etc.
- All personnel are fully familiar with the intended towage plan and their responsibilities.
- Any change of fuel and ballast to the tug and/or tow have been fully calculated and the crew are aware of any factors of concern.

5.2.1. Toolbox Talks/ Pre-Job Briefing

The Toolbox Talk/ Pre-Job Briefing is normally a brief meeting (15 - 30 minutes), with the people who will be carrying out the work to discuss potential hazards & safety issues and to ensure everybody knows what they are supposed to be doing. Briefings should be held between relevant parties such Tug/Tow master and pilots. The Tow Master or his representative should record key decisions at pre movement planning meetings. Tug crews should be in possession of the barge/dead ship pro-forma and can be briefed directly by the pilot after arriving on scene. More complicated jobs requiring the need for numerous tugs may need a toolbox talk with all Tug Masters in attendance. Time should be made in the schedule for such pre-job briefings, including tugs arriving earlier on a job.

Passage plan is drawn if agreed between marine pilots and tow master. Items for discussion & analysis of a Passage Plan Review are shown below:

- General route
- Distance and speed
- Weather forecast
- Environmental conditions (tide-lighting)
- No go areas
- Safety parameters a. Safety contour b. Safety Depth c. Anti-grounding (or anti-collision) sector (or cone)
- Basic areas of interest (TSS, pilot areas, anchoring areas)
- Fuel change over requirements
- Communication plan
- Roles and Responsibilities
- Related hazards and performed risk Assessment outcome
- Other (specify)

5.3 Roles and Responsibilities

The role of the pilot is to co-ordinate all available assets to safely conduct the intended manoeuver. These assets include the towage, the ships main propulsion, thrusters and rudder, the ships bridge and deck teams, the use of the mooring lines and boats to best suit the specific vessel, the berth and approaches and the environmental factors. The desired action of one tug may simultaneously create an unavoidable or undesirable consequence which the pilot will look to counter by introducing or removing a separate force elsewhere.

The role of tug master is to carry out the commands of the pilot providing it is safe to do so. They are responsible for the safety of their tug and their crew. If a tug is requested to carry out an action, they should do this as efficiently and as accurately as possible. Tugs frequently operate out of sight of the pilot and bridge team, as a result there is an assumption made by the pilot that the tug is operating as and where requested. Any restrictions to carrying out the action required, need to be relayed to the pilot as early as possible so that they can be taken into account. Equally any safety concerns, clearing proximity to hazards, or observations by the tug master are of timely interest to the conducting pilot.

Most operational concerns should have been addressed prior and anything not safety critical can always be discussed after the job and be utilized in future operations.

Organizational command lines should be established and responsibilities and duties clearly defined before a new towage commences. The tug master is at all times responsible for his vessel and crew. The tug master should always be satisfied before departing that his vessel is:

- Compliant with appropriate regulations and all machinery and equipment is in good order and fit for the intended tow. In addition:
- Crew is correctly certified, trained and using correct and appropriate personal protection equipment (PPE).
- Communications are established with the tow and tow master.
- Towing gear is in good condition and prepared.
- Watertight doors, hatches and ports are closed prior to the tow commencing.
- The barge certification is in order and the stability of the barge has been verified where applicable.

It must be clear between the parties (other tugs etc.) who the towing master is and his responsibilities. Investigators often cite the failure of not having someone in overall control of the towing operation as a factor in incidents. All personnel should be aware of their own responsibilities and tasks.

5.4 Call Signs

Pilots should only call with the individual tugs name when conveying instructions to the tug and refrain from using the Tug Master's name. Prefixing the message with "on the (tugs name)" often ensures that transmission commences and the tugs name gets heard. This allows the tug

master to pick out their orders amongst multiple tugs. This will also assist the vessel's bridge team to understand what is going on.

5.5 Pilot Point of Embarkation- Tugboats' Readiness

The proposed Pilot embarkation area is located in way of the FSRU for LNGC coming from the anchorage area, hence no deviation is required minimizing the operational time needed for the LNGC to reach the FSRU; A certain distance shall be kept between the Pilot embarkation point and the FSRU to allow safe boarding conditions for the Pilot and it shall allow sufficient time and sea room to meet the requirements of the master- pilot information exchange. Three nautical miles of distance are deemed sufficient for these scopes.

Pilot embarkation/disembarkation operations, in general, shall also be compliant with IMO guidelines and or applicable international standards.

In Figure 5.5 a circle with radius equivalent to 3 nautical miles have been added and centered at the FSRU midship. The tentative Pilot Embarkation area may be chosen outside the circle, approximately between the edges of the military area and the ones of the anchorage area.

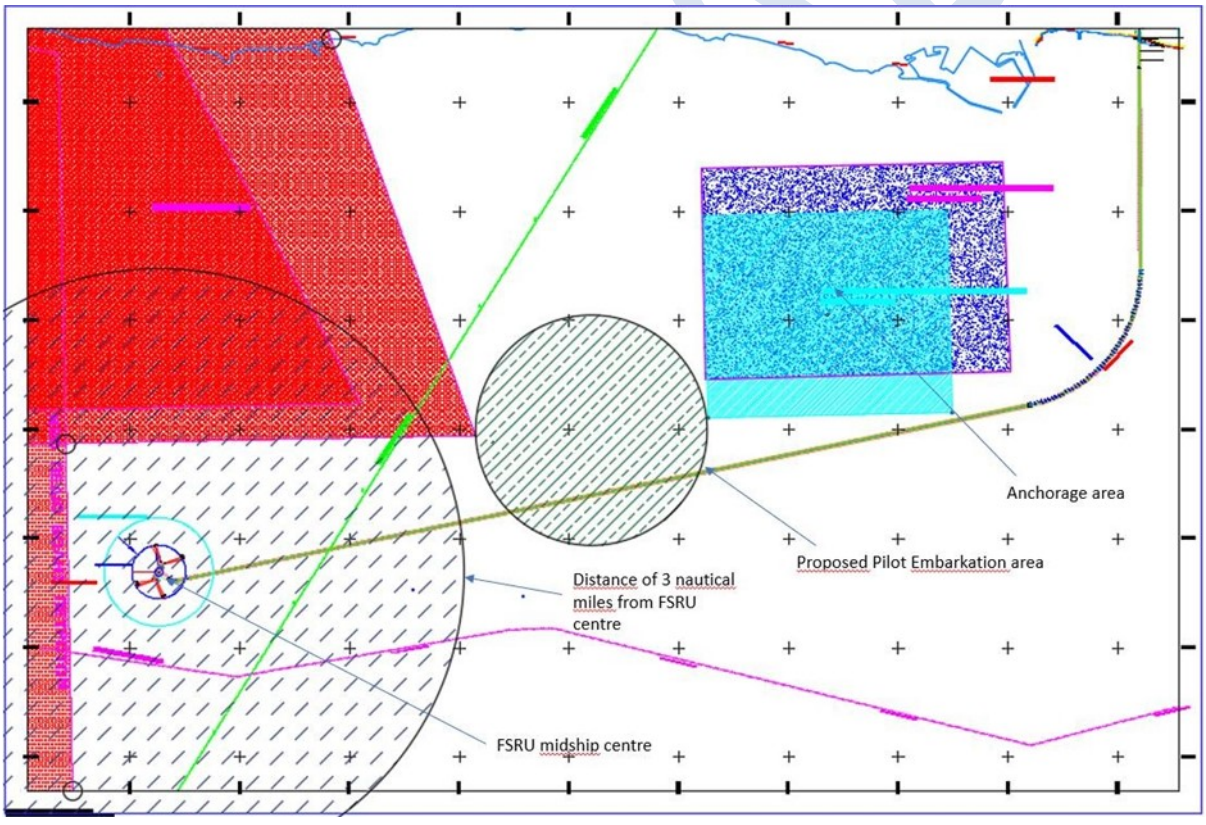


Figure 5.1: Visualization of the minimum distance to be kept from the FSRU and suggested PilotEmbarkation area

The tentative Pilot Embarkation area is indicative and not restrictive and it is at the marine pilot's discretion to determine a different location provided that the boarding point is at least at 3 nautical miles away from the FSRU. Indeed, the Pilotage Authority shall also give indications

about the safest location of the embarkation point within the proposed area or propose an alternative area and a dedicated embarkation point, in case the latter it is deemed safer.

The selection of a new position which determined by the pilot, notified to the master, the agent, the Terminal's Manager and the Maritime Authority, by communication on **channel 14**, approximately 1 hour before ETA of the LNGC at the rendezvous point.

The readiness of the tugboats and the rendezvous point with the LNGC is determined after consultation between the pilot and the tow master.

Pilot's disembarkation point, it may be properly defined in specific context e.g. port areas in channels. In the Alexandroupolis FSRU specific case, operations are in open sea and once unberthing is complete and safe Pilot may disembark at any suitable and safe location also taking into consideration factors as prevalent metocean conditions.

6. PILOTAGE

Pilotage LNGC to and from the Terminal is mandatory. Pilotage services only provided by Maritime Administration designated certified pilots.

Pilots serving the terminal must have received appropriate training and certification for STS procedures.

Strongly recommended to pay attention and establish guidelines on additional specific topics such as:

- Pilot-tug master exchange;
- best practice Do's and Don'ts for harbour towage;
- additional guidance on restricted visibility;
- guidance for assisted vessel crews;
- assisted vessel speeds;
- tug types;
- heaving lines;
- towing points and girting;
- interaction;
- escort towage;
- connecting and letting go;
- risk and hazards to consider; and
- pilot and tug master meeting discussion points.

Guidelines would be used to ensure that tug crews are appropriately trained and qualified. They should also include the need for tug crews to train with pilots. In particular, pilots and tug masters should conduct regular liaison meetings, safety workshops, visits including pilots tripping on tugs and tug masters accompanying pilots and all parties attending simulator training and refreshers together. Trips should cover as varied a selection of towage activities as possible

including escorting (where applicable). It is recommended that, at minimum, liaison meetings between facility representatives, pilots and towage operators take place every quarter.

Open reporting of incidents and candid exchanges are essential to gain maximum benefit from any lessons learned. The Pilots' guidelines potentially include bullet points for items to be discussed at liaison meetings including identification of good practice and improvements. Any accidents and near misses should be thoroughly reviewed and relevant reports discussed with changes to guidelines being made if necessary.

According to the National and International legislation, Pilot's suggestions and instructions to the Masters have advisory nature.

7. LIMITATIONS AND RESTRICTIONS

7.1 Exclusion Zone

A **500 meter radius** "Exclusion Zone" exists around the Terminal's outer limits (992m or 0.53nm from amidships in position Lat: 40°45'40.91"N, Long: 025°42'50.19"E) in which fishing and pollution (as ruled by MARPOL convention and/or national and local rules) are prohibited and navigation restricted (see 2.2). Access to the Exclusion Zone is restricted exclusively to LNG Carriers calling at the Terminal, mooring and service support vessels, either working for or authorized by the Terminal and Maritime Authority, as well as those vessels associated with law enforcement agencies. The Exclusion Zone is monitored by a dedicated guard-ship.

7.2 Environmental Conditions

7.2.1 Limiting Wind Conditions

A risk assessment should take place with respect to the safety of the commencement of operations if the prevailing wind and sea state exceeds 5 BF or 21 knots for a duration of more than 3 hours and Douglas sea state greater equal to 4. (no current condition towards NW and SE).

The following table shows the Beaufort Sea Scale and the parameters that accompany it.

Beaufort number	Description	Knots	m/s	Wave Height, m	What the sea looks like
0	Calm	0-1	0.0-0.2	0.0	Sea like a mirror
1	Light Air	1-3	0.3-1.5	0.1	Ripples without crests
2	Light Breeze	4-6	1.6-3.3	0.2	Small wavelets
3	Gentle Breeze	7-10	3.4-5.4	0.3-1	Large wavelets
4	Moderate Breeze	11-16	5.5-7.9	1.0-1.5	Small waves
5	Fresh Breeze	17-21	8.0-10.7	1.5-2.5	Moderate waves
6	Strong Breeze	22-27	10.8-13.8	2.5-3.5	Larger waves
7	Near Gale	28-33	13.9-17.1	3.5-5	Sea heaps up
8	Gale	24-40	17.2-20.7	5-6.5	Moderately high waves
9	Strong Gale	41-27	20.8-24.4	6.5-8	High waves
10	Storm	48-55	24.5-28.4	8-10	Very high waves
11	Violent Storm	56-63	28.5-32.6	10-13	Exceptionally high waves
12	Hurricane	≥64	≥32.7	≥14	Phenomenal high waves

7.2.2 Limiting Wave Conditions

Refer to Section 2.2.5 of Marine Operation Manual (M.O.M.).

The following table shows the Douglas Sea Scale Degree and the parameters that accompany it.

Douglas Sea Scale Degree	Height (m)	Description
0	No wave	Calm (Glassy)
1	0 – 0.1	Calm (Rippled)
2	0.1 – 0.5	Smooth
3	0.5 – 1.25	Slight
4	1.25 – 2.5	Moderate
5	2.5 – 4	Rough
6	4 – 6	Very Rough
7	6 – 9	High
8	9 - 14	Very High
9	14 +	Phenomenal

7.2.3 Limiting Current Conditions

Refer to Section 2.2.5 of Marine Operation Manual (M.O.M.).

7.2.4 Navigating in Restricted Visibility

When visibility is reduced the hazards associated with towage operations are increased.

There will be times when despite the docks or terminals being closed to vessel movements towage operations which have started may need to proceed to a conclusion.

These procedures apply to all towage operations which started prior to the onset of restricted visibility.

Restricted visibility is all circumstances where visibility is, or is expected to, reduce to a distance where the tugs normal ability to perform may be impaired. Such restrictions in visibility could be due to fog, mist, snow, rain, sleet or any other conditions which impair visibility.

In circumstances where restricted visibility exists, or is likely to exist, the Master/Pilot and tug master shall as part of the risk assessment process agree how the operation will be conducted, what dangers are associated with towing in restricted visibility and what risk reduction measures should be applied. When completing this assessment, the following should be considered:

- Type of tug, propulsion method, towing from winch or hook and location of winch/hook;
- Proposed method of towing;
- Operational status of navigational aids and equipment;
- Minimum speed to maintain steerage of vessel to be assisted;
- Movement of other vessels in the area;
- Navigational characteristics of the area including the use of information from Alexandroupolis Maritime Authority and the bridge officer of FSRU ; and
- Contingency plan should visibility deteriorate after the tow has commenced and/or if the tug must disengage at any stage of the operation.

Minimum visibility for all planned towage operations is **0.5nm**, and such that the Master/Pilot can see the tug and the tug master can see the towed vessel.

Should visibility fall below the minimum once a towage operation has commenced, and the pilot can no longer see the bow tug, he/she shall reduce speed to a minimum safe speed and if safe and appropriate to do so take all way off the vessel. Following discussion with the tug master the contingency plan discussed and agreed at the planning stage will be implemented.

If the options are not safe or practicable then as a last resort, with the agreement of all parties that it is the safest course of action, the operation can continue to completion. The agreed course of action should be fully communicated to Alexandroupolis Maritime Authority.

All towage operations in restricted visibility should be conducted with the assisted vessel maintaining minimum safe manoeuvring speed.

The tug master should immediately inform the Pilot/Master of any concerns that he may have as to the safety of his tug and crew. The pilot and tug master should take immediate action to ensure the safety of both the tug and assisted vessel; if necessary they should abort the operation as soon as it is safe to do so.

The tug master proceeding to a job and all parties involved in the operation should report any lack of visibility, immediately it is observed, to Alexandroupolis Maritime Authority and the vessel that they are rendezvousing with.

7.2.5 Conclusions and Recommendations

The Navigation Simulation Study concluded the following:

- The predominant current flows at 90 degrees across the FSRU to the SE and runs for extended periods of time (about 55 days per year) at greater than 1 knot occasionally above 2 knots.
- LNGC berthing and unberthing operations, to and from the FSRU, are not considered to be safe when the current speed is greater than 1.5 knots. The simulation runs demonstrated that control of LNGCs in conditions with 1.7 knots of current flowing towards the FSRU were such that, in the event of any failure, there would be almost no capacity for the Master/Pilot to avoid a hard (steel-to-steel) contact between the LNGC and the FSRU.
- In periods of slack current, the LNGC can safely approach, berth and depart the FSRU in conditions with NE or SE winds of up to 25 knots.
- With the currents flowing at up to 1 knot from either the SE or NW, the LNGC can safely approach, berth and depart the FSRU in wind speeds of up to 20 knots from either SE or NE.
- With the currents flowing at up to 1.5 knots towards the SE, the LNGC can safely approach, berth and depart the FSRU in wind speeds of up to 20 knots from either SE or NE.
- With the currents flowing at up to 1.5 knots towards the SE, the LNGC can safely approach, berth and depart the FSRU in wind speeds of up to 20 knots from W.

For more information refer to Section 2.2.5 of the Marine Operation Manual (M.O.M.).

7.3 LNGC's Approach Speed to the Tugs

When taking up the tow line, tug masters will ideally expect a speed of about **4 to 6 knots** through the water. This gives the necessary way to assist the tugs in manoeuvring close to the ship whilst also giving plenty of power in reserve should they have to break away. As the tug master is trying to balance the tug and able to pass the towline he is looking for a steady speed. If the pilot or Master requires to change the speed, e.g. to maintain steerage way, he must tell the tug master of his intentions before ordering a change to the engine speed.

The forward tug is especially vulnerable when passing up the tow line. This tug will position itself very close under the bow, sometimes under 1m from the ship's water-plane. The tug master will be concerned about any bulbous bow or other underwater protrusion, the proximity of the flare of the bow and other odd bits sticking out. At the same time, the tug master is fighting the hydraulic pressure wave that exists around the bow. The forward tug would be most disconcerted with a change of speed while passing up the tow. Alterations of course should also be avoided whilst connecting the tow.

7.4 Berthing/Mooring Approach

All maneuvering of LNG Carriers proceeding to and within the Exclusion Zone shall be conducted with appropriate care and caution at a speed and in a manner that shall not endanger the safety of other vessels or the Terminal.

When the LNG Carrier enters the Exclusion Zone, the Tugs must be connected to the forward and aft ends of the LNG Carrier as much as possible on LNGC center line. The berthing principle is to maneuver the LNG Carrier into a position parallel to the Terminal's berth at about 50 meters off. With the LNG Carrier stopped in this position, and by the use of the Line Throwing Apparatus, a connection will be established between the Terminal and the LNG Carrier in order that the first two mooring lines forward and aft (one breast and one spring respectively) can be passed from the LNG Carrier and connected to the Terminal's mooring hooks; then heaving on these mooring lines and with the support of the Tugs the LNG Carrier will maneuver alongside the Terminal's berth.

LNG Carriers will berth with their port side alongside to the Terminal's starboard side berth. The Terminal is provided with a berthing aid and mooring line tension monitoring systems.

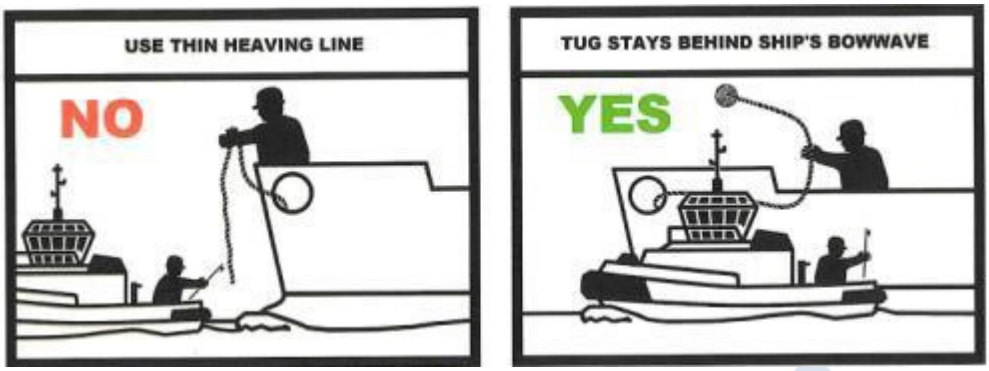
Berthing Aid System is available, from the Terminal to the LNG Carrier, that is linked to the Terminal by wireless telemetry during the berthing maneuver. This unit will, in LNG Carrier approach mode, display dynamic graphical data presentation of the LNG Carrier's speed, distance and longitudinal angle versus the Terminal.

To avoid damage to the Terminal's fendering system, the LNG Carrier should normally be landed squarely (in parallel) onto the Terminal's fenders with a contact speed **not exceeding 18 cm/second.**

7.5 Use of Heaving Lines and Line Throwing Apparatus

Crews of FSRU, vessels and tug boats are required to use properly constructed heaving lines for all mooring and towing operations. The use of 'dangerously weighted' heaving lines is both illegal and dangerous and may cause serious injury or even death to those on the receiving end ashore or onboard a tug or mooring boat.

To prevent personal injury to those receiving heaving lines, the 'monkey's fist' should be made with rope only and must not contain added weighting material. Safe alternatives include a small high-visibility soft pouch, filled with fast-draining pea shingle or similar, with a weight of not more than 0.5 kg. Under no circumstances is a line to be weighted by items such as shackles, bolts or nuts, or twist locks Additionally, vessels' mooring parties should always alert shore mooring gangs, tug crews or others in the vicinity prior to throwing a heaving line. Heaving lines with dangerous weighting, such as pieces of metal, are not to be used under any circumstances and, if used, appropriate action will be taken.



Pass the heaving line from the ship's shoulder

The use of any form of pneumatic, mechanical or rocket propelled line throwing device, for the passing of heaving lines or any other nonemergency application is strictly prohibited unless in a case of emergency (and then only when agreed with all parties involved).

7.6 Emergency Release

Most tugs are designed with emergency quick release systems which either trip the hook or release the brake on the towing winches so as to take the load off the towline and allow the tug some more time to regain control from a potential girting situation. These release systems are usually capable of being remotely activated from the bridge. There are also manual override arrangements available at the winch/hook in case of failure of the remote control. Crew members should familiarize themselves with these ship-specific arrangements, including limitations if any, as soon as they join the vessel. It must be borne in mind that these emergency quick release arrangements may not always release instantaneously due to various contributing factors such as the direction of pull, the heeling angle etc. and hence allowance must be made when contemplating its activation.

If a tug has any control issues either during the connection process or whilst connected they can emergency release the tow line. For the larger tugs this results in the winch freewheeling until the towline runs out completely, for the smaller tugs they simply drop the line. This will mean the tow line is left in the water and may still be connected to the ship. Is it important that if control of the situation cannot be regained by the tug concerned then they should inform "all stations" of the hazard now in the water. If the line is still connected to the ship, they should recover it onboard and if possible not release it to the water. Some tugs have a secondary tow line and providing their operational integrity is not compromised they can attempt to use this and regain operational control.

7.7 Berthing- Unberthing Alongside

For Berthing/mooring operations refer to Section 2.5 (Terminal Hours of Operation). Unmooring operations are carried out throughout the day and night time.

7.8 Anchorage Limits

According to the Special Port Regulation No 18 (G.G.6355/2023, Vol. B') issued by the Maritime Authority the limits of the Alexandroupolis port anchorage are defined by the coordinates:

A) Lat= 40° 49' 12'' N, Long= 025° 49' 21'' E

B) Lat= 40° 49' 12'' N, Long= 025° 52' 20'' E

C) Lat= 40° 47' 30'' N, Long= 025° 52' 20'' E

D) Lat= 40° 47' 30'' N, Long= 025° 49' 21'' E

Any arrival or departure from the anchorage properly reported to the Maritime Authority on VHF Ch. 12.

8. GENERAL REQUIREMENTS

8.1 Fire Fighting

The fleet of tugs serving the terminal has appropriate firefighting equipment and capability to support emergency and safety incidents. Depending on the firefighting equipment and capability of the terminal itself, the provision of external fire protection upgrades the level of safety and meets the criteria set by the terminal classification and the Presidential Decree 83/2022 (Gov.Gaz.Vol.A'229). In Chapter II, the topic of fire protection and firefighting provided by tugs is analyzed in more detail.

8.2 Oil Spill Fighting and Emergency Response Equipment and Materials

The fleet of tugs serving the terminal could be equipped with appropriate antipollution equipment and materials to support accidental marine pollution incidents, if provided for by the Facility Contingency Plan (F.C.P.). In relation to the antipollution equipment, material and capacity of the terminal itself, the existence of equipment also on the tugs raises the level of readiness and immediate intervention and meets the criteria set by the Maritime Authority's Act [Decision No. 1/2023 of Alexandroupolis Harbor Master (2262.3/946/2023/06-04-2023)] and the Equipment and Organization Table attached to it.»), the Ministerial Decision No. 2261.4-3/36177/2023 (Gov.Gaz. 3287, Vol B') and the Presidential Decree 83/2022 (Vol.A'229).

Antipollution equipment and means to support FSRU are shown below:

1. Oil Spill Booms

Suitable floating oil spill boom (for open sea) of an approved type according No. 3221.2/1/99 Ministerial Decision (Gov.Gaz. 76 B'/1999), with a total length of at least nine hundred (900) meters, with an overhang height of at least 0.40m. and draft of at least 0.65m.

2. Means of contemplation

To have an oil collection device/s, with a total suction capacity of at least 30 m³/h.

3. Chemical Dispersants

Suitable spraying device(s) of dispersants.

Two hundred (200) liters of 3rd generation Type 2 Chemical Dispersant (concentrated), with type approval, according to No.5219/Φ.11/4/2000 Joint Ministerial Decision (Gov.Gaz. 455B'/2000), with a dispersing capacity of twenty-seven times the volume of medium-viscosity petroleum products, or two thousand (2000) liters of 3rd generation Chemical Dispersant, type 3 (diluted), with type approval in accordance with the above JMD, dispersing capacity twice the volume of medium viscosity petroleum products.

4. Absorbent materials

Three hundred (300) meters of absorbent barrier of an approved type according to No. 1218.91/97 Joint Ministerial Decision (Gov.Gaz. 951B΄/1997), with an absorbent capacity of at least ten (10) times its weight in petroleum products.

Three hundred (300) kilograms of absorbent materials of an approved type in accordance with the above mentioned JMD, which are divided indicatively as follows:

Absorbent rolls with an absorbent capacity of at least fifteen (15) times their weight in petroleum.

Absorbent towels with an absorbent capacity of at least fifteen (15) times their weight in petroleum.

Absorbent pads, with an absorbent capacity of at least ten (10) times their weight in petroleum.

5. Means & materials for coastal cleaning

A sufficient number of buckets, bins and heavy-duty bags, so that it is possible to clean and collect the absorbent materials from the surface of the sea in pollution incidents.

6. Other means

One suitable motor boat for the transport of means and decontamination materials as well as for the deploying / recovery / towing of the boom.

For the emergency response planning and means of combating accidental pollution incidents, the Facility Contingency Plan (F.C.P.) is applied which has been competently approved. For further details see at Company's website.

8.3 Emergency Response Actions

The response to any incident will depend on the nature, location and severity of the event. The Terminal and the LNG Carrier must be directed by their respective Emergency Response Plans. The following contains bulleted immediate actions which are to be taken by the principal parties.

All Incidents

- LNG Carrier Related Incidents
    1. LNGC request tugs to be on standby and ready to provide assistance as required
    2. Terminal establish communications with standby Tugs
    3. Tugs: Go to immediate standby and initiate water spray or deluge systems as required- Await instructions from the Terminal Manager or the LNG Carrier's Master.
- Terminal Related Incidents
    1. After Terminal raise general alarm and initiate Terminal's Emergency Response Plan Request all Tugs and the Guardian Vessel to be on standby
    2. Tugs: Go to immediate standby and initiate water spray or deluge systems as required- Await instructions from the Terminal Manager or LNG Carrier's Master.

Specific Incidents

- Oil Spill from LNG Carrier (in conjunction with the initial actions)
    1. Standby Tugs prepare to assist
    2. Stand by upwind until nature and type of spill has been established
    3. Dedicated tugs to start anti-pollution activities as directed by the Terminal Manager according to FCP actions.
- Uncontrolled release of LNG Vapor or Liquid from LNG Carrier / Terminal (in conjunction with the initial actions)
    1. Standby Tugs and the Guardian Vessel to activate firefighting and deluge systems
    2. Stand well clear upwind
    3. Await instructions from Terminal
    4. Secure all ignition sources
    5. Impose total smoking ban.
- LNG Carrier Collision within Exclusion and Monitoring Zones (in conjunction with the initial actions)
    1. Standby Tugs to respond as directed by the Terminal Manager or LNG Carrier Master
    2. Guardian Vessel to act as directed by Terminal Manager.
- Man overboard incident within the Exclusion Zone (in conjunction with the initial actions)
    1. Direct Guardian Vessel to rescue man overboard
    2. Standby Tugs and the Guardian Vessel to respond as directed by Terminal Manager or LNG Carrier's Master.
- LNG Carrier Out of Position (in conjunction with the initial actions)
    1. LNGC's preparation for Tug connection and unmooring of the LNG Carrier, including emergency unmooring

2. Terminal's preparation for release of LNG Carrier, including emergency release
3. Tugs proceed to LNG Carrier and prepare for connecting towlines- Await instructions from LNG Carrier's Master for un-berthing operations- Guardian Vessel to respond as directed by the Terminal Manager.

All the above indicative (and not limiting) cases are under the full control and command of the Maritime Authority which oversees the implementation of the emergency plans by the parties involved, and is assumed to be the competent authority for the protection of human life, property and of the marine environment. Coast Guard personnel, means and assets involved in maritime operations have the status of "on scene command".

For more information refer to Section 8 of the Marine Operation Manual (M.O.M.).

8.4 Records Keeping

As a minimum the tug should keep a towing log as well as other logs and records required by the flag state. It is important that good records are maintained. In the event of an incident these are referred to in detail and are important in supporting the tug master's description of events and defending a Member's position in the event of a related claim.

The Maritime Authority must be provided with a file folder from each tugboat, which will contain all the necessary certificates, documents, plans, studies, manuals and crew list under the responsibility of the ship owner or Management Company. The master of each tug must inform of any change by providing the necessary information to update the file folder.

8.5 Licenses and Permits

- Towing vessels must be equipped with a Port Authority certificate of legal requirements for carrying out towing operations, in accordance with the applicable provisions.
- The owners and masters of the tugboats are obliged, in the context of their duties, to accept and transport with their vessels (when requested or when emergency arises), Officers of the Hellenic Coast Guard during the performance of their duties, as well as the employees of the Pilotage Service, according to the performance of their duties.
- The owners and masters of the tugboats when the vessels are not in operation in the port, they comply with and apply the port regulations in force by the Hellenic Coast Guard, the regulations of the Alexandroupolis Port Authority and cooperate with the competent bodies. They are under the supervision and control of the Maritime Authority and the Hellenic Coast Guard.
- The transportation of cargoes and persons/crew by tugboats is prohibited. Under conditions and only with the permission of the Maritime Authority, it is possible to carry out the transport of cargo or persons/crew. Only Crew Transfer Vessels (CTVs) or Supply Vessels (autonomous or mixed type) that have the relevant license and certificates may

perform the above operations (Ref, Ministerial Decision No: 2133.1/76490/2018, Of. Gaz.4931, Vol, B').

- In the designated berthing area at the port of Alexandroupolis (land and sea), the provisions of the ISPS Code and the specialized security measures are applied in accordance with the Port Facility Security Plan (PFSP). No person (even the crews) without relevant accreditation and registration may enter the security zone and board the tugs. The reverse process also applies. In any case, cooperation and compliance with the instructions and suggestions of the Port Facility Security Officer (PFSO) and the Ship Security Officer (SSO) is mandatory.

8.6 Tug's Contingency Plan

The towing vessels operating on standby at the facility must have an appropriate emergency response plan, keeping relevant documentation on board which includes the following:

a) "Contingency Plan" for dealing with emergency incidents in accordance with par. 6.2 of the directive of the IMO MSC/Circ .884/21.12.1998 (4124.11/03/2007/21.05.2007 Decision of the Minister of Merchant Shipping on the subject of ¨General Directive on the Mandatory Application of IMO requirements to Shipbuilding/Conversion Greek ships¨).

b) "Risk Assessment" to ensure the occupational health and safety of seafarers, taking into account for this purpose the IMO guidelines on the "Essential Elements of a Shipboard Occupational Safety and Health Programme (SOHSP)", as well as the International Labor Organization (ILO) Code of Practice entitled "Prevention of Accidents on Ships at Sea and in Port".

c) The training received by the tugboat crews,

under the responsibility and care of the managing or ship-owning company and the master, prior to the execution of any operation.

8.7 Design, Construction and Structural Strength

The design and construction specifications of the tugboats are as follows:

a) tugboats of 24 meters in length and above (LLL≥24m) meet the standards and requirements of a Recognized Organization (Classification Society), in combination with those defined in the applicable international bodies and in the current national regulatory framework for monitoring shipbuilding, retrofitting, repairs and inspection of commercial ships , depending on the date of mooring, type, characteristics, class of vessels and towing operations they perform in terms of design, construction, construction materials and maintenance of the vessel, main and auxiliary engines , electrical and automatic installations, towing equipment and safety devices, habitats, rescue and firefighting equipment, marine and telecommunications equipment as well as other constructions, equipment and installations.

b) tugboats under 24 meters in length (LLL<24m) comply respectively with the relevant provisions of the applicable national regulatory framework on monitoring shipbuilding, retrofitting, repairs and inspection of commercial ships, depending on the date of mooring, type, characteristics, the class of vessels and towing operations they perform.

8.8 Safe Towing Procedures Manual

a) For the safe performance of all types of towing operations of a towing vessel, under the responsibility of the managing or ship-owning company, a "Safe Towing Procedure Manual" is drawn up by a responsible naval architect, in accordance with the relevant regulations and the instructions of a recognized Classification Society, as well as the general IMO guidelines for this purpose.

b) The "Safe Towing Procedures Manual" is approved by the competent body issuing the Bollard Pull Test Certificate and includes, among others:

- certificates of seaworthiness and other shipping documents,
- bollard pull test certificate and pulling force measurement report,
- stability booklet with accompanying drawings and instructions,
- hoist means inspection book,
- category of towing operations (port, coastal or offshore), details of vessels, seasonal period and duration of operations,
- resistance force calculations of the towed vessel for the cases of mooring or unmooring at the terminal,
- assumptions and other limitations concerning towed vessels,
- risk assessment report as well as the contingency plan,
- planned maintenance system (P.M.S.) of the towing equipment and gear.

8.9 Safe Manning

The Presidential Decree No.232/2005 (Gov.Gaz. Vol.A' 280) defines the minimum safe manning for harbor tugboats (**Ref**. Flag State and national legislation and Collective Labor Agreement as applicable). The ship-owners and the masters of the tugboats are obliged, as they apply the current legislation, to man the ships with certified and well trained according to rank and specialty.

8.10 Shipboard Working Arrangements

a) The Presidential Decree 152/2003 "organization of timework of seafarers, in compliance with the Directives 1999/63/EC and 1999/95/EC" (A' 124), as amended by Presidential Decree 171/2014 "Adjustment of the National legislation in Directives 2009/13/EC (L 124) and 2013/54/EU (L 329)" (Gov.Gaz. Vol.A' 268)

b) The Collective Labor Agreement, as applicable at any time requires that: a record (table) of the staff's daily rest hours is kept by Tugboat's Master, the content of which shall always be available to the crew to be informed and for inspection by the competent authorities for the period of the previous eight (8) days.

c) IMO MSC/Circ.1014/12 June 2001 "GUIDANCE ON FATIGUE MITIGATION AND MANAGEMENT"

d) IMO MSC.1/Circ.1598/24 January 2019 "GUIDELINES ON FATIGUE"

e) IMO "Guidelines for the Development of Tables of Seafarers' Shipboard Working Arrangements and Formats of Records of Seafarers Hours of Work or Hours of Rest"

f) STCW regulation VIII/1 (Fitness for Duty) provides that each Administration shall, for the purpose of preventing fatigue:

- establish and enforce rest periods for watchkeeping personnel and those whose duties involve designated safety, security and prevention of pollution duties in accordance with the provisions of section A-VIII/1 of the STCW Code; and
- require that watch systems are so arranged that the efficiency of all watchkeeping personnel is not impaired by fatigue and that duties are so organized that the first watch at the commencement of a voyage and subsequent relieving watches are sufficiently rested and otherwise fit for duty.

g) The Maritime Labour Convention (MLC 2006). The Convention is split into three parts – Articles, Regulations and the Code (Part A and B). The Code details provisions of the Convention contain two parts – mandatory Part A and advisory Part B. The provisions cover different aspects:

- Minimum requirements for seafarers to work on a ship
- Conditions of Employment
- Accommodation, recreational facilities, food and catering
- Health protection, medical care, welfare and social security
- Compliance and enforcement.

8.11 Authorities- Hellenic Coast Guard: Legislation, Regulations, Directives, Recommendations and Orders- Conflict of Implementation

Tug masters strictly apply the Special and General Port Regulations, the orders of the Harbor Master and the Port Authority and the provisions of other Authorities. For this reason, they are in constant contact with the competent Officials to resolve any issue that arises or concerns them.

Tug masters shall apply the contractor's internal operating procedures and instructions, as long as they do not conflict with the existing legal framework and the provisions of this regulation. Any

proposal to amend or improve the Regulation and its procedures shall be submitted in writing to the company for evaluation.

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CHAPTER II

EXTERNAL (OFFSHIP) FIRE FIGHTING REGULATION

1. GENERAL INFORMATION

Class specifies rules for vessels that are intended to be primarily engaged in firefighting operations on offshore installations. The vessel's firefighting capabilities, its stability and its ability to maintain station while firefighting monitors are in full operation, and the degree of the vessel's self-protection against external fires, are dealt with in the rules. Vessels not in full compliance with these rules or not specifically built for the service intended to be covered by these rules, but which have some firefighting capability in addition to their regular service, may be designated as 'FF capable'.

There are three categories of FiFi classifications, each of which signifies the number of monitors, their capacity and throw, pump capacity, foam requirements, etc. In the case of FiFi class 1, a vessel must have a minimum of two firefighting monitors capable of throwing water 120 m from the vessel to a height of 45 m, along with one or two fire pumps. A vessel with a FiFi 2 class notation has two to four monitors, with a minimum throw length of 150 m and height of 70 m, with two to four fire pumps. A FiFi 3 class vessel must have three to four monitors with a throw length of 180 m and two to four fire pumps. Monitors are controlled from the wheelhouse.

ABS says FiFi 1 needs a permanently installed water spray system; FiFi 2 and 3 are expected to have mobile, high expansion foam generators in addition to water monitors. FiFi 3 is to have two fixed, low-expansion foam monitors in addition to the required water monitors.

FiFi 1 are typically first responders and FiFi 2 and 3 are for longer-term engagement. The FiFi class notation does not mean any change of other class notifications in case of a retrofit, provided there are no changes to other systems or equipment. However, this must always be confirmed by the class society.

A separate prime mover would not be required if the vessel has a power take-off (PTO) option, in which the main engine provides power for propulsion as well as other loads. If no PTO option is installed, then a vessel may require separate diesel engines, two 700 kW for FiFi 1 or two 1,600 kW for FiFi 2. For FiFi 1, the prime mover, along with the controls and auxiliaries, can be packaged and installed on deck.

Available power is critical for a vessel to conduct firefighting operations safely. FiFi class rules have strict requirements for how much power is available for manoeuvring when firefighting is ongoing. Typically, 20% of total engine power must always be available for station keeping and manoeuvring when the ship is conducting firefighting operations. If this requirement is not fulfilled there could be a problem conducting safe firefighting operations.

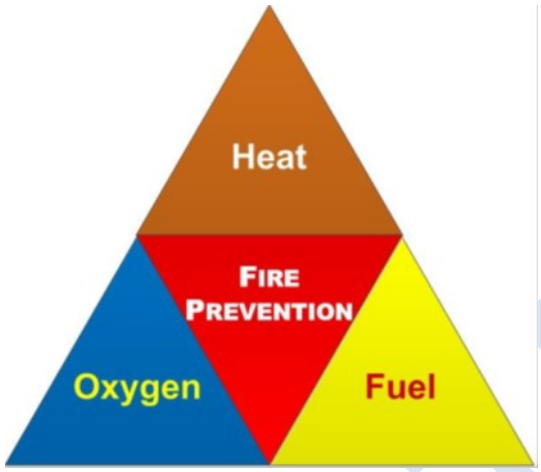
Another key aspect is the reaction force from the monitors. The vessel should have enough propulsive power so that the reaction force is not greater than 80% of propulsive power, as per ABS rules. If the reaction force as a percentage of propulsive power exceeds 80%, then an alarm may be sounded. Automatic reduction of power action at 100% of available propulsion power will be required to prevent sudden or complete loss of power due to power overload. The reaction force of monitors is calculated for each individual vessel so as to ensure that station keeping is confirmed according to class.

Independent sea suction will need to be provided for each fire pump; according to ABS, this should be low sea suction. "The sea inlet for the FiFi pumps must follow certain requirements for dimension to secure sufficient flow and water velocity. Normally, the maximum is 2 m/sec and the area of seaside inlet holes should be at least two times the area of pump inlet.

Among the equipment that might be fitted by the owner for firefighting operations is an air compressor to provide air for the self-contained breathing apparatuses for the responders. Such vessels can do double duty. The FiFi is in no conflict with other abilities of the vessel and is always additional to other notations.

Class Notation	FiFi1	FiFi2			FiFi3	
No. of Monitors	2	2(DNV)	3	4	3	4
Monitor capacity (m^3/h)	1200	3600	2400	1800	3200	2400/2500
No. of Pumps	1 - 2	2	2 - 4		2	2 - 4
Total Pump capacity (m^3/h)	2400	7200	7200		9600	9600/10000
Throw Length (m)	120	180	150		180 From Bow	150
Throw Height (m)	45	110 at 70m	70		110 at 70m	70

Figure 1 International recognized typical class notations for marine systems



Fire Elements:

Fuel
Air
Source of Ignition

Types of LNG Fires:

- Flash Fire/Vapor Cloud Fire
- Jet
- Pool
- Boiling Liquid Expanding Vapor Explosion (BLEVE) [N/A]
- Rapid Phase Transition (Is not a fire- Occurs when liquid comes in contact with water- LNG vaporizes violently- Rapid phase change from liquid to vapor- Physical or cold explosion- No combustion- Hugh amount of energy is transferred in the form of heat from the ambient temperature water to the cold LNG)

2. TUGBOATS' FIREFIGHTING CAPACITY AND CAPABILITY

The fire-fighting capability of tugboats is certified by the government certification body, in accordance with the standards and regulations of the Recognized Organizations (Classification Societies), depending on the more specific requirements that they define and mainly concern the following:

- the number of water monitors,
- the water supply/monitor,
- the number of fire pumps,

- total delivery of fire pumps,
- distance of water/nozzle discharge,
- fuel capacity for continuous operation,
- number of fire fittings,
- number of hoses on each side of the ship,
- foam fire extinguishing system,
- foam supply generator installation,
- number of foam nozzles,
- foam supply/nozzle,
- duration of continuous foam supply,
- towing vessel and crew self-protection system.

3. SPECIAL FIREFIGHTING EQUIPMENT REQUIREMENTS

Tugboats supporting LNG installations must have the minimum fire-fighting requirements provided for in Article 11 paragraph 1 (a), (b) and (c) of Presidential Decree 83/2022. As long as it is established by the entity that owns the operation and management of the facility that the necessary number of tugboats is not available, in accordance with the minimum firefighting requirements provided at any time, to support them as well as the ships they accept, tugboats with firefighting equipment may operate in accordance with the requirements of Presidential Decree 379/1996, exclusively for ship mooring and unmooring operations. Tugboats operating as standby tugs must have the prescribed minimum fire-fighting requirements of paragraph 1 (a), (b) and (c) of article 11 of Presidential Decree 83/2022.

4. THE FACILITY (FSRU)

The installation, as a static shipbuilding, has all the certified fire detection, fire safety and fire extinguishing provisions provided for by National and International legislation. The crew and personnel on board have received the appropriate training and certification to deal with fire incidents with the own means of FSRU. The execution of exercises and drills based on a program and different scenarios is foreseen. A copy of FSRU's Fire Plan is available to the Company, Maritime Authority/Coast Guard, Fire Service and Port Captain.

5. EXTERNAL (OFFSHIP) FIRE FIGHTING SUPPORT

The installation for dealing with immediate and emergency fire situations is supported by the tugboats that operate exclusively in it. The characteristics of dedicated tug boats are shown in the tables below:

Tugs max bollard pull / KW:	
SVITZER ELMINA	**85 tons / 2 x 2560 KW**

SVITZER EVROS	**85 tons/ 2 x 2560 KW**
SVITZER KIKONAS	**80 tons / 2 x 2100 KW**
SVITZER ORFEAS	**80 tons / 2 x 2100 KW**

GENERAL

DESIGN	Robert Allan Ltd. RAstar 2800
BASIC FUNCTIONS	Towing, pushing, escorting, mooring, firefighting
	LNG Compatibility
CLASSIFICATION (RINA)	C ✠ HULL ✠ MACH
	ESCORT TUG, UNRESTRICTED NAVIGATION
	FIREFIGHTING SHIP 1 WITH WATER SPRAYING
	AUT UMS, INWATERSURVEY
	OIL RECOVERY SHIP, FLASHPOINT > 60°C
CLASSIFICATION (ABS)	✠ A1, ✠ AMS,
	ESCORT VESSEL, FIFI 1, OIL RECOVERY VESSEL
	UNRESTRICTED NAVIGATION, QR, UWILD

DIMENSIONS

LENGTH O.A.	28,40 m
BEAM	13.00 m
DEPTH	5,40 m
DRAFT BASELINE	4,10 m
DRAFT EXTREME	5,70 m
GROSS TONNAGE	< 500

PERFORMANCES

BOLLARD PULL	85 tons
SPEED	12.5 knots (approx.)

PROPULSION SYSTEM

MAIN ENGINES	MTU / 16V4000M65L 2560 kW @ 1800 rpm
EMISSION STANDARD	IMO Tier II (IMO Tier III Ready)
AZIMUTHING STERN DRIVE	KONGSBERG US 255S FP, TK NOZZLE
	with HD slipping clutch for FIFI 1
PROPELLERS	2800 mm diameters
SHAFTING	Composite Shafts

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DRAFT BASELINE	4,10 m
DRAFT EXTREME	5,70 m
GROSS TONNAGE	< 500

PERFORMANCES

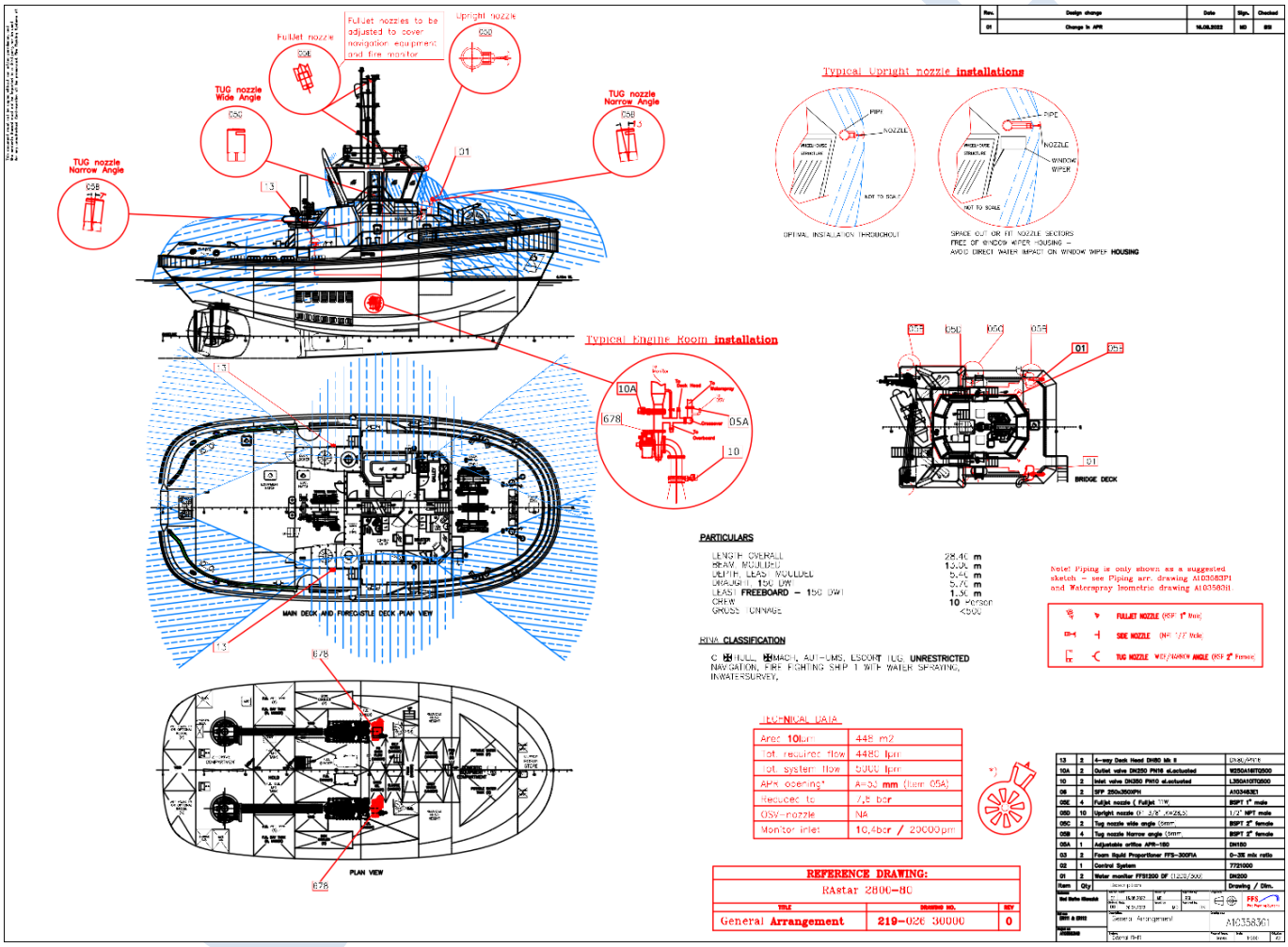
BOLLARD PULL	80 tons
SPEED	12.5 knots (approx.)

PROPULSION SYSTEM

MAIN ENGINES	CATERPILLAR / 3516E 2100 kW @ 1600 rpm
EMISSION STANDARD	IMO Tier II (IMO Tier III Ready)
AZIMUTHING STERN DRIVE	KONGSBERG US 255S FP, PD NOZZLE
	with HD slipping clutch for FIFI 1
PROPELLERS	3000 mm diameters
SHAFTING	Composite Shafts

The firefighting capacity and performance of the above units is shown in the table below:

- Pump capacity 1350m3 /h
- Pump power 558kW
- Monitor Capacity 1200m3/h
- Foam Tank capacity 6m3.
- Foam supply duration with 6% foam mixing ratio, 20 minutes. (300liters foam/minute).
- Throw length/height: >120 m / 50 m
- Rotation: 300 degrees
- Classification Rina



6. FIRE FIGHTING OPERATIONS

Once a fire emergency occurs at the facility, the internal emergency plan is implemented and the tugboats that support it are set on standby and initiate water spray or deluge systems as required- Await instructions from the Terminal Manager.

Actions- LNGC alongside

- ESD operation

- Cryogenic Hoses emergency releasing operation
- Mooring systems emergency releasing operation
- Emergency towing wires (fire wires) connected to tugboats
- Emergency unmooring operation (number of tugboats using depends on environmental conditions and the displacement of LNGC- rest remain on st'by near to FSRU)
- LNGC clear at safe distance
- Tugboats return to the site of incident to immediate standby and initiate water spray or deluge systems as required
- In the event that external firefighting assistance is required, tugboats carry out the FSRU Master's orders to concentrate firefighting efforts in coordination with The Maritime Authority/Coast Guard and Fire Service
- The Maritime Authority/Coast Guard is sending additional forces to the site and is responsible (coordinator) for SAR operations for persons in danger at sea
- When a fire-fighting vessel of the competent authority is dispatched to the scene, all engaged vessels are placed under the operational control of its captain.

Actions- No LNGC alongside

- Tugboats to the site of incident to immediate standby and initiate water spray or deluge systems as required
- In the event that external firefighting assistance is required, tugboats carry out the FSRU Master's orders to concentrate firefighting efforts in coordination with The Maritime Authority/Coast Guard and Fire Service
- The Maritime Authority/Coast Guard is sending additional forces to the site and is responsible (coordinator) for SAR operations for persons in danger at sea
- When a fire-fighting vessel of the competent authority is dispatched to the scene, all engaged vessels are placed under the operational control of its captain.

ANNEX A

TYPES OF TUGBOATS- FEATURES AND BENEFITS

GENERAL

There are several types of towage operations undertaken each of which brings its own challenges and risks. These can be summarised as:

- Ship Assist Towage or assisting vessels under way, typically during entering or leaving and/or shifting berth within a harbour;
- Dead Tows or assisting vessels without propulsion including, but not limited to; barges, pontoons, dredgers, rigs which typically involves vessels entering and leaving harbour being towed by a sea-going tug or other vessel;
- General Towage including towage of smaller barges, pontoons, rigs normally within harbour limits and marine construction equipment; and
- Project Towage including unusual events which require special consideration.

Towage can be undertaken utilizing several different methods and in many differing configurations including over the bow, over the stern, pushing, pulling, using long or short towlines, fixed or adjustable lengths, with or without towing bridles, lashed alongside ("hipped up") and using single or multiple tugs.

The choice of method will depend on the type/size of the assisted vessel and type/size/capability of the tug or workboat. The tug master and crew must be suitably qualified and experienced and are competent to not only to conduct the manoeuvre but also advise if the plan and/or its execution is unsafe.

The facility (after carrying out an appropriate study and simulation) provides towing services with specialized tug boats that have the most suitable and up-to-date specifications for achieving safe mooring and unmooring of LNGCs.

Four (4) ASD tugboats meet all the requirements for servicing the LNGCs and the facility.

Azimuth Stern Drive (ASD) (Z-peller)

ASD's (see Figure 1) have azimuth propulsion units in place of conventional propulsion; these enable the propeller and its associated nozzle to rotate about its vertical axis (360° rotation). The position of the propulsion units is identical to that of a conventional twin-screw tug. Just as with a twin-screw tug, these propulsion units can operate independently, making it possible for the tug to move forwards, backwards, sideways and turn around its own axis with great precision. ASD tugs can tow over the bow (see figure 2), normally from a bow winch, which is typical when operating in a Push/Pull mode or when fast on the center-lead.

Figure 1: Azimuth Stern Drive.

Benefits	Limitations
High powered, agile tugs which can deliver responsive power in all directions. Very effective when used as a brake on the stern of a ship, particularly at higher speeds.	Can be used as a bow to bow tug but lower ship speeds are essential to reduce the water forces and pressures around the ships bow. This gives the tug more directional stability whilst operating stern first.

Typical bollard pull vector diagrams for the various types of tugs are shown below. The length of the vectors indicates the "power" that can be provided in the direction of the vector.

Green: Conventional twin screw tug (with or without bow thrusters) – fixed propellers on horizontal shafts.

Red: Tractor tug - their diagram is much more "distributed" in all directions, with some more power delivered ahead and astern.

Blue: Azimuth Stern Drive tug - when moving sideways, the thrust in that direction is reduced considerably.

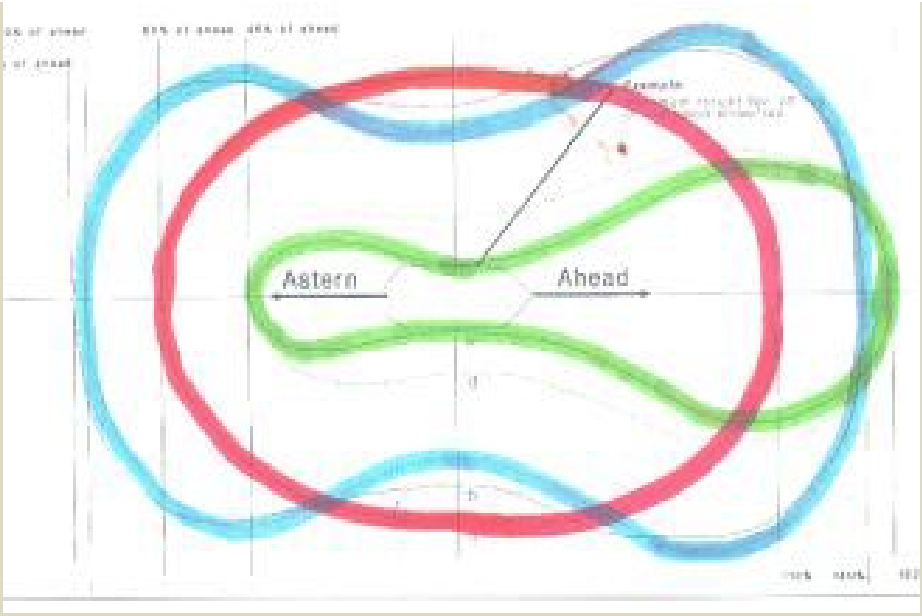


Figure 4: bollard pull vector diagrams

The characteristics of dedicated tug boats are shown in the tables below:

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	LNG Compatibility
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GROSS TONNAGE	< 500

PERFORMANCES

BOLLARD PULL	85 tons
SPEED	12.5 knots (approx.)

PROPULSION SYSTEM

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	with HD slipping clutch for FIFI 1
PROPELLERS	3000 mm diameters
SHAFTING	Composite Shafts

The bow fendering system having a large surface of impact, is providing a safe and non-damaging interface between the tug and the vessel. Fendering system has also water lubrication system, so to reduce the friction between the tug and the LNGC Hull. The Fendering pressure is around 20 tons/m^2.

ANNEX B

GIRTING

Ship's Masters, Pilots and Tug Masters must have a clear understanding of girting and its consequences. Girting happens when the towline comes at right-angles to the tug. The tug is pulled bodily through the water by its tow, which can lead to deck-edge immersion, flooding and capsize; unless the towline is released in time. It can occur very rapidly and it should not be assumed that the winch will pay out or that the towline will part before capsizing occurs. It can happen at the forward as well as at the stern of an assisted vessel. A conventional tug is particularly vulnerable and, being less manoeuvrable, it may be impossible to extract from a problematic situation. Girting may occur because:

- The assisted vessel turns abruptly and without warning away from the tug;
- The speed of the vessel is too high; and
- The tug is too far astern of its intended position, compared to the speed of the vessel.

Use of Gog Rope to Prevent Girting in Tugs and Workboats

This brief guide extracted from National Workboat Association "The Use of Workboats for Towage - Good Practice Guide" is intended as an aide memoire for conventionally propelled tugs and workboats in the safe use of gogs and gogging arrangements (otherwise known as bridles or gobs) in the prevention of girting.

Girting can occur when the tug is attached over her stern with a towing line from a hook or winch and is dragged astern at a speed through the water which prevents being able to manoeuvre and so brings the tow line over the side of the tug and the consequent heeling moment either capsizes her or pulls her over until down-flooding and sinking occurs. Trials and experience show that this can occur at speeds lower than 3 knots, depending on tug size, sea state, propeller wash and other factors and smaller workboats are particularly vulnerable.

Incidents have occurred in the workboat industry when a workboat has been at the opposite end of the tow to a larger and more powerful sea or harbour tug, where the imbalance in power and manoeuvrability (particularly if a modern tractor harbour tug is on the other end of the tow) means that the workboat can easily become overpowered by the other tug, and Masters should always be aware of the dangers of this potential imbalance when assisting tows or being assisted with their own tow.

Masters of modern manoeuvrable workboats can be overconfident of the ability of their vessel and themselves to withstand such forces until it is too late, there are sufficient well documented incidents to show that caution is always required.

Girted tugs have frequently been lost due to not following the basic, well promulgated and seamanlike precaution of ensuring that all appropriate hatches, doors and vents are closed before undertaking a towing manoeuvre, due to the possibility of very quick down-flooding through such openings when the tug starts to heel to larger angles.

If the tug may be put in a position where girting is possible at any stage during the planned towing manoeuvre, all such precautions must be taken.

It should be noted that some workboats are built without the necessary deck fittings required to attach an effective gog, and should therefore never be used in a situation where there is any risk of girting until they are suitably modified.

The necessity for towing over the stern at all should be considered bearing in mind that many tug/workboats can provide useful manoeuvring assistance by being the stern tug with the towing line rigged from the tug's bow with up to 60% of the ahead BP being available with the engines astern, or alternatively by being made fast alongside (hipped up) or indeed close coupled as a pushing/stern tug, all of these providing a safer and perhaps more appropriate alternative.

Trials have shown that the forces applied on a gog can exceed 70% of the BP of the tug, so the strength of the gog and fittings must be commensurate with the forces that may be applied, bearing in mind that parting of the gog or failure of a fitting will have an instantaneous and severe effect on the tug. All parts of the arrangement must therefore be maintained in good condition and regularly inspected. The point of attachment of the gog on the tug must be on the centreline and as close to the after end as possible. The gog may be attached to the towing line by shackle if there is a suitable connection in the towing line in the right location, but if it is attached by having a riding saddle over the tow line this should preferably be in the form of a saddle rather than a shackle bow to prevent bending the tow line round a small radius.

If the gog cannot be heaved in under load, it must be secured hard down at the start of operations and only released once the danger of girting has passed (e.g. when the tow is close to the berth and the speed of the tow is suitably slowed).

Trials and experience have shown that the dangers of girting are high when the speed of the tow approaches 3 knots and above, but that they can occur at lower speeds, particularly with smaller vessels and with the effect of environmental factors such as propeller wash, tidal effects and sea state.

Experience also shows that if a girting situation starts to develop it will do so extremely rapidly so tug masters and crews need to be practiced in releasing the tow under load when the tension required to release the tow hook may be much higher than expected, or at least be aware of the extra force that will be required if practice trials have only been done with minimal load on the hook.

Communication between the tug master(s), vessel/tow master and/or pilot must be clear and concise, leaving no room for misunderstandings to develop, bearing in mind that each party sees it from their own perspective and that may be very different from that of others. Before the

operation commences all must be clear about the intended sequence of events and must raise any issues of perceived risk or potentially safer ways of operating. Any necessary changes to the plan during the operation must be clearly communicated to all parties and acknowledged as understood.

The most difficult decisions to be taken by the tug master concerning the use of a gog may be the requirement to have it slack so as not to interfere with the necessary manoeuvring ability of the tug, and therefore the ability to properly assist/control the towed vessel, but then to be sure of having it snugged down or of being safely released from towing duties when the towed vessel's speed increases towards 3 knots or more. This can occur, for example, when acting as stern tug in assisting a ship from a berth when the ship is clear of the berth and starts to come ahead and make way with the tug still attached.

In these circumstances, the tug must be able to release from the tow before the ahead speed generated starts to build up, thus putting the tug in danger of girting, or must be able to be gogged hard down if the tug is required to remain attached, for example if the ship is shifting berths within the port.

Clearly if the tug lacks a gog winch it will be very difficult to safely harden it down, and if the tug is using her own towing gear it is not easy to manoeuvre effectively to enable the tow line to be released by the ships' crew.

Another dangerous circumstance arises if the tug is acting as a head tug and the towed vessel starts to overtake it, either because it is a ship and needs to make way for any reason and so applies power, or when the tow is non-propelled. This can happen either because the tow has built up speed and then does not respond quickly enough to the slowing down or alteration of course of the head tug, or because of another tug is pushing or towing alongside and adding power.

This is especially dangerous when the head tug is on a very short towline: If it is too short to allow the tug to move to the side of the tow, perhaps in the case of a square bowed, wide barge, so that the stern of the tug contacts the tow and gets run over, or with any tow where the towline length is insufficient to allow the tug to make a required alteration of course and/or speed while allowing the space for it to take effect on the tow.

Since the head tug must be able to move from side to side to control the heading of the tow, a gog would increase the dangers to the tug unless slack enough to allow the necessary manoeuvring room.

As always, the tug should avoid trying to make any sharp turn with the tow and keep the towing speed low to avoid dangerous circumstances arising.

There is not always a simple answer to these risks, so they must be clearly understood and allowed for in the planning of the tow between the tug master(s), pilot and master of the towed vessel 15. If a tug is to make fast stern first to a tow under way, the normal safe operational sequence would be as follows:

- When the speed of the tow has been reduced and it is safe to do so, run alongside the stern quarter on the lee side of the tow and come alongside, holding station by maintaining the same speed as the tow and keeping the helm slightly towards the tow;
- Pass up (or take down from the tow if they have a suitable towline) the towline to the stern of the tow, make fast, rig and secure the gog hard down;
- When the towline is fast and the gog rigged, move ahead slowly, remaining alongside the tow, until the towline is under tension;
- When the speed of the tow is sufficiently reduced through the water and the pilot/tow master is ready, start to move slowly away from the tow while maintaining tension on the towline by easing the helm slightly away from the tow;
- The tow will move ahead and the tug will come around in an arc until astern of the tow; and
- Do not slack off the gog until the ahead motion of the tow is sufficiently slow to allow the tug to manoeuvre safely with a slackened gog without risk of girting.

ANNEX C

TOWING IN ADVERSE WEATHER CONDITIONS AND IN RESTRICTED VISIBILITY

1. When towing in adverse weather, hazards associated with towage operations are increased.
In circumstances where heavy weather (i.e. high winds and/or heavy swell) exists, or is likely to exist, the Master/Pilot and tug master shall as part of the passage plan and risk assessment process agree how the operation will be conducted, what hazards are associated with the towage operation and what risk reduction measures should be applied. When completing this assessment, the following should be considered:

- Sea and/or swell conditions at the intended operating area and the route to/from same;
- Wind speed, direction and trend i.e. rising, steady or falling;
- State of tide and trend;
- Information offered by latest weather forecast and other vessels in the area;
- Type of tug, propulsion method, towing from winch or hook and location of winch/hook;
- Proposed method of towing, including likelihood of shock-load to towing gear;
- Movement of other vessels in the area; and
- Navigational characteristics of the area of the port including the use of information from VTS.

56 Contingency plan should weather deteriorate before/after the tow has commenced and/or if the tug must disengage at any stage of the operation. This could include after careful consideration, but not only be limited to, one or more of the following:

- Tugs do not make fast and remain on station to assist the vessel to a position of safety;
- Tugs are let go and remain on station to assist the vessel to a position of safety; and
- Tugs are let go to assist in a pushing mode.

If there is likelihood that the weather conditions may pose a significant threat to the tug crew/tug/towing gear, the tug master should immediately inform the pilot/Master of any concerns that he may have. The pilot and tug master should take immediate action to ensure the safety of the assisted vessel/tug/tug crew and, if necessary, the operation aborted as soon as it is safe to do so. The agreed course of action should be fully communicated to Maritime Authority. When the tug is proceeding to a job in poor weather conditions, the tug master is to make a pro-active report to discuss the weather conditions with Maritime Authority, the pilot, the Terminal Operator and, if necessary, the vessel with which they are rendezvousing.

2. When visibility is reduced the hazards associated with towage operations are increased. Parameters have been established (see Chapter 1, Section 7.2.4) due to restricted visibility. However, there will be times when despite the port or the terminal being closed to vessel, movements' towage operations which have started may need to proceed to a conclusion.
These procedures apply to all towage operations which started prior to the onset of restricted visibility.

Restricted visibility is all circumstances where visibility is, or is expected to, reduce to a distance where the tugs normal ability to perform may be impaired. Such restrictions in visibility could be due to fog, mist, snow, rain, sleet or any other conditions which impair visibility.
In circumstances where restricted visibility exists, or is likely to exist, the Master/Pilot and tug master shall as part of the risk assessment process agree how the operation will be conducted, what dangers are associated with towing in restricted visibility and what risk reduction measures should be applied. When completing this assessment, the following should be considered:

- Type of tug, propulsion method, towing from winch or hook and location of winch/hook;
- Proposed method of towing;
- Operational status of navigational aids and equipment;
- Minimum speed to maintain steerage of vessel to be assisted;
- Movement of other vessels in the area;
- Navigational characteristics of the area of the terminal including the use of information from other sources; and
- Contingency plan should visibility deteriorate after the tow has commenced and/or if the tug must disengage at any stage of the operation.

Minimum visibility for all planned towage operations is 0,5nm, and such that the Master/Pilot can see the tug and the tug master can see the towed vessel.
Should visibility fall below the minimum once a towage operation has commenced, and the pilot can no longer see the bow tug, he/she shall reduce speed to a minimum safe speed and if safe and appropriate to do so take all way off the vessel. Following discussion with the tug master the contingency plan discussed and agreed at the planning stage will be implemented. This could include one or more of the following:

- Use the tugs to turn the vessel, let go the tugs and the vessel proceeds either to an anchorage
- Let go the forward tug and/or both tugs and have the tugs assist in a pushing mode;
- Allow the tugs to manoeuvre the vessel under the pilot's instructions. This may include using the tugs to maintain the vessels position at a safe location in the Lough, channel or turning circle; and
- If safe to do so the aft tug may remain attached for escort, when required. If considered unsafe by any party the aft tug will be let go and remain passive for escort.

If the above options are not safe or practicable then as a last resort, with the agreement of all parties that it is the safest course of action, the operation can continue to completion.
The agreed course of action should be fully communicated to Maritime Authority.
All towage operations in restricted visibility should be conducted with the assisted vessel maintaining minimum safe manoeuvring speed.
The tug master should immediately inform the Pilot/Master of any concerns that he may have as to the safety of his tug and crew. The pilot and tug master should take immediate action to ensure the safety of both the tug and assisted vessel; if necessary they should abort the operation as soon as it is safe to do so.
The tug master proceeding to a job and all parties involved in the operation, should report any lack of visibility, immediately it is observed, to Maritime Authority, the pilot, the Terminal Operator and the vessel that they are rendezvousing with.

2.1 Additional Watch-Keeping Responsibilities Onboard the Tug

During restricted visibility additional watch-keeping responsibilities must be considered, these are:

- The tug master must take charge of conning the tug and have another member of crew on to act solely as lookout;
- Maintain a moderate speed (defined as a speed at which a collision is avoidable);
- Use all electronic navigational aids at your disposal to determine own position and other ships positions (if possible do not rely solely on electronic navigation aids);
- Close watertight doors and openings to maintain watertight integrity;
- Make the appropriate sound signals in accordance with collision and port regulations;
- Respect the rules of Convention on the International Regulations for Preventing Collisions at Sea, 1972 (COLREGs)

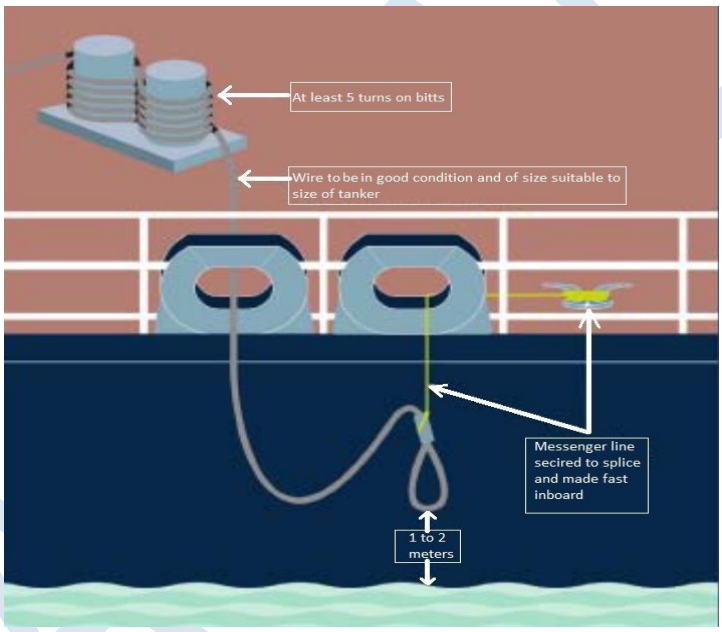
ANNEX D

GENERAL DIRECTIONS, REQUIREMENTS AND RECOMMENDATIONS

1. EMERGENCY TOWING-OFF PENNANTS

Emergency towing wires (fire wires) are required to be Correctly Rigged and Positioned, and shall be made fast to bitts as far forward and as far aft as practicable on the side of the vessel opposite to the cargo connections.

The wires shall be in good condition and secured with a minimum of five turns on the bitts. The wire shall lead directly to the chock with no slack on deck and a heaving line made fast to the eye shall be used to maintain the eye of the wire between one and two meters above the water at all times (see diagram below). The wires shall be regularly checked and adjusted.



2. MARINE SAFETY MANAGEMENT SYSTEM

Not all towage operators are required to comply with the ISM Code; it is however recognized that implementing a MSMS is consistent with good practice. A structured and recorded system of an appropriate size to the operation not only improves safety, and protects the employees but also protects the owner/operator. It is difficult to comply with accepted good practice if no MSMS system is in place.

Experience shows that accidents often occur during routine operations and an MSMS assists to identify the risks, allowing important lessons to be learnt so they will not be repeated. Risks are increased with:

- Poor planning;
- Poor communication;
- Poor supervision;
- Failure to appreciate the dangers of a task or operation;
- Lack of experience or knowledge;
- Misuse of equipment;
- Taking of short cuts, possibly due to commercial pressure;
- Unpredictable environmental factors such as weather, tide or current;
- Changes or unappreciated factors of the tow, such as cargo shift; and
- Unexpected events, such as equipment failure or unusual traffic movements.

Effectively managing the human factor can lessen the exposure to accidents. A MSMS allows a company to put into place the building blocks for reducing incidents of human error.

3. FAMILIARISATION TRAINING

To ensure full continuity of operations on-board the tug and to ensure that the safety of all personnel, the tug and the environment are protected, all personnel joining a tug should familiarize themselves with all aspects of their responsibilities and the vessel's emergency procedures. Each towage operator should ensure that an appropriate induction familiarization checklist is in place.

4. SAFE SYSTEMS OF WORK

A Safe System of Work is a means of implementing control measures which may be taken to protect those who may be put at risk in some key areas on board ship. Such measures should be based on the findings of the risk assessment.

All components of the work should be examined. Consider the following:

- **People**: - who is involved, competence, information, training, instruction, supervision etc.;
- **Plant and equipment**: - what is used, suitability, design, maintenance, guarding arrangements, isolation and ergonomic factors (matching person to the task);
- **Materials**: - handling (mechanical or manual) and health hazards;
- **Environment**: - lighting, heat, cold, noise, ventilation, wet conditions, welfare facilities etc.; and
- **Place of work**: - condition of floors and decks, access into and egress from, means of emergency escape, working space etc.

Only when all the components of the work have been examined can a safe system be devised. The following controls should be considered in descending order of priority:

- **Eliminate the hazard** - highly unlikely aboard a tug;
- **Reduce the hazard** - Is there a safer alternative (e.g.; less toxic, low voltage, lower noise level etc.);
- **Enclose the hazard** - fit guards, spill trays, insulation etc.;
- **Isolate the hazard from people** - fencing, guard rails, trip switches, isolation locks;
- **Control the extent of the exposure/contact with the hazards** - Reduce the length of time and exposure, rotate persons more frequently, purchase toxic substances in smaller containers etc.; and
- **Personnel Protective Equipment** - Wear PPE to lessen the effect of the injury or accident.

5. MAINTENANCE OF SAFETY EQUIPMENT

At all times safety equipment is to be maintained to the highest standard. It is ultimately the responsibility of the tug-master to ensure equipment is in date and has been serviced at the appropriate time.

6. ACCIDENT, INJURY AND HAZARDOUS INCIDENT REPORTING

An accident is any unforeseen, uncontrolled event which has the potential for injury or loss, whether injury or loss were sustained at the time or not.

In the event of a serious accident, major injury or time critical severe injury contact Alexandroupolis Maritime Authority/Coast Guard Duty Officer, with urgent request for assistance from the emergency services, who will initiate the necessary action.

Guidelines:

- During initial contact keep report brief and factual;
- Description of incident;
- Whether any injuries;
- Extent of damage;
- Whether assistance is required;
- Allocate a dedicated VHF channel or telephone line to deal with communications;
- Administer first aid, if possible;
- Prepare tug for receiving emergency services (e.g. helicopter evacuation); and
- Maintain a log of events as they happen.

The incident/accident should be recorded on an appropriate incident form and on Bridge Log Book.

7. SAFETY OF TUG CREW

Safety of crew is the first responsibility of tug masters.

All towage operations and manoeuvres must be conducted in a safe and seamanlike manner. If at any time a tug master is requested to carry out a manoeuvre, which he considers will result in a hazardous situation; he is to decline the order, stating the reasons why.

During towage operations, the towing gear equipment and personnel should be continuously monitored and any change in circumstances immediately relayed to the tug master. This is particularly important on tugs where the tug master has a restricted view of the towing area/personnel.

Whilst engaged in towing operations the minimum number of crew essential to carry out duties, is to be on deck, and never exposed to a rope or wire under tension or load. Crew should be aware that the tow may have to be released in an emergency, and that this may occur without warning. Wherever possible, a "clear deck" of crew should be in operation whilst towing.

Personal Protective Equipment (PPE) and working lifejackets should be worn always whilst engaged in, or near, towing operations on towing deck. It is the tug master's responsibility to enforce the wearing and use of safety equipment.

8. PERSONAL PROTECTIVE EQUIPMENT (PPE)

Personnel on exposed decks are to wear appropriate Personal Protective Equipment (PPE) including hazardous duty (working) lifejackets in line with the tug's risk assessment. It is the Tug Master's responsibility to enforce the wearing and use of safety equipment. All PPE should be approved and in date.

The decision to put crew on the working deck to handle the towline and messenger in order to connect from the escorted ship will rest solely with the Tug Master. The criterion for this task will be whether the crew can safely carry out the task.

Crew members are recommended to only proceed on deck during towage operations with the following equipment:

- Boilersuit or suitable alternative
- High Visibility Jacket
- Lifejacket
- Safety shoes or boots
- Safety Helmet fitted with chinstrap or approved safety head wear
- Gloves

9. RELEASING TOWING GEAR

During disconnection, both the vessel's and tug's crew on deck should be aware of the risk of injury if the towing gear is released from the tow in an uncontrolled manner and avoid standing directly below.

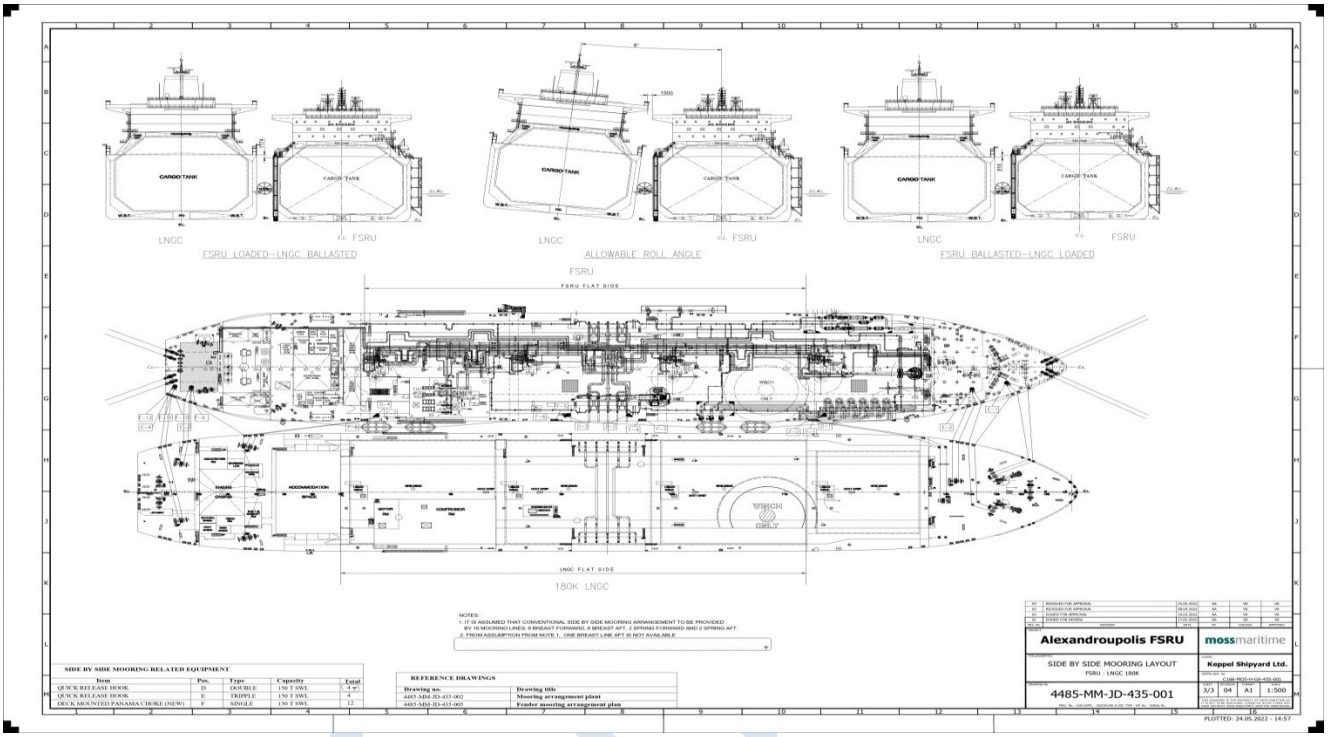
Any towing gear which has been released and is still outboard may 'foul' on the tug's propeller(s), steelworks or fendering, causing it to come tight unexpectedly. The towline should always be lowered onto the tug deck, never just 'cast off' and left to run. The following guidelines should be observed when releasing towing gear:

- Beware of ships crews releasing gear in an uncontrolled manner and not using the messenger to lower rope/wire to tug;
- Whenever possible "shorten in" to shortest length possible before giving ship's crew the "all clear" to let go. This will avoid the possibility of a rope or wire being caught in tugs propellers or trapped between sections of fendering, if released in an uncontrolled manner;
- Never stand directly under the ships fairlead during letting go;
- Be aware of possible interaction effects. The violent movements caused by two vessels coming into contact could cause a crew member to be injured in a slip or fall;
- When recovering towing gear, clear the ship as soon as possible. It is always easier to recover gear at a slow speed than a higher speed, which may be necessary if running ahead of the ship; and
- Always re-stow gear correctly so that it is ready for use immediately, should an incident arise.

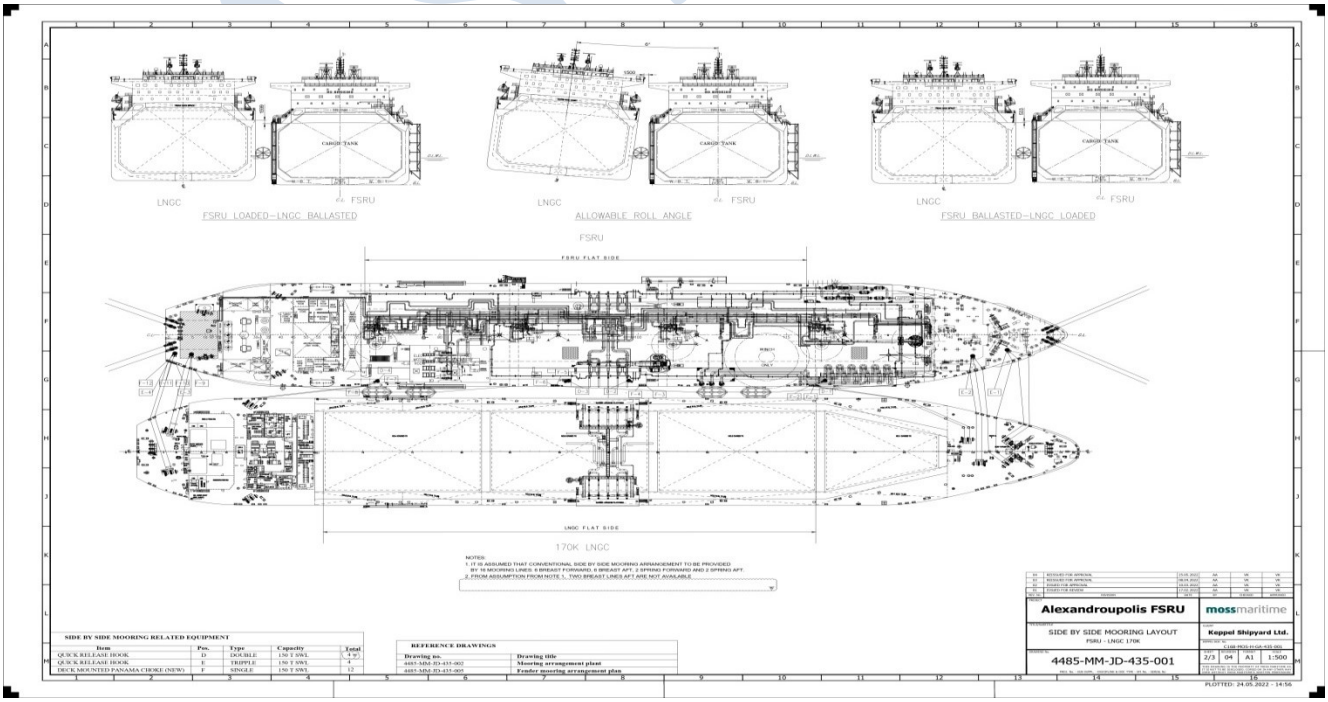
ANNEX E

SIDE BY SIDE MOORING LAYOUT FSRU-LNGC's

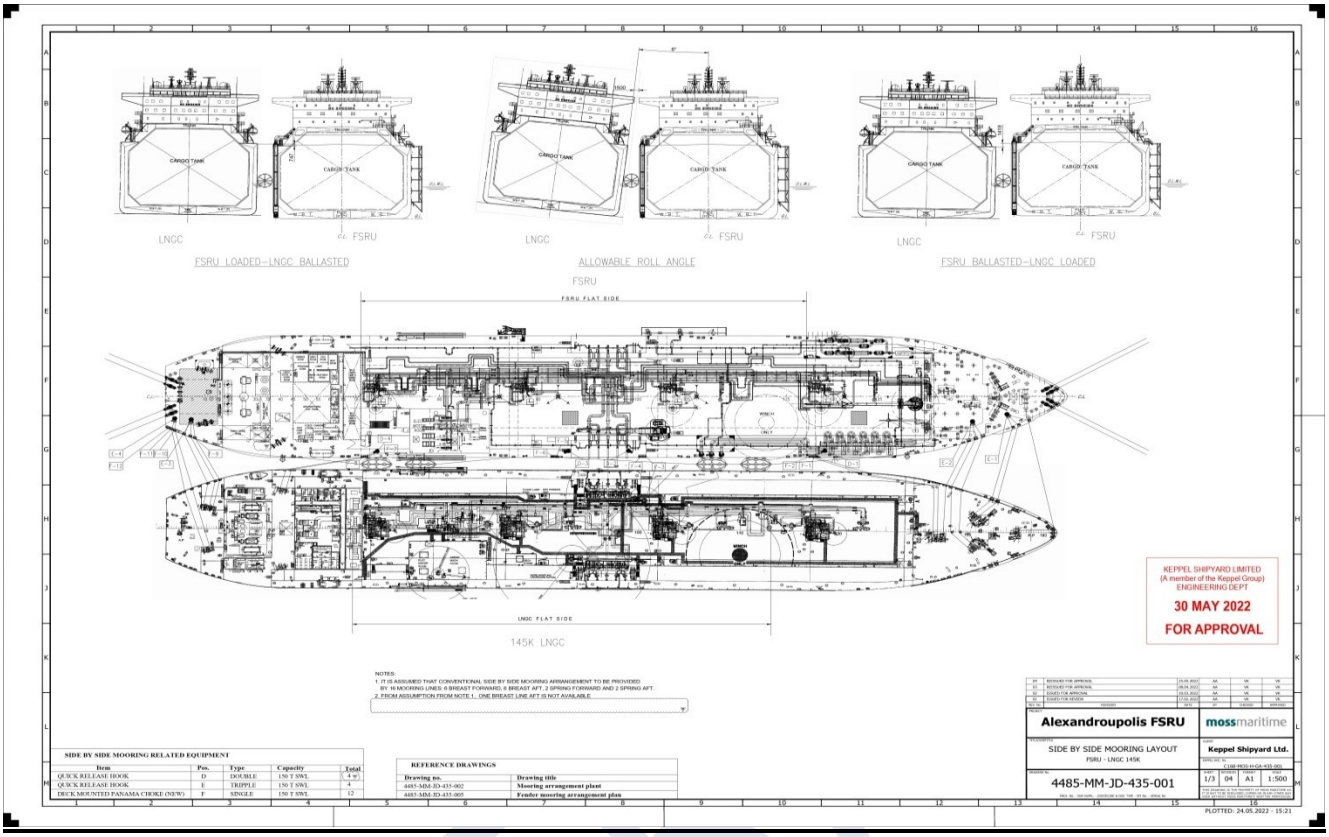
1. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 180k m³ LNGC



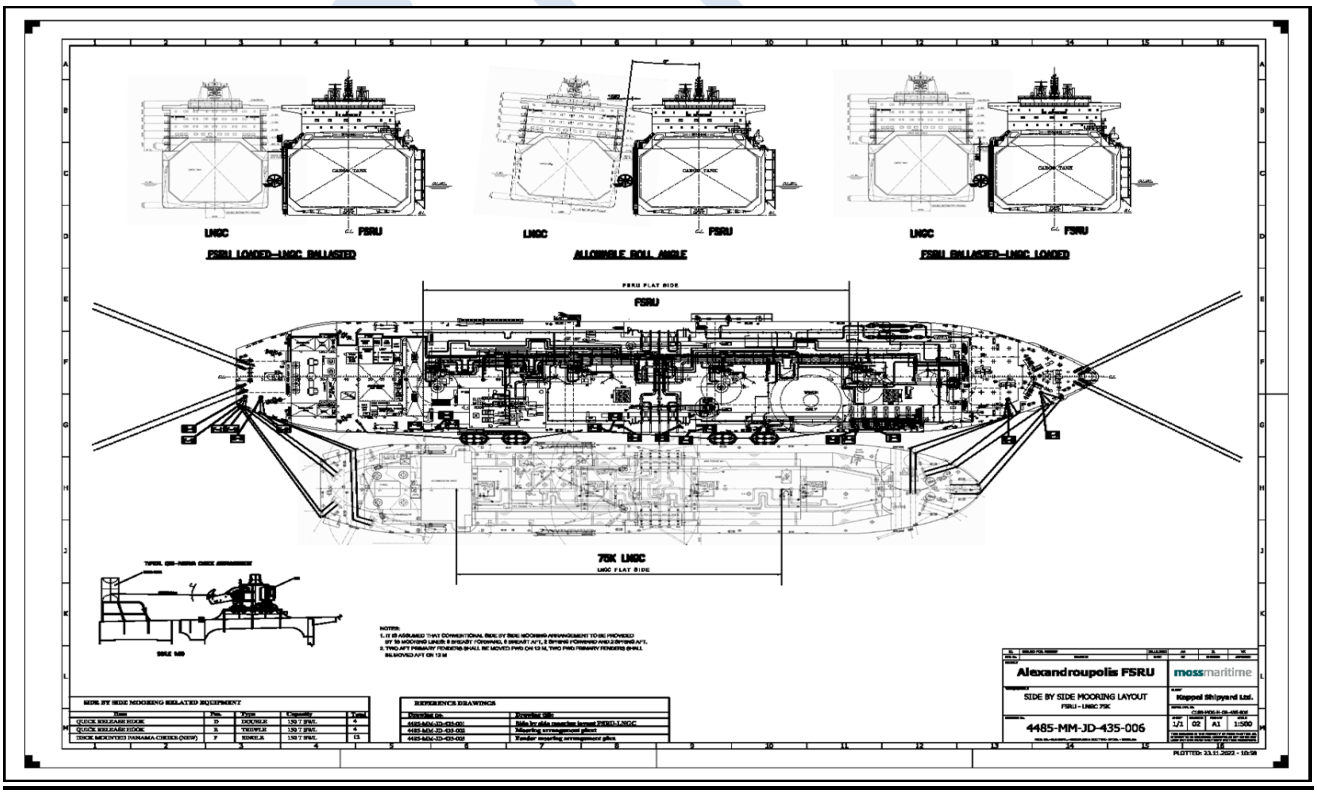
2. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 170k m³ LNGC



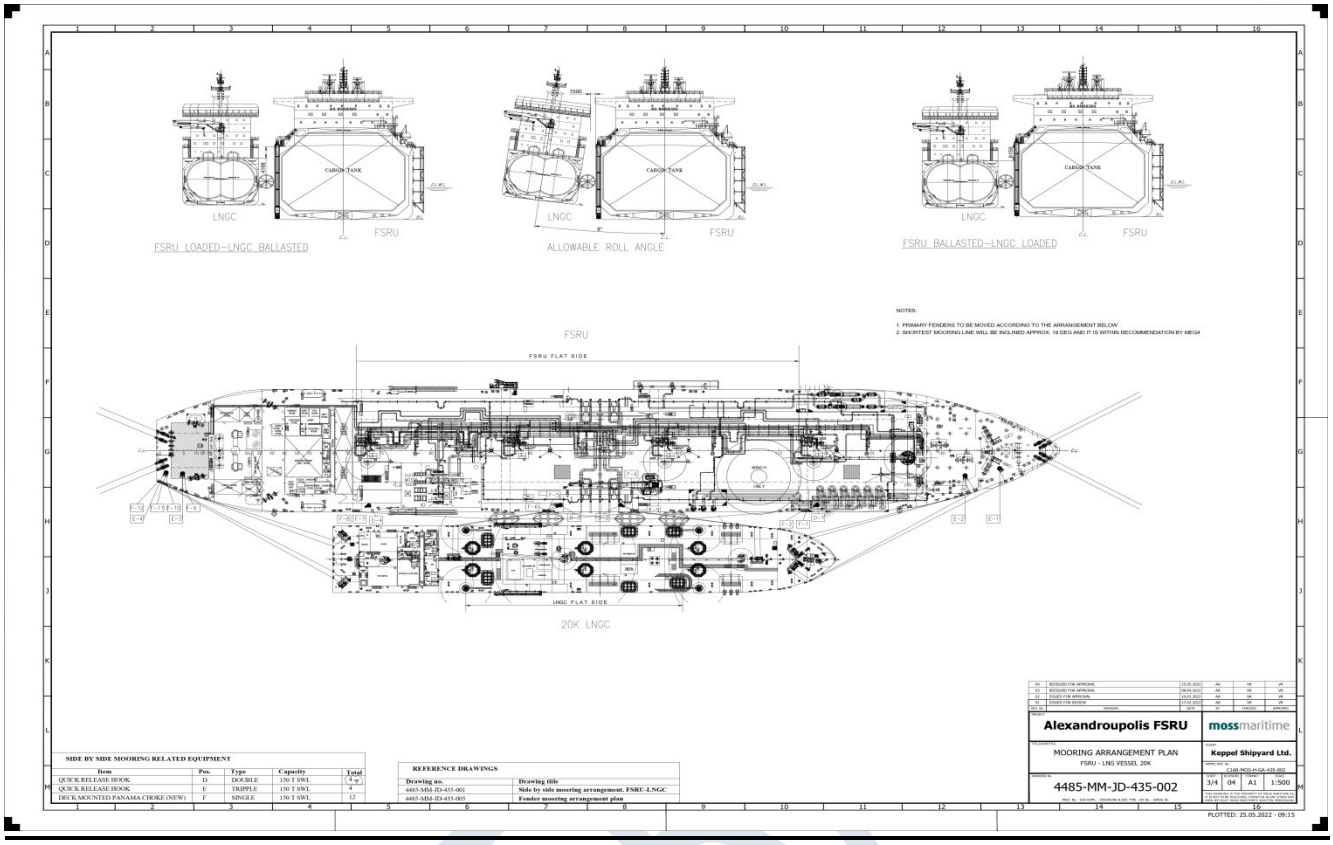
3. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 145k m³ LNGC



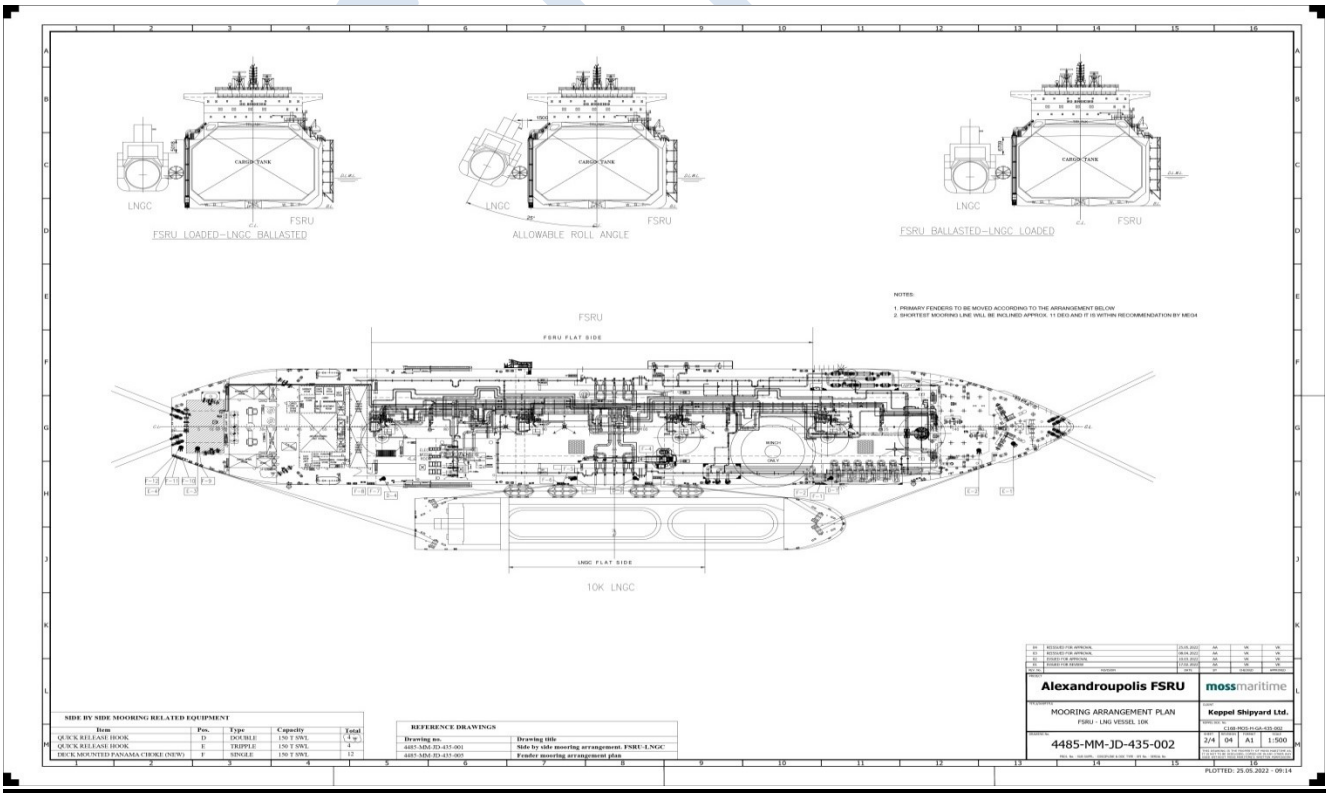
4. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 75k m³ LNGC



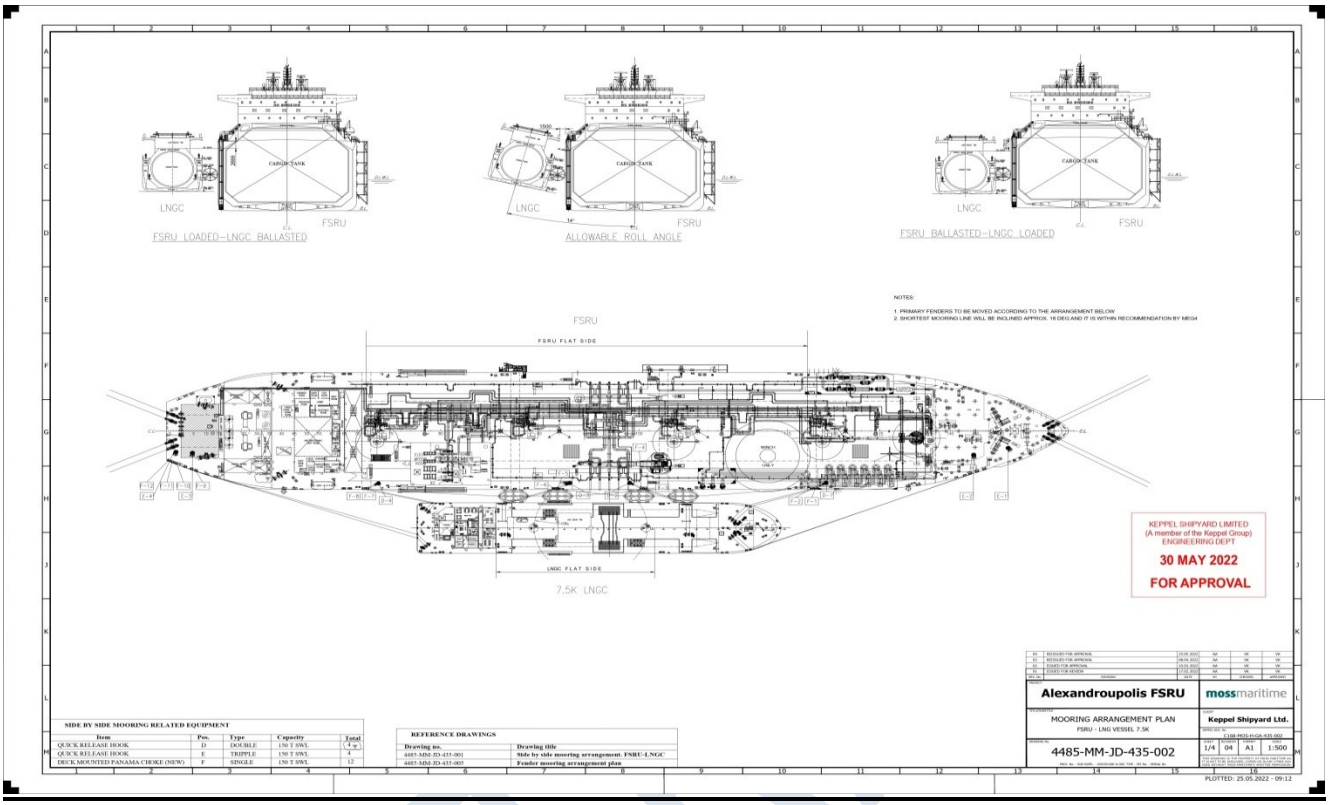
5. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 20k m³ LNGC



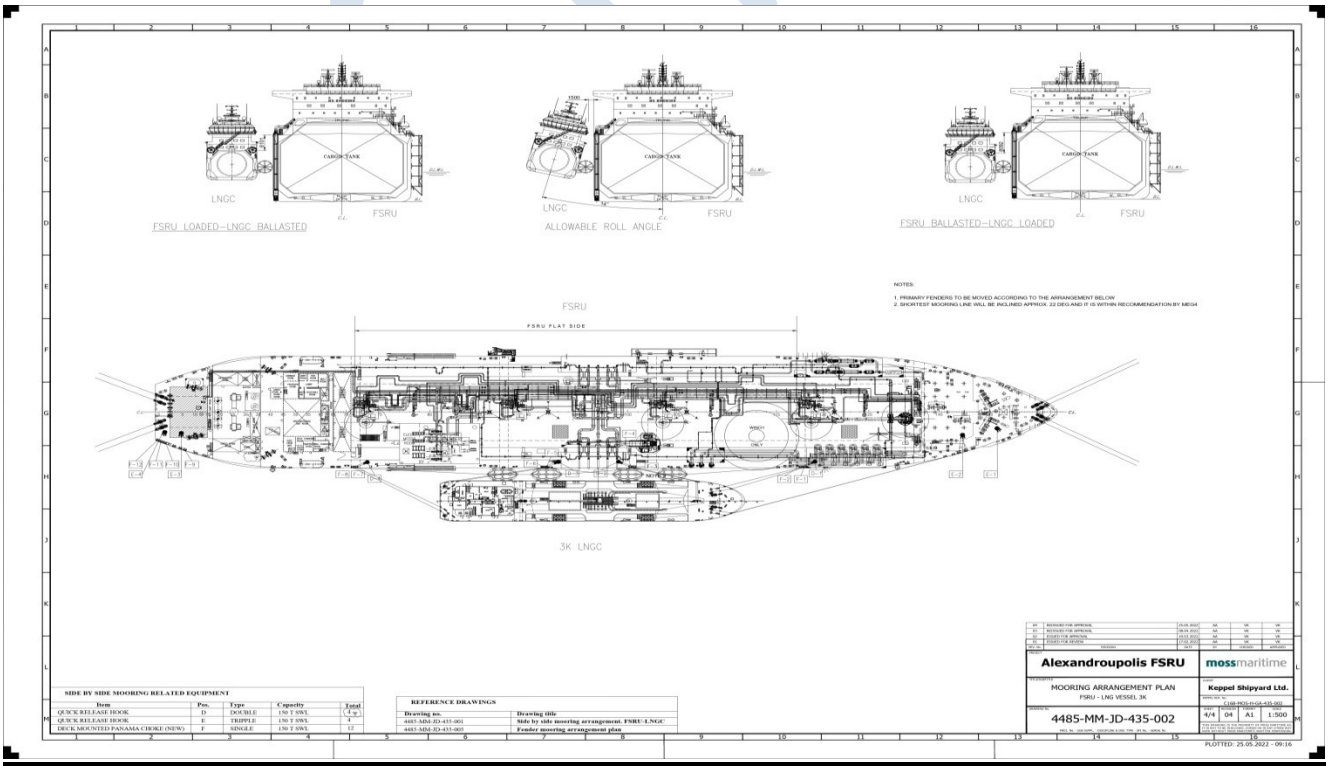
6. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 10k m³ LNGC



7. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 7.5k m³ LNGC



8. SIDE BY SIDE MOORING LAYOUT FOR FSRU & 3k m³ LNGC



ANNEX F

"DO NOT" AND "DO" IN TOWAGE OPERATIONS

DO NOT Actions of Pilot, Ship's Master and Mooring Parties

Do not send the crew to the mooring stations (too) late.

Do not maintain the speed of the vessel too high whilst securing tugs.

Do not use DANGEROUSLY HEAVILY WEIGHTED HEAVING LINES.

Do not execute course changes whilst the tugs are securing their towlines.

Do not use tug Master's name when communicating orders to the tugs.

Do not engage the vessel's engine/s during manoeuvres without first informing the respective Tug Masters.

Do not throw the heaving line (at the bow) from the centre line but from the ship's shoulder.

Do not make rapid and excessive steering changes without informing the tugs.

Do not build up speed in excess of 6 knots through the water with the bow tug (still) connected.

Do not use full engine power particularly on a large vessel when a tug is secured aft.

Do not keep floodlights shining into the tug master's eyes; this will impair his night vision and will seriously hamper his ability to estimate distances and to assess the operations.

Do not keep floodlights shining towards the tug in case of restricted visibility.

Do not make headway on own power in very dense fog with a bow tug secured without prior agreement between tug and pilot. Consider letting the tug(s) tow the vessel rather than using the vessel's propulsive power.

Do not build up speed over 6 knots through the water starting from a "dead ship" with a bow tug secured.

Do not drop the towline at the stern when disconnecting the tug (unless instructed otherwise by the tug).

Do not delay to drop the towline at the bow when disconnecting the tug once instructed to do so by the tug.

Do not wait for something to happen to start preparing the heaving line(s) again.

DO Pilot - Master Exchange of Information or Vice Versa

Pilot-Master exchange to include info on modus operandi of tugs.

Pilot to instruct vessel's Master to have his crew at mooring stations in ample time, agree on period of notice needed by ship's crew.

At night, Pilot to instruct vessel's Master to turn off blinding floodlights.

Inform vessel's Master of Local regulations, if applicable.

To secure the bow tug in very dense fog, it is imperative that the assisted vessel takes off all speed through the water and the tug moves in to make fast.

It should be discussed and agreed well in advance with the tug master whether once the bow tug is secured the vessel may use her own propulsion power.

Keep vessel's speed at maximum 6 knots through the water, particularly when the bow tug is being connected and whilst the bow tug is still connected.

Pilot to use tug's name when giving orders, so the bridge team can understand.

Pilot to inform the stern tug when engaging the vessel's propeller in order to watch out for the propeller wash.

Pilot to inform the stern tug about any rudder position changes about to be effected during manoeuvring.

Tug Master to inform the Pilot whilst reaching 75% of the total engine power of the tug.

Pilot to be made aware of any "novice" or "trainee" Tug Masters or of any Tug Masters who may not be familiar with the area and who will be participating during the harbour towing operation.

Do bring speed down sufficiently before securing a tug, especially the bow tug.

Do limit use of propeller to the minimum required for steering.

Do drop the towline at the bow when disconnecting the tug, however only when instructed to do so by the tug.

Do slack away the towline slowly at the stern when disconnecting the tug and only let go off the messenger line when instructed to do so by the tug.

Do use tug's names when conveying orders to the tug and provide clear and concise instructions.

Do turn off floodlights as soon as the tug is secured.

Do have a spare heaving line ready at hand and a skillful deckhand to handle same.

Do use heaving lines with light weights, preferably using soft sand bags.

Do inform the stern tug before engaging engines astern.

As may be noticed, items are repeated in both the Do and Do Not section, obviously in the opposite way. This was done intentionally to increase the chances that they will be noted and remembered.

ANNEX G

{The following excerpt of instructions is taken from European Maritime Safety Agency (EMSA) Safe Platform Study Technical Report "Development of vessel design requirements to enter and operate in dangerous atmospheres" January 2012}

Fire Scenario

1. PROTECTION IN A FIRE INCIDENT

The responding vessel has to have self-protection to ensure the safety of the responding crew and any additional responders carried. It should also provide protection for casualties received from the casualty vessel.
On initial arrival on scene the primary concern will be the saving of life hence the first responding vessel may not need dedicated fire fighting facilities but should be capable of assisting in the saving of life.
Subsequent vessels and incident development may require fire fighting support to be provided either from the vessel or the embarkation onto the casualty vessel of additional personnel to fight the fire.
Whilst the key element is personnel safety in some incidents the safest place for the crew of the casualty vessel may be to remain on board and not transfer to the responding vessel. In this case the responding vessel may only be required to provide firefighting assistance to help contain the fire. In this situation the design elements relate to firefighting capability.

Fire Fighting Design Goals
There are two goals associated with the firefighting designs as follows:

- Goal 1: to provide self-protection for the responding vessel to prevent a fire on the casualty vessel causing an adverse effect on the responding vessel when it approaches.
- Goal 2: to provide equipment to allow the responding vessel to actively support fire fighting on the casualty vessel.

2. DESIGNS FOR FIRE FIGHTING AND SELF PROTECTION

Overview: When an incident occurs and flammable liquids or gases are released, the potential for a fire to occur or one being present when the rescue vessel arrives on scene is high. The responding vessel therefore needs to be protected from the heat, and smoke. It also needs to be able to provide appropriate assistance to the casualty to fight or mitigate the effects of the fire, so as to achieve safe evacuation of the personnel.
Therefore the design requirements for a vessel entering zone H will be more stringent than a vessel which does not approach the casualty vessel.
Fire Fighting vessels are typically identified in three classes as follows:

- **Firefighter / FiFi Class I**
  Active protection, giving it the capability to withstand higher heat radiation loads from external fires: minimum capacity of 2.400 m³/h divided on two monitors with minimum throw length of 120 meters in still air. The minimum throw height is 45 meters measured from sea level and 70 meters away from the nearest part of the vessel. In addition the vessel has to be equipped with a spray system for self-protection.

- **Firefighter / FiFi Class II**
  Continuous fighting of large fires and cooling of structures: minimum capacity of 7.200 m³/h normally divided on three monitors. Minimum throw length is 150 meters in still air. The throw height has to be a minimum of 80 meters from sea level measured 70 meters and away from the nearest part of the vessel.

- **Firefighter / FiFi Class III**
  Continuous fighting of large fires and cooling of structures with larger water pumping capacity and more comprehensive firefighting equipment than for class II: minimum capacity of 9.600 m³/h divided on 4 monitors. Minimum throw length is 150 meters in still air. The throw height has to be a minimum of 80 meters from sea level measured 70 meters and away from the nearest part of the vessel. In addition the vessel is to be fitted with two foam monitors, each with capacity of 300m3/h and throw height of 50 meters above sea level.
  These classifications of firefighting vessel are widely accepted and well understood and all leading classification societies have rules which detail the specification for the vessel both in terms of the firefighting equipment and the support services required. Therefore in this Chapter it is considered reference to the type of vessel is sufficient to avoid duplication existing specifications.
  The use foam will normally be for the prevention of ignition or re-ignition of a fire by forming a fire suppressing blanket over the spilt substance where the threat of a fire is present. The use of foam as a fire fighting agent will be limited, but if it is used then arrangements for re-supply will need to be made by the responsible authorities. FiFi 2 & 3 requirements to provide for 30 minutes supply of foam should be achieved as a minimum on appropriate vessels.