

GASRUL

**RLPG Terminals, Juaymah and Jazan
Including Contents Page**



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GASRUL

Rules Regulations and General Information

Preface

The rules prepared by Saudi Aramco concerning the safe handling of gas tankers at the berth, the vessel safety inspection check list, and forms of declaration and agreement between the Master of a gas tanker and Saudi Aramco, are based on the IMO Codes for the Construction and Equipment of Ships carrying Liquefied Gases in Bulk and include the EGC Code, the GC Code and the IGC Code.

They also incorporate recommendations and guidelines issued by

- The International Chamber of Shipping (ICS).
- The Oil Companies International Marine Forum (OCIMF).
- The Society of International Gas Tanker & Terminal Operators (SIGTTO).
- The International Association of Independent Tanker Owners (INTERTANKO).

Saudi Aramco handles only Refrigerated Liquefied Petroleum Gases (RLPG) on the gas tankers to which these rules apply and whenever a gas tanker has dangerous substances other than RLPG on board and is accepted by Saudi Aramco for handling at the berth, their safe containment shall be in accordance with the requirements of internationally recognized Codes and Guides and such other authoritative sources of relevant information concerning the substances as may be appropriate.

These rules have been introduced by Saudi Aramco to ensure the safe handling of RLPG cargos and as evidence of the determination of Saudi Aramco to support the internationally recognized standards.

1 General

1.1 Application

- 1.1.1 Except as provided for, these rules shall apply to gas tankers at the berth under the following conditions:
- a. RLPG cargo operations.
 - b. Having onboard any LPG and/or other liquefied gases either as a part cargo, cargo residue or coolant.
- 1.1.2 These rules do not apply to a gas tanker at the berth when handling cargo other than RLPG.
- 1.1.3 Nothing in these rules shall interfere with the requirements of any special or additional rules or regulations, which may be made by the Government or Saudi Aramco in respect of the vessel to which these rules apply.

1.2 Jurisdiction

Gas Tankers, the Masters and Crews thereof are subject to these rules and the applicable laws of Saudi Arabia when the vessel is at any Saudi Aramco berth. Both shall be strictly enforced.

NOTE: Masters are advised to consult their Agent in respect of the interpretation of Government Law or Regulation.

1.3 Unsafe Conditions

When any operation being conducted in the vicinity of the vessel represents in the opinion of the Master, an unacceptable safety hazard to the vessel, handling shall be suspended at the request of the Master until such time as any corrective action, which may be required is taken.

1.4 Berth Assignment

Assignment of gas tankers to Saudi Aramco berths will be in accordance with the procedures and requirements of Saudi Aramco.

1.5 Acceptability

- 1.5.1 Gas tankers that are not of an approved design for the transport of RLPG at atmospheric pressure will not be accepted.
- 1.5.2 In accepting orders to handle RLPG at a Saudi Aramco terminal, the Master of a gas tanker shall ensure that the safe minimum operating temperature and the maximum operating pressure of the vessel's cargo containment system is compatible with the boiling point of the RLPG to be handled.

1.5.3 All cargo requirements are to meet the following criteria:

	Top Temp.	Bottom Temp.	Pressure
Propane (A140)	-22 °C	-39 °C	70 mbs. or 0.07 kg/cm ²
Butane (A-160)	14 °C	0 °C	70 mbs. or 0.07 kg/cm ²

1.5.4 When provision cannot be made by the vessel to arrive with cargo tanks ready for loading in the condition required (for example, a new gas tanker; a gas tanker arriving from dry-dock or repair yard; or subsequent to a necessary change in cargo grade) acceptance shall be subject to prior arrangement and agreement with Saudi Aramco.

1.5.5 A gas tanker will not be accepted when it is unable to comply with these rules.

1.6 Responsibility

The Master and Crew of a gas tanker at berth shall be responsible at all times for the safety of the vessel and shall make provision to exercise all necessary precautions to maintain the integrity and efficiency of the closed cargo containment system and cargo system with which the vessel is provided.

1.7 Prior to Cargo operations

1.7.1 Cargo operations shall not start until quarantine clearance has been granted to the vessel in accordance with the requirements of the Port.

1.7.2 The Master and Terminal shall complete the Ship Shore Safety Checklist including Part "D" Bulk Liquefied Gases.

1.8 Vessel Access and Emergency Escape

1.8.1 Access to the accommodation shall always be at levels above the main cargo area deck.

1.8.2 Gangways shall be carefully tended at all times and adequately illuminated at night. Personnel shall use only the designated access.

1.8.3 Means for emergency escape shall be provided on the side of the vessel opposite to the loading connections. For security reasons, the means for emergency escape shall be stowed at deck level in such a manner as to be ready for expeditious use in an emergency condition and shall be of adequate length to reach the water at all times.

1.9 Penalties

1.9.1 Disregard of or failure to fully comply with any of these rules or any safety practices generally accepted in the marine transport industry will result in the suspension of all operations and the vessel will be required to vacate the berth.

- 1.9.2 Vessels presented for loading with deficient equipment or machinery will not be berthed. If such deficiency becomes apparent after berthing, the vessel will be required to vacate the berth.
- 1.9.3 Safety violations due to negligence on the part of the vessel's personnel will result in the suspension of loading operations for investigation and correction.
- 1.9.4 Removal from the berth as a result of safety violations or deficiencies will be at the vessel's expense and Saudi Aramco will not accept responsibility for any resulting delay to the vessel.
- 1.9.5 Gas tankers with unacceptable safety performances will not be accepted at Saudi Aramco berths on subsequent voyages.

1.10 Hazardous Gases

- 1.10.1 Masters of gas carriers berthed at Saudi Aramco marine terminals where crude oil is handled shall be aware that the crude oil may contain dissolved Hydrogen Sulphide (H₂S) in concentrations, which may be hazardous. Saudi Aramco provides upon request, a list of recommendations concerning the hazards of Hydrogen Sulphide.
- 1.10.2 Masters shall recognize that potentially dangerous flammable and other hazardous gas concentrations may originate from sources other than their own vessels.

2 Certificates of Fitness

2.1 Valid Certificate of Fitness Issued

A gas tanker must be issued with a valid Certificate of Fitness and able to meet the requirements of these rules.

3 Defects and Deficiencies

3.1 On or Prior to Arrival

- 3.1.1 Prior to arrival the Master of a gas tanker shall report to the Terminal any defect or deficiency which may prevent compliance with these rules.
- 3.1.2 Any defect or deficiency reported to the Terminal shall be jointly investigated by the Master in consultation with the Terminal to establish if the reported defect or deficiency represents a safety hazard for any reason.
- 3.1.3 When any vessel is found upon inspection to have any safety defect or deficiency in contravention of any appropriate Certificate or in contravention of these rules, that vessel may be subject to delay in berthing and/or handling until such time as the defect or deficiency is corrected to the satisfaction of the Terminal.

3.2 Reports to Owners, Operators and Others

Defects, deficiencies or violations of safety rules which are not promptly corrected or which represent an immediate or potential threat to the safety of cargo operations shall be reported to the Owners/Operators of the gas tanker concerned and to other organizations and authorities for information or appropriate action.

4 Repairs and Maintenance

4.1 Readiness to Vacate Berth

Boilers, main engines, steering machinery and other equipment essential for maneuvering shall be maintained so as to enable the vessel to be unberthed under full engine power at short notice. Repairs and other work, which may immobilize the vessel, shall not be undertaken.

4.2 Gas Freeing and Tank Washing

Gas freeing and tank washing at the berth is prohibited.

4.3 Repairs and Other Work

- 4.3.1 Repair or maintenance of any part of the cargo containment system or cargo system in the cargo area or in gas dangerous zones, other than of a routine operational nature, is prohibited.
- 4.3.2 Any work in the cargo area, other than work associated directly with handling and/or safety procedures, is prohibited.

4.4 Hydrates and Antifreeze

When cargo operations are believed to be adversely affected by the formation of hydrates within the cargo system which require the injection of antifreeze into the system, such injection procedures shall be subject to the permission of the Terminal who shall have sole discretion as to whether or not the proposed procedures are of a routine operational nature.

4.5 Funnel Uptakes and Boiler Tubes

Every precaution shall be undertaken to ensure that sparks do not escape from the funnel.

4.6 Radio and Radar Equipment

The servicing of radio and radar equipment shall not be permitted without the written agreement of the Terminal.

5 Fire Precautions and Emergency Procedures

5.1 Prior to Cargo operations

Prior to the start of Cargo operations, the Master shall;

- a. Provide dates and results of the last regular full test of the fire main and water spray systems in the cargo and accommodation areas.
- b. Agree on the action to be taken in the event of an emergency condition.

5.2 Naked Lights, Smoking and Cooking Appliances

- 5.2.1 Open flames or fires, exposed incandescent material and any other sources of ignition are prohibited on deck and in other places where there is a risk that flammable gas may be present.
- 5.2.2 Personnel entering any space designated as a Gas Dangerous Zone shall not introduce any potential source of ignition (e.g., matches, mechanical or electronic lighters, non-approved radios, etc.) into the space.
- 5.2.3 Smoking shall only be permitted in places in the after accommodation which have been jointly agreed in writing by the Master and the Terminal and suitable notices shall be posted at the entrance or entrances to the designated smoking places.
- 5.2.4 No place shall be considered suitable for smoking unless
 - a. It is enclosed accommodation aft of the cargo area.
 - b. It has no doors which open directly onto the outside deck.
 - c. All ports and windows are kept closed.
 - d. Doors into passageways are kept closed except when in use.

5.3 Electrical Equipment

- 5.3.1 The use of portable electrical equipment on flexible leads (power cords) is prohibited in the cargo area, gas dangerous zones, and in any other area or spaces where flammable gas may be present. The power cords for such equipment shall be disconnected and removed from the area, zone or space.
- 5.3.2 Electrical installations shall be maintained so as to minimize the risk of fire and explosion from flammable products. Modifications to electrical equipment and/or wiring, which have not been approved by an appropriate authority, shall not be accepted.
- 5.3.3 Battery operated hand torches (flashlights) shall be in good condition and of a type certified to be safe for use in hazardous locations.
- 5.3.4 Domestic radios, electronic calculators, recorders and other battery powered equipment of a type which has not been approved, shall not be used on deck or in any place where flammable gas may be present.

- 5.3.5 Portable VHF/UHF transceivers shall be of an intrinsically safe type, which is approved by a competent authority. When used, this equipment shall be in good condition.
- 5.3.6 Main radio equipment shall not be used and main transmitting aerials shall be earthed.
- 5.3.7 Radar scanners shall be switched off.

5.4 Emergency Signal

- 5.4.1 In the event of fire or other emergency conditions the vessel shall sound continuous short blasts on the whistle.
- 5.4.2 The Master will be advised of the sound signals used by the Terminal in the event of an emergency condition and will also be advised by the Terminal whenever that signal is to be used for test or drill purposes.

5.5 Fire Mains

- 5.5.1 The firewater main and on the deck water spray or water curtain systems shall be available for immediate use.
- 5.5.2 The draft, trim and list (angle of heel) of the vessel shall be controlled to ensure that there is no interruption in the supply of seawater to any of the fire or spray pumps.
- 5.5.3 At least two firewater hoses with dual purpose spray/jet capability shall be connected to the fire main in the cargo area and each such hose shall be laid out ready for immediate use.
- 5.5.4 When a permanent installation dry powder type fire extinguishing system is provided, at least one dry powder hose/nozzle of adequate length to discharge dry powder at the loading connection shall be available for immediate use.

5.6 Stopping of Cargo operations

Cargo operations shall be stopped whenever;

- a. There is danger of fire or explosion on board the vessel or on shore.
- b. There are high concentrations of any dangerous gases on or in the vicinity of the vessel or berth.
- c. It is considered unsafe to continue due to leaks or spillage.
- d. It is considered unsafe to continue due to weather or tidal conditions.
- e. There is any emission of sparks or flames from the vessel's funnel.
- f. There is significant electrical or mechanical failure adversely affecting the safety of cargo operations.
- g. The vessel is found to be violating any safety rules or procedures and fails to take immediate corrective action.

- h. There is significant movement of the vessel affecting the safety of the transfer connections.
- i. It is considered unsafe to continue due to the stability, draft, trim or list condition of the vessel.
- j. There is a failure of the agreed means of communication between the vessel and the Terminal.
- k. Required by the Terminal.
- l. Required by the vessel.

NOTE: If practical, the ship and shore should communicate before stopping cargo.

5.7 Electrical Continuity

Electrical continuity bonding wires shall not be used between the vessel and the berth at any time. Loading arms for RLPG are equipped with approved insulation pieces.

The Terminal will ensure the adequacy of insulation on gangways provided to the vessel when necessary.

6 Inert Gas Requirements

6.1 Acceptance Conditions

- 6.1.1 LPG shall not be loaded into any gas tanker unless all the cargo tanks and their associated cargo systems have an oxygen concentration of less than five percent by volume and a positive pressure.
- 6.1.2 When a gas tanker arrives at the berth with warm cargo tanks, the Master shall make provision to allow the Terminal to obtain atmosphere samples from each warm tank for the purpose of oxygen content analysis.

6.2 Hold Spaces and Inter-Barrier Spaces

- 6.2.1 As per ISGOTT hold and inter-barrier spaces are to be properly inerted or filled with dry air.
- 6.2.2 When there is no requirement to maintain the cargo tank hold spaces or inter-barrier spaces in an inert condition, the Master shall confirm or demonstrate to the Terminal that those spaces are free of any cargo gases.

6.3 Use of Inert Gas

Inerting of the cargo containment or cargo system at the berth is prohibited except to maintain the inert condition standard of hold or inter-barrier spaces.

6.4 Inert Gas Equipment

Inert gas systems provided on or to a vessel for the purpose of Inerting or clearing the vessel's cargo manifolds of dangerous substances shall be used for that purpose if required by the Terminal.

7 Leaks, Spillage and Gas Detection

7.1 Leaks and Spillage

7.1.1 When any leak or spillage of dangerous substances occurs during cargo operations, the following action shall be taken immediately:

- a. Stop all cargo and bunker operations.
- b. Use the vapor return system if this will assist in relieving pressure at the leak source.
- c. Prohibit all smoking and the use of naked lights.

7.1.2 Cargo operations shall be discontinued when LPG accumulates in the spill tank at the cargo manifold, and appropriate action shall be taken to vaporize the LPG in a safe and controlled manner.

7.2 Deck Scuppers

7.2.1 The deck scuppers of gas tankers may be kept open for the purpose of avoiding any dangerous accumulation of cargo on deck in the event of a major leak or spillage, subject to the agreement of the Terminal and provided that an ample supply of water is immediately available at all times in the cargo area.

7.2.2 When a vessel is equipped with arrangements to prevent the flow of dangerous substances from the cargo area to other deck areas of the vessel, the overboard deck scuppers in other deck areas protected by such arrangements shall be effectively plugged, to contain fuel tank overflows.

7.3 Gas Detection - Permanent Installation

A permanent installation gas detection system shall be properly calibrated and set for the cargo. The system shall be in continuous operation monitoring the appropriate spaces.

7.4 Gas Detection - Portable Equipment

7.4.1 Not less than one set of portable gas detection equipment in good order and condition and suitable for each grade of cargo on board the vessel shall be provided.

7.4.2 Appropriate means shall be provided on board the vessel for calibrating and testing the required portable gas detection instruments.

7.5 Breathing Apparatus and Protective Clothing

Sufficient sets of self-contained breathing apparatus and protective clothing in good working order shall be provided and maintained for immediate use.

7.6 Sea and Overboard Discharge Valves

When not in use, sea and overboard discharge valves shall be closed and secured against inadvertent use.

7.7 Spill Tanks

Suitably constructed spill tanks conforming to gas code requirements shall be provided to contain a reasonable volume of LPG, which may result from leak or spillage at loading connections.

8 Emergency Shut Down (ESD)

8.1 Information Required

- 8.1.1 In vessels equipped with a manual and/or automatically activated ESD, the Master shall provide the Terminal with information relating to the following operating features of the system prior to the start of cargo operations.
 - a. The minimum time required to close the vessel's liquid loading manifold valve when loading at the vessel's maximum requested loading rate.
 - b. The date of the last test of the ESD activating elements.
- 8.1.2 The Master shall confirm that the crew are aware of the location and use of the ESD and are also aware of the dangers that may result from the accidental triggering of the system during cargo operations.
- 8.1.3 When the vessel is berthed, the Terminal shall be informed whether the vessel is equipped with the SIGTTO ship/shore ESD.

8.2 Use of the ESDS

- 8.2.1 The use of the ESDS at any time during cargo operations shall be at the discretion of the vessel subject to acceptance of the system by the Terminal.
- 8.2.2 Whenever a vessel's ESDS is activated during cargo operations, the Master shall provide the Terminal with a written explanation if so requested.

NOTE: Ship/Shore ESD systems must comply with SIGTTO or gas code(s) recommendations.

9 Control and Supervision

9.1 Supervision

- 9.1.1 All cargo, bunker, ballast or other handling shall be competently and constantly supervised.
- 9.1.2 A designated responsible person or persons shall be appointed by the Master to supervise cargo operations on board the vessel.

9.2 Watch Keeping

Adequate crew shall be on board at all times to maintain a proper watch and to operate the appropriate shipboard equipment in case of an emergency condition.

9.3 Access to Cargo Area

As far as it is practical, access to the cargo area or gas dangerous zones of the vessel shall be restricted to personnel directly involved in handling and safety maintenance procedures.

10 Communications

10.1 Agreement

- 10.1.1 Prior to the start of cargo operations, the Master and the Terminal shall agree on the primary means of communication between the vessel and the shore.
- 10.1.2 Information relating to routine and emergency communications between the vessel and the Terminal shall be prominently displayed.

10.2 English Language

Communications between the vessel and the Terminal shall be in the English Language.

10.3 Primary Means

- 10.3.1 Primary means of communication between the vessel and the Terminal shall normally be by an approved portable radio supplied by Saudi Aramco.

NOTE: Replacement batteries for the Saudi Aramco radios are available from the Terminal on request.

- 10.3.2 A portable radio loaned to the vessel by Saudi Aramco shall be continuously monitored by the person responsible for cargo operations on board.

10.4 Serious Emergency Condition

A responsible Senior Officer of the vessel shall be designated to communicate with a Senior Representative of Saudi Aramco in the event of fire, explosion or other serious emergency condition on board the vessel.

11 Ventilation and Openings

11.1 Accommodation and Service Spaces

- 11.1.1 All air intakes and openings of the accommodation, service and control station spaces shall each be provided with well maintained, efficient and readily available closing devices capable of preventing the passage of dangerous substances into those spaces.
- 11.1.2 If at any time it is suspected that dangerous substances are being drawn into the accommodation, central air conditioning and mechanical ventilating systems shall be stopped and intakes closed or covered.
- 11.1.3 Window type air conditioning units shall be disconnected from the power supply.

11.2 Cargo Control Rooms

Cargo control rooms used for the monitoring of cargo operations and/ or the remote operation of cargo and other valves or machinery required for cargo operations shall be continuously ventilated by mechanical means.

NOTE: Saudi Aramco recommends that in the interests of safe cargo operations, cargo control rooms be air conditioned, particularly during the summer months.

11.3 Cargo Machinery Spaces

- 11.3.1 Cargo machinery spaces shall be provided with approved mechanical ventilating systems, which shall be in continuous operation except as may be required in an emergency condition.
- 11.3.2 When it is practical, the ventilating system of cargo machinery spaces containing electric motors shall be so arranged as to maintain a positive pressure in the space.
- 11.3.3 Doors, scuppers and drain openings leading to the open cargo area deck from cargo machinery spaces containing electric motors shall be kept closed except when they may be required for routine inspection or maintenance.

11.4 Air Locks

- 11.4.1 When air locks are provided to any enclosed space in the cargo area, the two or more doors forming the air lock shall be maintained in a substantially gas-tight condition and each door shall be capable of self-closing without any holding back arrangements.
- 11.4.2 Alarms and/or automatic machinery trip systems fitted to air locks and activated by improper use of the air lock shall be maintained in the correct working order.

12 Transfer Connections

12.1 OCIMF Recommendations

Aramco supports OCIMF recommendations for gas tanker manifold standards (0 °C to minus 104 °C) as a means of providing safe RLPG transfer connections.

12.2 Loading Arms

12.2.1 Loading arms shall be connected to the vessel so that stress or strain, particularly at the maximum loading rate, will not cause the loading connections to leak.

12.2.2 Under normal operating conditions, loading arms will not be connected or disconnected until it is demonstrated to the satisfaction of the Terminal that the vessel's loading connections are free of cargo liquid and at atmospheric pressure.

12.3 Loading Connections

12.3.1 The clear space surrounding each loading connection (Quick Connect Disconnect Coupling "QCDC") shall be adequate (including proper spacing and support for the loading arm jacks), to ensure that the connection can be safely made, unmade and inspected by the Terminal, and to ensure that in an emergency the loading arms and QCDCs can be safely retracted by remote control.

12.3.2 Every precaution shall be taken to ensure that there is no release of cargo gas or liquids from the vessel or loading connections when loading arms are being connected or disconnected.

12.4 Vapor Return

The gas tanker shall be connected to at least one vapor return line for the principle purpose of ensuring that pressure within the vessel's cargo system does not exceed operational limits.

12.5 Blanks (Blind Flanges)

All cargo containment and cargo system pipeline connections capable of being readily opened to atmosphere (other than safety relief valves) shall be efficiently blanked (blinded) with gas-tight seals prior to berthing.

12.6 Flexible Hoses

Flexible hoses and other temporary connections shall be disconnected from the permanent cargo system.

12.7 Manifold Strainers

- 12.7.1 Means shall be provided in vessels equipped with strainers for the Terminal to confirm prior to the start of loading that such filters are clear and do not restrict the free flow of RLPG to the vessel. Vessels are advised to use a manifold strainer mesh suitable for LPG with a normal aperture of between 3.0mm and 5.0mm as detailed in SIGTTO/OCIMF 'Recommendations for Liquefied Gas Carrier Manifolds'.
- 12.7.2 All LPG ships fitted with strainer must have the mesh size of more than 0.84mm/20mesh. Ships that do not comply with requirement should remove such strainer prior berthing to avoid back pressure and blockage.
- 12.7.3 Permission to clear or replace blocked manifold cargo strainers at the berth shall be at the sole discretion of the Terminal and when such permission is given, every precaution shall be undertaken to ensure the safe conduct of necessary procedures.

12.8 Manifold Reducers and Spool Pieces

- 12.8.1 Reducers or spool pieces supplied by the vessel to facilitate the connection of the loading arms shall be approved for the purpose, suitable for the grade of cargo or bunkers to be handled and shall be in place prior to arrival at berth.
- 12.8.2 The vessel's flanges shall be well maintained and free from corrosion, pitting or deep scoring, which may permit leakage during handling.

13 Cargo Machinery, Equipment and Instruments

13.1 General

Prior to arrival at the berth, all the vessel's machinery, equipment instruments and their respective alarm systems provided for the proposed cargo operations, shall be tested and adjusted or calibrated as necessary to ensure their reliability during cargo operations.

13.2 Cargo Machinery

All cargo machinery including cargo reliquification units, cargo vaporizers, cargo gas blowers, pressure relief valves, compressors, main cargo pumps, booster pumps shall be approved for the purpose and be maintained in good condition.

13.3 Cargo Machinery Spaces

- 13.3.1 When approved gas-tight bulkheads are provided between a cargo machinery space and any associated electric or motor switchboard space, the seals and other approved arrangements to prevent the passage of dangerous gas from the cargo machinery space to the electric motor or switchboard space shall be maintained in good condition.

13.3.2 Cooling water discharges from cargo machinery spaces shall be discharged on the offshore side.

13.4 Liquid Level Gauges

13.4.1 Not less than one approved means of measuring the liquid level shall be provided for each cargo tank.

13.4.2 Cargo tank sighting ports shall, if the vessel is so equipped, be maintained in a good and gas-tight condition and each such port shall be equipped with a suitable protective cover.

13.5 Pressure Gauges

13.5.1 Not less than one means of accurately indicating the vapor pressure shall be provided for each cargo tank.

13.5.2 Not less than one means of accurately indicating pressure in each liquid and vapor cargo manifold shall be provided.

13.5.3 A local reading pressure gauge shall be provided at each of the vessel's loading connections.

13.5.4 Each hold space or inter-barrier space that is required to be maintained in the inert condition shall be provided with a means of accurately indicating the space pressure.

13.6 Temperature Gauges

Not less than two temperature indicating devices shall be provided for each cargo tank, one placed at the bottom of the tank and the second near the top of the tank at or directly below the MATFL.

13.7 Safety Pressure Relief Valves

When approved means are provided for altering the settings of cargo tank safety gas pressure relief valves, they shall be set prior to arrival at the berth in the appropriate position for the proposed cargo operations.

13.8 Cargo Drains and Sampling Connections

Cargo line drain, cargo sampling and similar cargo containment or cargo system connections shall be effectively closed and gas-tight except when required by the Terminal or the vessel in the execution of agreed sampling procedures.

13.9 Cargo Tanks

When a cargo tank is provided with insulation, the insulation shall be maintained in a good condition.

13.10 Cargo System Pipelines and Valves

- 13.10.1 Pipelines, which may contain cargo as a liquid or gas, shall be well maintained and free of significant corrosion.
- 13.10.2 Non-approved temporary repairs to defective cargo system pipelines and valves are unacceptable.
- 13.10.3 All cargo pipeline insulation shall be maintained in good condition.
- 13.10.4 Cargo system valves, and when provided, their remote control and position indicating systems, shall be maintained in an efficient condition.

13.11 Failure or Malfunction

Failure or malfunction of any essential cargo machinery, equipment, instruments or their respective alarms during cargo operations shall be brought to the immediate attention of the Terminal.

14 Venting, Vapor Return and Cargo System Pressure

14.1 Venting

- 14.1.1 The controlled venting of dangerous substances to atmosphere other than by means of the vapor return line is strictly prohibited.
- 14.1.2 The manual operation of cargo system safety pressure/vacuum relief valves, or the operation of any pressure or vacuum relieving systems other than safety relief valves and the vapor return system is prohibited.

14.2 Vapor Return

- 14.2.1 Prior to the start of cargo operations, the procedures for use of the vapor return or vapor recovery systems shall be agreed by the Master in writing.
- 14.2.2 At least one vapor return line connection shall be maintained at all times for the principal purpose of ensuring that pressure within the vessel's cargo system does not exceed defined limits.
- 14.2.3 The use of either the shore recovery system or the shore flaring system, when the vapor return system is open, will be at the discretion of the Terminal.
- 14.2.4 When only one vapor return line is available and more than one grade of cargo is handled, the adequacy of that one vapor return line to ensure compliance with the safety principals of these rules shall be mutually agreed between the Master and the Terminal before cargo operations are started.
- 14.2.5 The acceptance of any vapors returned from a vessel for the purpose of processing in a shore vapor recovery system is entirely at the discretion of Saudi Aramco. Vapors not accepted for recovery shall be flared off and Saudi Aramco

reserves the right to recover from the vessel the cost of any Saudi Aramco product, which may be lost as a result.

14.3 Cargo Tank Pressure

- 14.3.1 Cargo tank pressures shall be constantly monitored by a responsible person from the vessel for the purpose of ensuring that the maximum safe pressures are not exceeded.
- 14.3.2 The pressure of any cargo tank shall be maintained within the range between zero gauge minimum (atmospheric pressure) and a maximum, which shall not exceed 70% of the MARVS for that cargo tank or at the discretion of Saudi Aramco
- 14.3.3 Whenever the pressure of any cargo tank reaches 60% of the MARVS or such lesser percentage as may be required by Saudi Aramco the Terminal shall be advised and the loading rate shall be reduced.
- 14.3.4 Whenever the pressure of any cargo tank reaches 70% of the MARVS or such lesser percentage as may be required by Saudi Aramco the Terminal shall be advised and loading operations shall be suspended and the cause of the pressure increase investigated. This delay cost will be to vessel's account.
- 14.3.5 The dangers of developing a negative pressure condition in the cargo containment system or cargo system shall be recognized and adequate precautions taken to avoid the introduction of atmospheric air into a flammable product.

14.4 Cargo System Pressure

The pressure in cargo pipelines and other parts of the cargo system shall be maintained to ensure an adequate safe margin between the pressure generated during cargo operations and the approved setting of safety pressure relief valves in the pipelines or cargo system.

14.5 Pressure Relief Valves

- 14.5.1 Safety pressure relief valves provided for hold spaces or interbarrier spaces maintained in the inert condition and may discharge directly to atmosphere if the system is so designed.
- 14.5.2 When any liquid accumulates in the venting system downstream of safety pressure relief valves so as to provide a potential for valve malfunction or when there is any cargo leakage past a safety pressure relief valve, cargo operations shall be stopped and the vessel shall, at the discretion of the Terminal, vacate the berth until the accumulated liquid is drained and the venting system is gas-free.

15 Cargo Stowage

15.1 Cargo Information

- 15.1.1 Provision shall be made by the vessel to ensure the availability of information data on the physical and chemical properties of the RLPG and of any other dangerous or unstable substance, which may be on board the vessel on arrival.
- 15.1.2 When a gas tanker has on board any cargo other than propane (C3) or butane (C4), the Master shall provide such information concerning the cargo as may be required for the purpose of determining acceptance of the vessel by Saudi Aramco. When the other cargo is butadiene or other substance subject to the requirements of the IMO Gas Tanker Code for Certificate of Inhibition, the Master shall provide Saudi Aramco with appropriate Certificate giving details of the inhibitor added to the cargo.

15.2 Cargo Segregation

- 15.2.1 Prior to the start of cargo operations, a copy of the cargo stowage plan, which shall include existing and proposed stowage of all cargo on board the vessel, shall be provided to the Terminal, and the plan shall be regularly updated and maintained on the vessel during loading.
- 15.2.2 Any part cargo, cargo residues or coolant on board on arrival which is not in accordance with the Saudi Aramco classification of propane (C3) or butane (C4) shall be maintained in a segregated cargo system.
- 15.2.3 The transfer of any dangerous substances other than propane or butane from a segregated cargo system to any other part of the cargo system is prohibited.
- 15.2.4 Propane shall not be loaded into cargo tanks containing butane liquids classed as part cargo, cargo residues or coolant.
- 15.2.5 Butane shall not be loaded into cargo tanks containing propane liquids classed as part cargo, cargo residues or coolant.
- 15.2.6 The mixing of butane and propane liquids in a vessel's cargo tanks or in any other part of the cargo system is prohibited. Except when purging, injecting antifreeze or the mixing of butane or propane with any other substance on board is also prohibited.
- 15.2.7 When handling fully refrigerated propane or butane separately or concurrently, every precaution shall be taken to prevent any hazardous physical reactions by selecting cargo tanks with separate liquid pipeline arrangements.
- 15.2.8 Part cargo and cargo residues of propane and butane that are not to be commingled with propane or butane from Saudi Aramco shall also be maintained in a safe condition to prevent leaks or the venting of gas to the atmosphere.

15.3 Cargo Contamination and Samples

- 15.3.1 It shall be the responsibility of the Master to ensure that RLPG loaded and/or commingled at Saudi Aramco berths is not contaminated or altered by any part cargo, cargo residue, or any other substance.
- 15.3.2 Whenever samples are required to be taken from the cargo system of a gas tanker by Saudi Aramco, the Master shall make proper provision to allow the sample to be obtained by a Saudi Aramco Representative.
- 15.3.3 Contaminated vapor (as may be determined at the sole discretion of Saudi Aramco) shall not be accepted for processing in a shore vapor recovery system.

15.4 Ammonia Vapor in Cargo Tanks

- 15.4.1 If the previous cargo carried by a vessel was ammonia, the vessel must arrive with the cargo tanks inerted and with an oxygen content of 5% or less.
- 15.4.2 The maximum allowable ammonia content in the cargo tank atmosphere will be 20 ppm by volume.

15.5 Excess Loading

Every precaution shall be undertaken to ensure that cargo is not loaded in excess of the agreed quantity or the vessel's MATFL. In agreeing the cargo quantity to be loaded, the Master shall take note that Saudi Aramco does not provide facilities for the discharge of LPG. The potentially disastrous consequences, which may result from over filling a cargo tank with RLPG, shall be recognized.

16 Coolant, Purging and Cool Down

16.1 Coolant

- 16.1.1 Prior arrangements shall be made with Saudi Aramco for cargo operations involving coolant loading, purging and cooling down.
- 16.1.2 It shall be the responsibility of the Master to determine the quantity of any coolant required by the vessel for the purpose of purging and/or cooling down of the cargo system to the standards required by these rules. Saudi Aramco shall be advised of this requirement not less than 72 hours prior to arrival of the vessel. The Master shall estimate the time required to safely complete purging or cooling down and the Terminal shall be so advised.
- 16.1.3 Any coolant supplied whether for purging or cooling down, shall not be loaded into more than one cargo tank (excluding deck tanks) designated for that purpose by the Master and agreed to by the Terminal.
- 16.1.4 The use of an approved deck tank for coolant loading shall be at the discretion of the Terminal.
- 16.1.5 Prior to the start of coolant loading, the Master shall estimate the time required to safely complete loading and so advise the Terminal.

16.1.6 On completion of coolant loading, a gas tanker may, at the discretion of Saudi Aramco, be required to leave the berth and conduct any further purging or cooling down at anchor.

16.2 Purging

16.2.1 Purging of any part of the cargo system shall only be permitted subject to the approval of the Terminal.

16.2.2 When purging is permitted, displaced gas from the vessel's cargo system shall be disposed of by way of the vapor return system provided.

16.3 Cooling Down Cargo Tanks

16.3.1 Cooling down cargo tanks shall only be permitted when the tanks have been adequately purged so that any cargo system pressures generated by the loading of coolant can be safely contained by the vessel's reliquefaction system and/or the vapor recovery system if available.

16.3.2 Cooling down of any cargo tank shall only be permitted subject to the approval of the Terminal.

16.4 Suspended Operations During Purging and Cooling Down

Except for coolant loading associated with purging and cooling down, other loading operations shall be suspended until the Terminal is advised that purging and/or cooling down is completed.

17 General Cargo Operations Procedures

17.1 Precautions

17.1.1 Immediately prior to the start of cargo operations, it shall be confirmed that:

- a. All variable setting cargo system alarms are correctly set to the levels appropriate to the proposed and agreed cargo operations procedures.
- b. Due allowance has been made for the maintenance of acceptable pressures in cargo tanks containing part cargos or cargo residues.
- c. Safety pressure relief valves are correctly set.

17.1.2 The Terminal shall be advised when the vessel is ready in every respect for the start of cargo operations and every precaution shall be undertaken to ensure that when loading RLPG, the initial loading rate shall be such that cargo tanks and cargo pipelines are gradually and evenly cooled to prevent thermal stress or dynamic shock and avoid hazardous rates of pressure increase.

17.2 Loading Rates

17.2.1 The maximum safe loading rate shall be provided in writing and agreed with the Terminal prior to the start of cargo operations.

17.2.2 In determining the maximum loading rate, every precaution shall be undertaken to ensure that the declared rate can be safely achieved and is compatible with the temperature of the cargo system, the capacity and efficiency of the reliquefaction system, the condition of cargo tank insulation, the load temperature and grade of cargo to be handled and the maximum cargo system pressures as designed.

17.2.3 When “topping-off” a cargo tank, every precaution shall be undertaken to ensure that the loading rate is compatible with a capability to safely stop loading into that tank when MATFL is reached.

17.3 Loading Temperature

17.3.1 The vessel will be advised of the RLPG temperature in the berth circulation line prior to the start of cargo operations and upon request to the Terminal during loading, and shall take note that significant cargo temperature increases can occur between the berth circulating lines and the vessel’s loading connection as a result of low loading rates.

17.3.2 While Saudi Aramco will endeavor to provide RLPG at the lowest practical temperature, there is no guaranteed maximum temperature of the RLPG delivered to the ship.

17.4 Concurrent Handling

17.4.1 It shall be the responsibility of the Master to determine the capability of his vessel to handle a number of different substances concurrently and the Terminal shall be so advised.

17.4.2 Permission to handle a number of different substances concurrently shall be at the discretion of the Terminal.

17.5 Cargo Measurement

The contents of all cargo tanks, including deck tanks, shall be measured in accordance with agreed procedures for the purpose of determining the total quantity of LPG cargo on board the vessel as part cargo, cargo residues or coolant:

- a. Prior to the start of any cargo loading operation.
- b. Whenever cargo operations are suspended and the vessel is required to vacate the berth for any reason other than an emergency condition.
- c. At the completion of loading operations.
- d. Whenever required by Saudi Aramco during cargo operations.

NOTE: Ju’aymah Gas Plant always transfers RLPG via shore turbine meters to ships. The turbine meters determine the amount of cargo loaded, which is verified by ship tank measurement in accordance with agreed procedures.

18 Ballast and Ship Fuel Oil Handling

18.1 General

- 18.1.1 Procedures for the safe and pollution free handling of ships fuel oils and ballast shall comply with these rules and be subject to the agreement of the Terminal.
- 18.1.2 The Deck Watch shall make frequent inspections of the vessel for the purpose of detecting any leakage of oil to the sea and the Terminal shall be immediately advised whenever any such leakage is detected.
- 18.1.3 The increased risk of pollution to the sea by oil from gas tankers when ship fuel oil and/or ballast is being handled shall be recognized and the appropriate IMO Conventions and other Port requirements shall be observed.

18.2 Ballast

The handling of ballast in segregated ballast tanks shall be at the discretion of the Master and every precaution shall be undertaken to ensure that the vessel is maintained in a stable condition, upright and with a suitable trim so that the vessel is ready to vacate the berth at short notice.

18.3 Ship Fuel Oil

- 18.3.1 Ship fuel oils shall normally be loaded concurrently with cargo provided that the Master and the Terminal agree that no unacceptable safety or pollution risk will develop.
- 18.3.2 The maximum safe loading rate for ship fuel oils shall be provided in writing and agreed with the Terminal prior to the start of bunkering.
- 18.3.3 Prior to the start of bunkering, the Master and the Terminal shall agree in writing as to the party responsible for determining when the nominated quantity of bunkers has been delivered.

18.4 Ballast and Ship Fuel Oil Tank Lids

Ballast and ship fuel oil tank lids shall be closed and secured except as may be agreed with the Terminal.

19 Gas Tanker Mooring

19.1 General

- 19.1.1 It shall be the responsibility of the Master and Crew to ensure that the mooring arrangement is adequate in all respects to maintain the gas tanker in the berthing position during cargo operations. The Master shall accept guidance and provide mooring lines additional to the minimum requirements whenever so advised by the Terminal.
- 19.1.2 All of the mooring lines used to secure the gas tanker at berth shall be constantly monitored and carefully tended throughout.
- 19.1.3 All of the mooring lines, mooring winches, roller fairleads, mooring and towage equipment with which the gas tanker is provided shall be in good condition and properly maintained.
- 19.1.4 Any defect or deficiency in the mooring and towage equipment with which the ship is equipped shall be reported to Saudi Aramco prior to arrival.

19.2 Anchors

- 19.2.1 On completion of mooring, the anchors shall be effectively secured and lashed in the hawsepipes so as to prevent their accidental use at berth.
- 19.2.2 Masters shall be aware of areas where use of anchors is prohibited due to the presence of underwater oil pipe lines and other submerged installations.

19.3 Mooring Winches

- 19.3.1 Subject only to the suitability of mooring line leads (fairleads/chocks) every gas tanker shall utilize all of the mooring lines mounted on independent mooring winches.
- 19.3.2 All mooring winches shall be ready for immediate use.
- 19.3.3 Any mooring line used that is not mounted on an independent mooring winch shall be turned up on a set of mooring bitts. The mooring winch brake must be set whenever the winch is unattended.

20 Appendix - Glossary of Terms and Abbreviations

Administration

The Government of the country in which the gas tanker is registered.

Anti-Freeze

A substance introduced to the cargo system of a gas tanker for the purpose of preventing or reducing the formation of water ice crystals or hydrates.

Approved

Equipment, material or procedures approved by an Administration or otherwise recognized by International Codes in the absence of an Administration approval. It shall also mean equipment of a design that has been tested and certified for use under given hazardous conditions and approved by an appropriate authority. The authority shall have certified the equipment as safe for use in a specified hazardous atmosphere.

Authorized Person

Any person authorized by the Government of Saudi Arabia to exercise the power or perform the duties in respect of which the expression is used.

Berth

Any berth, dock, pier, jetty, quay, wharf, mooring, anchorage or terminal at which Aramco is the authorized person in charge.

Butane (C4)

A commercial grade of C4 LPG consisting predominantly of butanes and/or butylene's. The general Saudi Aramco code number for this product is A-160 and it is classified as a dangerous substance.

Cargo

Products listed in Chapter XIX of the IMO Codes for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk and its successors.

Cargo Area

That part of a gas tanker, which contains the cargo containment system and cargo machinery, spaces and includes the deck areas over the full beam and length of the ship above the foregoing.

Cargo Machinery

Cargo pumps, cargo compressors, cargo vaporizers, cargo gas blowers, inert gas generators, their motors, control equipment, and other cargo handling equipment. It shall also include where appropriate, primary and emergency power supply, circulating pumps, other auxiliary machinery and equipment essential to the safe and efficient operation of the cargo machinery.

Cargo Machinery Spaces

Any space in the cargo area of a gas tanker which contains cargo machinery.

Cargo Control Room

A space on board a gas tanker designed and equipped for the control of cargo handling and other cargo related operations.

Cargo Containment System

The arrangement for the containment of cargo on gas tankers including, if fitted, a primary and secondary barrier, associated insulation and any intervening spaces and adjacent structure if necessary for the support of these elements

Cargo Residues

Quantities of cargo on board the vessel on arrival at the berth totaling less than 10% of each compatible cargo grades to be loaded.

Cargo System

The cargo tanks, deck tanks, cargo machinery and their related pipelines, valves, control systems and ancillary equipment designed and provided for the containment, control and handling of cargo on gas tankers.

Cargo Tank

The liquid tight shell designed to be the primary container of cargo and includes all such containers whether or not associated with insulation and/ or secondary barriers.

Certificate of Fitness

A certificate issued to a gas tanker by or on behalf of an Administration in accordance with the relevant codes for the construction and equipment of gas tankers certifying that the construction and equipment of the said vessel are such that certain liquefied gases may be carried in the vessel.

Coolant

RLPG loaded into a gas tanker or liquefied gas stored onboard a Gas Tanker for the purpose of purging and cooling down the vessel's cargo system.

Cooling Down

The procedure by which the temperature of the cargo system on a gas tanker is reduced to a level compatible with these rules.

Commingle

The mixing of Saudi Aramco RLPG with any part cargo or other similar and compatible RLPG on board a gas tanker.

Dangerous Substance

Any substances shipped in bulk and subject to the requirements of the IMO Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk and its successors, in so far as such substances may constitute a hazard to those in the Port area or environment and shall include gaseous mixtures of which such substances form a constituent part.

Deck Tank

A deck mounted cargo tank; that is, an approved tank, which may be provided on a gas tanker for the stowage of coolant, cargo or other substances, and be capable of being efficiently segregated from other parts of the cargo system.

Emergency Condition

A hazardous situation, which is a radical departure from normal, operating conditions and which constitutes an immediate or potential threat to human life or property.

Emergency Shutdown

An approved system designed to shut down the cargo system of a gas tanker from one or more remote locations on board the vessel in the event of an emergency condition.

Emergency Procedures

Written procedures approved by the Administration and/or the Owners of a gas tanker for the efficient control and containment of an emergency condition on board the vessel.

Gas

Gas and/or vapor when used in respect of gas tanker cargo containment systems, cargo systems and cargo handling.

Gas Tanker

A special purpose vessel constructed and equipped for the transportation of liquefied gases in bulk.

Gas Dangerous Zone

Zones or spaces on board a gas tanker designated as gas dangerous by the Administration or zones or spaces recognized as gas dangerous by international codes in the absence of an Administration designation.

Handling

The operation of loading and unloading a gas tanker, transfer of substances to or from or within a gas tanker, and ullaging, sampling, sounding or other ancillary operations at the berth.

Hold Space

The space on a gas tanker enclosed by the vessel's structure in which a cargo containment system is situated and may elsewhere be referred to as a Void Space.

Interbarrier Space

The space on a gas tanker between a primary and secondary barrier, whether or not completely or partially occupied by insulation or other material and may elsewhere be referred to as a Void Space.

Inert Gas

A gas which is incapable of supporting combustion and is chemically and operationally compatible with RLPG at the temperatures likely to occur within the spaces to be inerted on a gas tanker. It is classified as a dangerous substance and may be supplied to the vessel or manufactured on board.

Inerting

The process of providing a non-combustible environment by the addition of compatible inert gas. Inerted or Inert Condition means that the atmosphere of the space to which it refers is incapable of supporting combustion.

LPG

A Liquefied Petroleum Gas consisting predominantly of butanes, propane, butylene's and propylene or mixtures of them, which can be retained in a liquid form by compression or refrigeration or a combination of compression and refrigeration.

Loading Arm

An articulated pipeline assembly and associated pieces used for the purpose of transferring petroleum products including RLPG between the berth and a gas tanker and may be elsewhere be referred to as a Hard Arm.

Loading Connection

The associated pieces of a loading arm used to connect it to a gas tanker's cargo or bunker manifold presentation flange; and related to a vessel means that section of the cargo or bunker manifold between the presentation flange and the first efficient valve.

Manifold

The pipelines of a gas tanker's cargo or bunkering system provided for the purpose of transferring RLPG or bunkers between the vessel and the berth.

Manifold Area

That area or areas of a gas tanker in which the cargo and/or bunker manifolds are situated.

MARVS

The approved Maximum Allowable Relief Valve Setting of a cargo tank.

MATFL

The Maximum Allowable Tank Filling Level, i.e., the maximum level as approved by an appropriate authority and to which any cargo tank of a gas tanker may be safely loaded with liquid cargo.

Master

Means, when used in relation to a gas tanker, any person (other than a Pilot) having the command, charge or management of the vessel for the time being and may be construed in these rules, at the option of the master, as a responsible person delegated by the Master to undertake general or specific duties in liaison with the Terminal Representative, provided that the Master shall at all times have sole responsibility for the application of these rules.

Mean Temperature

The average temperature indicated by the total number of efficient temperature sensing devices installed in the space or that part of the space to which it refers.

NGL

Natural Gas Liquids, a feedstock from which LPG is produced.

Operating Manual

Written procedures approved by the Administration and/or Owners of a gas tanker for safe and efficient cargo handling, transfer, gas-freeing, ballasting, tank cleaning and changing cargos.

Part Cargo

Quantities of cargo on board the vessel on arrival at the berth totaling 10 percent or more of each of the compatible cargo grades to be loaded.

Pressure

Force per unit area. A positive pressure means a pressure in excess of the atmospheric pressure and a negative pressure means a pressure less than atmospheric.

P.S.I.: Pounds per square inch.

Mbs: Millibars (thousandths of a bar).

Kg/cm²: Kilograms per square centimeter.

Pressure Recorder

An instrument designed to continuously monitor and record pressures in cargo tanks and/or other spaces or units of the cargo containment or cargo system.

Propane (C3)

A commercial grade of C3 LPG consisting predominately of propane and/or propylene. The general Saudi Aramco Code Number for this product is A-140 and it is classified as a dangerous substance.

Purging

The introduction of a suitable gas (inert gas or cargo gas depending on the situation) for the purpose of displacing an unacceptable atmosphere in all or part of that system.

Responsible Person

A competent person, i.e., a person possessing qualifications, training and experience which satisfies the appropriate authority that he is competent to carry out the duties required of him.

Reliquefaction System

Means, in respect of gas tankers, a system, which regulates the pressure in the cargo, tanks by means of mechanical refrigeration.

Reliquefaction Unit

An independent section of the reliquefaction system of a gas tanker which usually consists of one or more compressors with their driving motors, control systems and any other necessary equipment, such as heat exchangers, which will permit the unit to operate independently of the remainder of the reliquefaction system.

RLPG

Fully refrigerated LPG, i.e., LPG at a temperature corresponding to the boiling point of that LPG at atmospheric pressure.

Saudi Aramco

The Saudi Arabian Oil Company (Saudi Aramco) as the authority in charge of operating the berth at which these rules apply.

Service Spaces

Spaces outside the cargo area used for galleys, pantries containing cooking appliances, lockers and storerooms and workshops other than those forming part of machinery spaces. Cargo service spaces are spaces within the cargo area used for workshops, lockers and storerooms of more than two square meters in area.

SIGTTO

Society of International Gas Tanker & Terminal Operators.

Skilled Person

A person having the knowledge and experience to perform a certain duty.

Span Gas

An approved gas mixture formulated and certified for the purpose of calibrating and testing gas detection equipment with which a gas tanker may be provided.

Terminal Representative

The responsible person or persons designated by Saudi Aramco to exercise the power or perform the duties in respect of which the expression is used.

Unstable Substance

A substance, which may present a hazard under transport or storage, conditions due to spontaneous reaction (polymerization, decomposition, etc.) unless the necessary specific precautions have been taken to prevent such a hazard (e.g., inhibition, dilution, refrigeration) or other equally effective measures.

Vapor Return System

A system provided at the berth, which enables a gas tanker to transfer gas vapor ashore.