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Loading Plan – Part 1

Instructions – Refer to SMS Doc	
1.	*To be reviewed and approved by the Master and where applicable the Chief Engineer*
2.	*Circulated and cross checks by ALL officers engaged in the Cargo Operation.*
3.	*Follow the plan and Port specific Loading Operation Manual without deviation at all time.*
4.	*If an approved Port specific plan is available, this should be followed as per #3 and replicated in to this plan.*
5.	*Whenever review of an approved port specific finds circumstances have changed or it is deemed unsafe, it must be reported to the Office and/or parties concerned on site and never proceed without the approval from the office and/or terminal/cargo buyer or seller's representatives.*

General			
Vessel	LNG Carrier	Voyage No.	2.1
Date		Port	

TERMINAL	LNG Marine Terminal		
PRODUCT/STOWAGE	LNG	Normal LNG	
QUANTITY after Loading	98.5% = 170,644 m3 (TOV)	Ship's STOP	
LNG DENSITY	425.4 kg/m³		
TEMPERATURE	-159.8deg C		
VISCOSITY	N/A		
POUR POINT	N/A		
REID VAPOUR PRESS	N/A		
SEA WATER DENSITY	1,025 kg/m³		
MANIFOLD CONNECTION	L4 - L3 – V - L2 - L1	PORT SIDE	
LOADING RATE	12,000 m³/h	Shore Max.	4 arms
LOADING TIME	Approx. 12.5 h (bulk) + 2 h (RU & RD)		
POLLUTION CATEGORY	N/A		
UN / MFAG NUMBER	1972 / 1971 / 620		
EXPLOSIVE RANGE	5-16 % by volume		
RELATIVE GAS DENSITY	0.554 (AIR=1)		
T.L.V.	1,000 ppm	Based CH4	
FLASH POINT	-175 deg C		

REMARKS:

- density of seawater and cargo temperature to be confirmed on arrival
- port side alongside used for cargo system line up
- this plan is subject to change in accordance with terminal instructions and mutual agreement
- max draft at berth: 15.0 m / max trim alongside 2.00 m/ berth depth 15.0 m
- vessel to arrive cargo tanks and cargo lines in ready to load conditions
- arm c/d to be completed before start loading

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DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX		DRAFT		TRIM
		SF	BM	FWD	AFT	
ARRIVAL CONDITION:		31.3 %	40.8%	9.09	9.12	0.03
CARGO [m³]:	202.6					

TANK No. 1 @ 0.13 m	75.3
TANK No. 2 @ 0.03 m	37.5
TANK No. 3 @ 0.03 m	38.6
TANK No. 4 @ 0.04 m	51.2
TOTAL VOLUME AT COMPLETION [m³]:	202.6 m3

BALLAST [MT]:	50,379

Water Ballast Quantity at Arrival Load Port

Water Ballast Tanks	Sounding (m)	Volume (m3)
FPT	0.00 m	0 m3
Frwd Port	15.26 m	1,897 m3
Frwd Stbd	15.26 m	1,897 m3
No. 1 Port	12.06 m	4,832 m3
No.1 Stbd	12.06 m	4,832 m3
No. 2 Port	12.76 m	4,566 m3
No. 2 Stbd	12.76 m	4,566 m3
No. 3 Port	25.93 m	6,427 m3
No. 3 Stbd	25.93 m	6,427 m3
No. 4 Port	25.95 m	6,083 m3
No. 4 Stbd	25.95 m	6,083 m3
E/R Port	0.00 m	0 m3
E/R Stbd	0.00 m	0 m3
APT	15.04 m	1,461 m3
Total:		**49,068 m3**
		50,378 MT

DEPARTURE CONDITION:	
CARGO [m³]:	170,644
BALLAST [MT]:	1,445

Loading Plan

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DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT AFT	TRIM

Water Ballast Quantity Departure Load Port

Water Ballast Tanks	Sounding (m)	Volume (m3)
FPT	20.69 m	1,466 m3
Frwd Port	0.00 m	0 m3
Frwd Stbd	0.00 m	0 m3
No. 1 Port	0.00 m	0 m3
No.1 Stbd	0.00 m	0 m3
No. 2 Frwd Port	0.00 m	0 m3
No. 2 Frwd Stbd	0.00 m	0 m3
No. 3 Aft Port	0.00 m	0 m3
No. 3 Aft Stbd	0.00 m	0 m3
No. 4 Port	0.00 m	0 m3
No. 4 Stbd	0.00 m	0 m3
E/R Port	0.00 m	0 m3
E/R Stbd	0.00 m	0 m3
Total:		**1,466 m3**
		1,505 MT

CARGO TRANSFER OPERATION SUMMARY:		
QUANTITY TO LOAD [m³]:	170,441	
HEEL ON ARRIVAL [m³]:	202.6	
STOPPINGLEVELS [m] / VOLUMES [m³]:		(Levels shown are for even keel condition)
TANK No. 1 @ 28.368 m	24,844	
TANK No. 2 @ 28.163 m	48,600	
TANK No. 3 @ 28.163 m	48,600	* … Approx. 50 m³ expected to drain back
TANK No. 4 @ 28.163 m	48,600	
TOTAL VOLUME AT COMPLETION [m³]:	170,644	

1. COOL DOWN OF THE CARGO TANKS

Cargo tank cool down & liquid lines cool down will be undertaken before arrival as per charterer's instructions.

(*Vessel will arrive in cargo tanks cold condition – ready to Load):*

Cool down is considered to be complete when the ART, temperature of the four lower sensors in each tank indicate an average temperature of -130 °C or lower and when CTS registers the presence of the liquid in the cargo tanks.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

2. MOORING & ARRIVAL:

The vessel shall berth PORT side alongside at LNG Marine Terminal. On arrival at stations Officers to check that all vents on winches are opened and secured properly. All winches to be tested and report this to the bridge. All lines to be made fast on the split drum, close supervision of the mooring crew is to be kept to ensure that the transfer to the split drum and working of tug lines is undertaken safely. Particular attention is required for the Aft springs, due to the short lead to transfer to split drum. Please ensure that you familiarise yourself with the anticipated mooring arrangement prior to arrival.

You should also be familiar with the contents of Mooring Procedures in the Safety Management System manual and ensure that mooring practices conform to these guidelines and to the Code of Safe Working Practices and the OCIMF Effective Mooring booklets. Mooring wires are marked for this terminal for changeover to split. Lower rope tails to 1.5 m above the water.

Once the vessel is all fast, please confirm that all mooring winch split drums have been correctly arranged, prior to standing down (a minimum of 4 full turns and not more than one complete layer on the tension drum). Also check all winches are out of gear with the clutch engaging handle safety pins in place.

OOW is to check that all band brakes are correctly applied on 60% MBL.

Anchors have to be unlashed, compressor bar down with the pin out. Also the anchor cable should not be touching the compressor bar. The bar should be such that it can be lifted in an emergency.

Duty officer has to check the correct tension is set on all the wires.

The minimum is to be 10 t (100 kN) and maximum of 40 t (400 kN) if tension monitor providede

Deck watch should monitor moorings regularly and report to OOW at least hourly regarding same. OOW is to be informed prior to any adjustments. Keep a good check of the ship's position relative to the vapour arm.

Fire wire is to be rigged so wire eye is 2 meters above the water level.

On completion of mooring operations the ship's outboard accommodation ladder is to be swung out and lowered to approximately 3 meters above the water as an emergency escape route.

Shore gangway is provided, ensure this is safely rigged.

Cradle clamp pins to be removed from sea side lifeboat. Painter is to be rigged.

Fire plan is to be put next to the shore gangway.

All scupper plugs should be in place and all external accommodation doors to be closed.

Officer Fwd and Aft to obtain a set of visual draughts and draughts from gauges and loading computer on arrival and before sailing. This will be recorded with the cargo information for comparison.

Prior to safety inspection OOW to check that manifold dry powder monitor valve is opened. A safety inspection is made by a Terminal Representative (Loading Master) and the Officer in the watch.

The OOW shall meet officials in the CCR or at the Gangway.

During this time the communication links are tested.

During cargo operations regular rounds of the Upper Deck, Trunk Deck and over the side should be made by the watch keeper and reported to the OOW at least once every hour. The results of the rounds should be entered in the Deck Operations Logbook. Any abnormalities should be reported to either the Chief Officer or Cargo engineer. QOB, Hourly rate, and Manifold pressures should be entered into their appropriate forms at least once every hour.

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DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

Every operation should be entered in the Deck Operations Logbook for future reference. Visual draughts are to be compared w Loading Computer ShipManager-88 / IAS on arrival and at the end of watch (day time only).

Once the Vessel is securely moored and Steam is Off, Gangway can be landed. The Liquid & Vapour arms will be connected along with the ESD Cable and only shore personnel is to handle the ESD/communication cables.

Cargo Engineer shall be supervising at the Manifold.

The ship should be kept upright and on even keel for CTMS, which will be done once all arms are connected and purged. After the CTMS, probably two warm ESD tests will be carried out prior to arm cool down. Ship's Electrician should supervise ESD tests and functionality of our systems.
The first ESD will be OPTIC from the ship and then PNEUMATIC from the shore.
Whessoe comparison will be done as well.
After the ESD tests, we will start with arm cool down.
Cold ESD will be carried out after shore arms/ship lines and cargo tanks cool down is completed.

Safety Note – Line up of the cargo system:
The Chief Officer and Gas Engineer should check this independently and this should be recorded in the cargo log.

Safety Note – Vent mast mode:
The forward riser vent valve should NOT be in manual mode/inhibited in port. The only exception to this is if it is a terminal requirement which must be recorded in the log.

Safety Note - Procedure for OVERRIDDING the safety / tank protection system:
At no time shall any cargo safety system be overridden by:

- Inhibiting
- Disconnecting
- Bypassing
- Switching off the system
- Any other method, this is to include the level alarms, pressure alarms and temperature alarms.

Should it become necessary to override any of these safety systems both the override and the restoration is to completed by chief officer and the Master must witness this event.

A separate log/Record sheet should be maintained for recording dates/times and the reason for the override and when they are reset/restored. This record acts as the Masters written approval.

In addition to this record as a double check the appropriate section of the print out from the IAS event log must be signed by both the Chief Officer and the Master whenever the system is overridden or restored.

If for any reason this is not possible an extract of the IAS event log for the override / restore is to be printed and signed and kept with the above log/record.

Whenever the safety system is overridden a notice is to be posted on the IAS operating console warning that the Alarm system is overridden.

While the system is overridden the cargo tanks / system must be monitored until the alarm system is brought back to normal status.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM
The system shall be returned to normal status as soon as possible.						

Safety Note:

A Watch Keeper must patrol the whole Trunk Deck area during during Ramp Up Operations to monitor for all potential cargo leaks. All leaks, even the smallest one, must be reported immediately to CCR.

Whenever the Chief Officer or Gas Engineer are present in the CCR, the OOW can periodically make additional rounds of moorings, trunk deck, manifold, gas house and over the ship's side.

In any case, thorough rounds to be made by the relieved OOW at the end of the watch and recorded in the deck log book.

1. ARRIVAL

- Start main Cargo and Ballast hydraulic pumps. Stop Topping-Up pumps.
- Water ballast lines filled with water
- Shipôs trim and list adjusted to be even keel and up right
- CTMS trim/list readings set to óAutoô
- Change status on CTS from ñSeagoingò to ñHarbourò
- CTMS snapshot at EOSP and POB
- Loading computer confirmed online and óAt seaômode
- Clocks synchronized
- Shipôs impressed current system switched off
- Inform engine when óAll fastô
- Setting of Warning Buoys by shore (if applicable)
- Connecting shore gangway aft of the manifold
- Water curtain started on terminal request
- Manifold drain scoops swung out
- Confirm that TOPS very high (99.0%) and (99.5%) level alarms are unblocked, and alarm delay set up to 0 (zero)
- IAS and CTMS snapshot schedule changed to hourly printing
  - Connecting ESD/communication link (Fibre Optic and/or Pneumatic)
- Checking ship/shore communication system:
- Setup Tension Monitor ï separate station provided by terminal
- Safety Round (Deck Officer to accompany shore representative)
- Lower Whessoe gauges and record stored and actual levels
- Pre-Discharging Meeting and Safety Documentation (all cargo loading procedures and precautions to be discussed)

2. PRE ARRIVAL CARGO LINE COOL DOWN (expected duration 2 hrs)

COOL DOWN OF THE LIQUID HEADER TO BE CARRIED OUT BEFORE ARRIVAL (TARGET TEMPERATURE -100°C or LESS)

Duties:

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT AFT	TRIM

- C/O ï in charge of operation, starting/stopping spray pump
- G/E ï on deck, operating manual valves as required
- Remaining crew ï pilotage, mooring operations

Preconditions:

- Confirm: TOPS system is active, and all delays are removed
- Double check line up by C/O and G/E, make entry in cargo log book
- Confirm: All doubleshut valves are shut
- Confirm: All unused manifold flanges are fully bolted and pressurized with nitrogen
- Confirm: All manifold coold down valves are fully shut

Initial valve setup:

- Branch valves (CL107, CL207, CL307, CL407) ï open
- Filling valves (CL200, CL300) ï shut
- Filling valves (CL100, CL400) ï open 15%
- Pump discharge valves (CL101, CL102, CL201, CL202, CL301, CL302, CL401, CL402) ï shut
- Reliq return (RL041, RL301, RL401) ï open
- Spray master valves (CS103, CS203, CS303, CS403) ï shut
- Spray return valves (CS103, CS203, CS303, CS403) ï shut
- Spray discharge valves (CS101, CS201, CS301, CS401) ï shut
- Spray to liquid crossover (CS071, CS703, CS705, CS803, CS805) ï open

Start spray pump #2:

- G/E to stanby locally at tank dome #2
- Open spray return (CS200) ï 100%
- Open spray discharge (CS201) ï 20% - to remove interlock
- Inform E/R
- Start spray pump
- Gradually close spray return (CS200) to increase pressure in spray header up to 200kPa

Cooling down:

- Open on each tank main cargo pump discharge valves 20%, when temperature on liquid header is below -100C to allow cooldown of pump discharge lines
- Also open for short time filling valves on CT #2 and #3 - 20% to cool down liquid return lines
- Liquid header cool down is completed when -100C or less is reached on crossover and liquid header
- Continously monitor cargo tank levels

Stop spray pump:

- Start closing spray discharge valve
- At the same time stop pump
- Close spray return valve

3. CARGO ARM CONNECTION

Duties:

- C/O ï standby in CCR, carry out pre-operation meeting.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

- Duty Officer ï standby in CCR.
- 1/O ï carry out safety round with loading master.
- G/E ï on manifold, supervise cargo arm connecting, line purging, pressure tests, ESD cable connection.
- Trunk deck watchmen ï on manifold, assisting G/E.
- Mooring watch ï Escorting visitors to CCR.
- Manifold watch ï on manifold, assisting G/E.

Arm connection:

Expected shore arm ï manifold configuration:

Ship	L4	L3	V	L2	L1
Shore	Liquid E	Liquid D	Vapour C	Liquid B	Liquid A

- Connecting hard arms (O_2/leak tests). G/E to assist on the manifold.
- Vapour arm to be connected first
- Arms purging and leak testing (500kpa liquid line, 200kpa vapour line)

  - » Open manifold vent valves on lines in use
  - » Supply N_2 into arms ï open N_2 supply valves
  - » Close N_2 supply valves
  - » Measure O_2 contents (less than 1% required) on the sampling points
  - » Repeat procedure until required O_2 value is observed
  - » Close manifold vent valves

4. OPENING CTMS

- Drain liquid header into cargo tanks
- Confirm: Vessel is up right and even keel
- Confirm: Trim/list readout is in auto mode
- Confirm: Cargo data and voyage settings
- Confirm: Unloading mode is selected
- Confirm: All ESD valves shut
- Confirm: Gas burning stopped
- Record cargo float gauges readings
- Open CTMS
- Printout gas flow meters

5. WARM ESD TEST

Duties:

- C/O ï CCR, Supervise operation.
- 1/O ï CCR, Carry out ESD tests in liaison with Loading Master.
- G/E ï at manifold, confirms operation of ESD valves, measuring closing time.
- Duty officer ï CCR, taking records.
- Trunk deck watchman ï as required.
- Mooring watchman ï checking moorings, escorting visitors to CCR.
- Gangway watch ï security watch at gangway.
- Manifold watch ï assisting G/E as required.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

Fibre Optic ESD: Ship initiate

Preconditions:

- Confirm: All double shut and cooldown valves port and stbd are fully closed
- Confirm: Fiber Optic is selected in ESD cabinet
- Confirm: Port side is selected on fibre optic console
- Confirm ship/shore link is healthy, if not press RESET on Optic console and/or confirm with loading master terminal readiness
- Confirm: ESD inhibition is on
- G/E to be ready at manifold

Procedure:

- Open ESD valves on connected manifolds
- Remove ESD inhibition
- Wait for terminal countdown / ships countdown
- Activation of ESD
- Record valve closing time

Reset ESD system:

- Inhibit ESD
- Reset each manifold valve
- Reset cabinet
- Confirm terminal is ready
-

6. ARMS COOLDOWN (expected duration 1.5 hr)

Duties:

- C/O and 1/O in CCR ï in charge of cooldown operation.
- G/E ï on deck at manifold ï operates coold down valves as required
- Duty Officer ï in CCR taking records.
- Trunk deck watch checking lines, port manifold, compressor room, motor room.
- Manifold watch in vicinity of manifold, checking pressure when requersted.
- Gangway watch at gangway.
- Mooring watch checking lines condition, escorting visitors to CCR.

Preconditions:

- Confirm shore tank pressure with terminal
- Confirm ship/shore ESD link is healthy
- Confirm: Water curtain is running
- Remove ESD inhibition
- Open ESD valves (liquid CL041, CL031, CL021 CL01 and vapour CG071)
- BOG valve open (if shore pressure is favourable). Control tank pressure with CG075.

Initial valves setup (liquid supply from shore):

- All spray header block and isolation manual valves (CS071, CS700, CS701, CS403, CS303, CS203) - open

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

- Spray discharge valves (CS101, CS301, CS401) ï shut
- Spray return valves (CS100, CS300, CS400) ï shut
- Spray to liquid crossover (CS035) ï open
- Spray to liquid crossover (CS036, CS025, CS026) ï shut

Cargo arms cooldown:

- Open manifold cool-down valves (CS043, CS033, CS023, CS013) as required in liaison with Loading Master
- Maintain manifold pressure as per Loading Master advice by adjusting spray return valve CS200.
- Take care of sudden rise of pressure on the manifold
- During last stage of Shore Arms cool-down it may be required to crack open Crossover Cool down valves (CS025V & CS026V) valves to additionally cool down the liquid header.
- Operation is completed once confirmed by loading master.

7. COLD ESD TEST

Duties:

- C/O ï CCR, Supervise operation.
- 1/O ï CCR, Carry out ESD tests in liaison with Loading Master.
- G/E ï at manifold, confirms operation of ESD valves, measuring closing time.
- Duty officer ï CCR, taking records.
- Trunk deck watchman ï as required.
- Mooring watchman ï checking moorings, escorting visitors to CCR.
- Gangway watch ï security watch at gangway.
- Manifold watch ï assisting G/E as required.

Fibre Optic ESD: Shore initiate

Preconditions:

- Confirm: All double shut and cooldown valves port and stbd are fully closed
- Confirm: Fiber Optic is selected in ESD cabinet
- Confirm: Port side is selected on fibre optic console
- Confirm ship/shore link is healthy, if not press RESET on Optic console and/or confirm with loading master terminal readiness
- Confirm: ESD inhibition is on
- G/E to be ready at manifold

Procedure:

- Open ESD valves on connected manifolds
- Remove ESD inhibition
- Wait for terminal countdown / ships countdown
- Activation of ESD
- Record valve closing time

Reset ESD system:

- Inhibit ESD

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

- Reset each manifold valve
- Reset cabinet
- Confirm terminal is ready

IS and IBS before loading operation commence

Confirm operation of N_2 pressurisation system to primary & secondary insulation spaces; be ready if required to ócommon upô the spaces utilising manual valve
Set N2 header Pressure from 2 kPa to 50 kPa
Confirm operation of Glycol heating system for cofferdams & tank liquid dome spaces.
Nitrogen buffer tank pressure around 800 kPa
Primary Insulation space at **≈ 0.7 kPa**, Secondary Insulation space at **≈ 1.2 kPa**.

8. LOADING:

Engine dept. is to be advised to provide enough power for starting of HD compressors. Ramp up is to conducted as agreed on pre-loading meeting.

G/E is to control pressure in the cargo tanks, and to liaise with C/O for rate increase. At these moments, Trunk deck watch has to monitor closely liquid line and report any deficiencies. OOW from the manifold will monitor Pressure on the manifold and will be in radio contact with CCR.

When the valves on the liquid line have been lined up, loading can commence. The first pump ashore will be started and ship will start to receive cargo into the Cargo Tanks. Ramp up will be completed as it is shown below, until bulk rate is attained.

Cool down both H/D below -100 C by opening / adjusting **CG547** with 10 degrees per min.

HD compressors will be started as required, to maintain desired pressure in the cargo tanks. Pressure will be controlled by valve vapour to shore throughout the flare until further advice from shore.

When the ship achieves steady pressure in the tanks shore should be advised to start 'recovering' (JBOG). One HD will continue running throughout all loading.

Loading will continue at bulk loading rate of approximately 12,000 m^3/ h.

Tank flow rates should be adjusted in order to be at the levels/volumes, as stated in attached rate down sheet, when ramp down begins.

As a guide, loading valves will be initially set at:

Tank 1 @ 50% // Tank 2 @ 100% // Tank 3 @ 100% // Tank 4 @ 80% = Total 330 %

At no time during max loading rate have less than 300 % valves opening in order to accumulate load rate

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

RAMP UP (from start of cargo transfer to bulk rate):

Once lined up we will start to load at 1,000 m³/h, ramping up in increments of 1,000 m³/h, as per schedule, until bulk loading rate (12,0300 m³/h) is attained.

Load Step (pumps)	Interval [min]	Rate [m³/h]
1	+ 10 (10)	1000
2	+ 5 (15)	2000
3	+ 5 (20)	3000
4	+ 5 (25)	4000
5	+ 5 (30)	5000
6	+ 5 (35)	6000
7	+ 5 (40)	7000
8	+ 5 (45)	8000
9	+5 (50)	9000
10	+5 (55)	10 000
11	+5 (60)	11 000
12	+5 (65)	12 000

NOTE:

During ramp up, there might be a rapid increase in the tank pressure. As soon as we start loading we will start one of the HD compressors.

The Liquid and Vapour lines and Cargo Machinery & Electric Room are to be frequently patrolled by a watchman throughout operations, particularly checking for leaks.

Once full rate is achieved, one HD will be set on auto, and OOW will continue monitoring loading operation.

OOW from the manifold will proceed to the jetty to obtain draught readings. Special procedure must be followed to enter/move on the Terminal. All permits and necessary RA will be discussed during pre-operation meeting with loading master.

One of previous Loading agreements between Supplier Marine Superintendent and Master & C/O, it was decided not to stop Gas burning (Engines + GCU).

In case of need to stop Gas Burning, resume it once level in cargo tanks reaches 3.0 meters. Start Gas Burning to Engine and use GCU for maintain the LD compressor in the minimum load for running safely. Instructions from charterers.

9. DE-BALLASTING INSTRUCTIONS

IMPORTANT NOTE:

Please ensure that ballast piping is filled up with water gradually prior to commencement of

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

ballasting/de-ballasting - to avoid damage to ballast GRP piping, regardless of intention to gravitate or actually pump ballast water. Please do not hesitate to seek advice if in doubt about condition of piping (full or empty), as ñwater hammerò effect can cause serious damage to equipment and concurrently with that - serious commercial implications.

BALLAST WATER WILL NOT BE DISCHARGED UNTIL PERMISSION

GRANTED BY Terminal !!!

List / Trim / Stress: Keep the vessel upright throughout. If you are getting a list, find out why and call me ASAP (if it is 0.5 degrees or more). It could be a leaking valve or a ballast pump that has lost suction. The stress limits are on the stability printouts by the loading computer. These are low and should not raise much if we load according to the plan.

Start de-ballasting by gravity once vessel on maximum loading rate (app 60 mins after start Loading) and when levels in the ballast tanks reach 1 meter above ship's draught, continue with Ballast Pumps No. 1 & No. 3 as per the Stability guide. Each step of the ballasting operation should be continuous. During the majority of the cargo transfer aim to keep the vessel trimmed not more than 2.0 m by the stern. Ballast Eductor (driven by Spray Pump) will be used for stripping the ballast tanks.

Maximum allowed Draught at berth is 15.0 m

Keep vessel always astern trim and not less than 9.60 mid ship draught!

Max. list 0.5 degrees

During topping up ship must be on even keel and upright.

Commence de-ballasting operations from IAS once cargo flow established, maintain hourly log of ballast ROB bearing in mind each ballast pump capacity as 3000 m^3/hr. Arrange to complete de-ballasting (bulk) about 2-3 (TWO to THREE) hours PRIOR rate down. When bulk de-ballasting is completed we will start ejectors to de-ballast as much as possible.

Soon after full rate is achieved, de-ballasting will start. De-ballasting by gravity will be done till level in the ballast tanks reaches 1 meter above draught. OOW to follow procedure for starting the ballast pumps when necessary.

Aim to complete bulk ballasting about 1 (ONE) hour prior Rate Down. On completion bulk ballasting the vessel will be brought to approximately 2.50 m trim by the stern & to upright condition.
Trim to maintain at the end of discharging max 2.50 m AS (do not excess max. allowed draft 12.0 m)

During loading operation, following must be recorded hourly!

- Hourly loading rate calculation –
- Hourly de-ballasting log (including ballast pump performance)
- Cargo tanks levels, volume, temperature, pressure
- Cargo tank level alarm confirmation set points – as required on manual form.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

- Cargo operations logbook – all pertinent times to record
- Float gauge &radar gauge level comparison
- Stability data-hourly record

All forms including safe Criteria of Min / Max limits. If coming / passing any of limits please call C/O immediately.

10. RAMP DOWN:

The Chief Officer shall carefully control this operation. It is essential that there are sufficient crewmembers to maintain continuous monitoring of all cargo tanks. The Chief Officer should ensure that good communications are maintained with the Terminal, so that the Operation is completed safely. Rates and times are discussed and agreed at the pre-loading meeting

This is the period from stopping the first pump to stopping the last pump, i.e. completion of loading.

Ramp down procedures are on Excel spread sheet attached with this plan.

Terminal requires to be advised 1 hour before Ramp Down.

The Loading Master is usually in the CCR throughout the whole ramp down period, communicating MTB accordingly.

Terminal requires last 10 minutes of loading at minimum rate of 1,000 m^3/h (one pump only) until completion, of which they should be advised accordingly.

Chief Officer will be in charge of this operation with OOW ensuring the vessel is kept on even keel and zero list, as required for closing CTMS.

The topping off order will be:

Tank 1 –→ Tank 4 –→ Tank 2 –→ Tank 3

Final volume in all tanks is planned to be not less than 98.5% loaded, which means it is planned to sail with a minimum 170,644 m^3 of the cargo.

Last tank to complete will be CT#3 and keep filling valve CL-300 full open to allow for draining

After draining loading arms, remaining liquid in ships lines will be drained by itself back to cargo tank 4 through filling valves.

Procedure is to build-up a nitrogen pressure of 4-5 bars at manifold connection & then release via aforesaid drain valves. Repeat 2 or 3 times or until lines are proven liquid free. On completion of nitrogen purging on all arms & after confirming hydrocarbon levels at less than 1% Vol., the cargo arms can be disconnected.

Line disconnection procedure is to be confirmed with terminal at pre-loading meeting.

Maintain vapour ESD valve open to control tank pressures & liaise closely with shore prior closing. Vapour flow to GCU will be opened upon completion of loading operation after CTS is triggered. After final gauging (CTS printout) advise engine room & start blowing gas to GCU and in such way maintain cargo tanks pressure until ER is ready to gas burn in respect of engine generator load (this will occur after/during departure) .

Final CTS gauging to be carried out after completion of arm draining. We will take readings from Fuel Gas Totalizer and after close CTMS reset all counters.

On disconnection loading arms, stop water curtain, ensure no liquid 'trapped' in any part of cargo lines & make preparations for sailing, blocking any alarms as applicable & reverting voyage

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

control ballast – laden for BOG management.

SMS Req.: The plan shall clearly identify finishing ullages / soundings / quantities as instructed in the voyage instructions, and if heel to be retained, as agreed with the charterer and specified in the voyage instructions.

SMS Req.: The condition of the vessel every four (4) hours to include details of draft, trim, air draft (where applicable), UKC, stability, stresses with estimated hog or sag and estimates of quantities loaded/discharged/remaining-on-board.

Safety Note – Ballast system operations:

Great care must be taken in order to avoid damage to glass reinforced plastic pipework.
Ensure ballast piping is gradually filled with water – beware of hammer effect!
Under no circumstances should a vacuum be drawn on closed ballast main!

Safety Note:

Watch keeper to patrol on the Trunk Deck from start of Ramp Down until the completion of cargo loading.
Whessoe gauge readings will be observed locally and reported to the CCR during topping up of cargo tanks.
Trunk deck watch will have limited stay in manifold area. Only operational parameters shall be observed, as requested from CCR.
Once the parameters are observed, watchman should continue patrolling Trunk deck.
"Safety of personnel on manifold" Fleet Bulletin instructions must be followed.

Maximum permitted drafts, list and trim for the terminal

- **VESSEL MEAN DRAFT SHOULD NOT BE LESS THAN 9.60 m OR NOT BE MORE THAN 12.000 m AT ANY GIVEN MOMENT OF THIS LOADING OPERATION.**
- **IN CASE YOU REACH THIS MEAN DRAFT OR EXPERIENCE ANY DIFFICULTIES TO KEEP VESSEL DRAFT DEEPER PLEASE CALL CHIEF OFFICER IMMEDIATELY.**
- **KEEP VESSEL UPRIGHT AT ALL TIMES. MAX. TRIM 3.0 M (BUT 1.0 M AS PER CARGO PLAN).**

PRECAUTIONARY NOTES:

Monitoring of Tank Levels and Pressures:
All cargo tank levels and pressures in the whole cargo system shall be monitored on a frequent basis. Specific checks of the level and pressure should be made to ensure the action is having the desired effect after any of the following actions

- *Cargo / Spray pump start/stop*
- *On completion of valve opening / closing / level adjustment*

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

11. ARMS DRAINING and PURGING

Duties:

- C/O or 1/O in CCR.
- G/E at manifold ï assisting shore personnel.
- Duty officer in CCR.
- Trunk deck watch checking lines, port manifold, compressor room, motor room.
- Manifold watch ï assisting G/E as required.
- Gangway watch at gangway.
- Mooring watch checking lines condition ï assisting G/E as required.

Valve lineup:

- Spray master valves (CS105, CS205, CS305, CS405) ï open
- Spray nozzles valves (CS106, CS107, CS206, CS207, CS306, CS307, CS406, CS407) ï open
- Spray return valves (CS103, CS203, CS303, CS403) ï open
- Reliq return to tanks (RL041, RL301, RL401) - open
- Reliq return to spray header (RL042) ï shut
- Spray header to crossover (CS071) ï open

Arms purging and draining

- Close liquid manifold ESD valves and double-shut valves
- Commence pressurizing linesô section with Nitrogen - open N2 supply valves
- Open manifold by-pass cool-down valves, close after pressure drop
- Open manifold linesô purge (drain) valves and measure LEL content.
- Repeat procedure until required HC value observed
- Close manifold by-pass (cool-down) valves after pressure drop
- Close vapour ESD valve
- Open N2 supply valve ï pressurize the section (pressure to be 1 bar)
- Open manifold vapor ESD by-pass valve ï depressurize section
- Close vapor ESD by-pass valve
- Open vapour vent valve chock
- Measure LEL content
- Repeat procedure until required Methane content is observed

Gas Engineer shall be present at the Manifold. Shore arms will be cleared as directed by the Loading Master and any draining to the ship shall be to the Cargo Tank No. 3, either through ESD or through ESD by-pass valves into the liquid line. This will be discussed on pre-loading meeting.

All liquid and vapour arms must be purged before disconnection of the arms.

20 min purging is estimated for each liquid arm and 10 minutes for vapour arm.

Purging is considered completed when CH_4 reading is below 1% Vol.

Readings must be obtained by shore representatives as well as ship's Gas Engineer.

12. CLOSING CTMS

- Drain liquid header into cargo tank #3
- Confirm: Vessel is up right and even keel

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT AFT	TRIM

- Confirm: Trim/list readout is in auto mode
- Confirm: Cargo data and voyage settings
- Confirm: Unloading mode is selected
- Confirm: All ESD valves shut
- Confirm: Gas burning stopped
- Record cargo float gauges readings
- Close CTMS
- Printout gas flow meters

13. CARGO ARMS DISCONNECTION

Duties:

- C/O ï standby in CCR, carry out post-operation meeting.
- Duty Officer ï standby in CCR.
- G/E ï on manifold, supervise cargo arm disconnection, ESD cable disconnection.
- Trunk deck watchmen ï on manifold, assisting G/E.
- Mooring watch ï Escorting visitors to CCR.
- Manifold watch ï on manifold, assisting G/E.

Disconnection:

- Confirm: All ESD valves and cooldown valves are shut
- Starting with liquid lines. Last one vapour arm.
- Stop water curtain
- Secure and tight flanges on manifold
- Disconnect ESD cable.
- Power off ESD cabinet

Permission must be obtained from the Loading Master before any disconnection can take place

14. DEPARTURE

- Post-Discharging meeting and documentation exchange
- Switch off ESDS cabinet
- Disconnect shore links
- Change status on CTS from ñHarbourò to ñSeagoingò
- Shore Gangway Off
- Secure float gauges
- Make sure there are no gas locks (keep CG031 15% open, cooldown valves and cooldown crossover valves fully open)
- Change reporting schedule for IAS and CTMS
- Changeover CTMS to seagoing mode
- Switch off hydraulic pumps for ballast and cargo (left only topping pumps)

15. UNDER KEEL CLEARANCE:

UKC (Under keel clearance) policy for moored vessels:

For vessels with extreme breadth in excess of 20 meters, the minimum UKC must be no less than 1,5% of vessel's extreme breadth.

Ship breadth = 43.40 m (1.5% of 43.40 = 0.651 m)

Minimum U.K.C. alongside = 0.65 m.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

The minimum under-keel clearance (UKC) inside ports - 10% of the deepest draught (see note A):

NOTE A - Inside ports (A) refers to vessels over 50,000 tones dwt. As a matter of principle, 10% of the deepest draught must be maintained. In cases where voyage orders from charterers specify a draught or cargo nomination that will result in a lesser UKC, and if there are reasonable local regulations, rules or recommendations by relevant authorities, which endorse such voyage orders/nominations, the Master may use his discretion in deciding whether or not to comply.

16. OTHER OPERATIONS

Stores/spares/provisions/services are expected to be received before or after completion of cargo operations.

17. RECORDS TO BE MAINTAINED DURING CARGO OPERATIONS

- Hourly Rate Calculation - Excel spreadsheet (print every hour)
- Hourly De-Ballasting Log – set up trough IAS
- Hourly Cargo Operations Log –
- Cargo Operations Logbook - all pertinent times to be recorded
- Timesheet
- Loading Operation Log
- Float gauge vs. radar gauge level comparison
- Stability data-hourly print of summary sheet
- At any salient point or event of interest or concern - print IAS snapshot at any time

18. Procedure for OVERRIDING the safety / tank protection system:

At no time shall any cargo safety system be overridden by:

- *Inhibiting*
- *Disconnecting*
- *Bypassing*
- *Switching off the system*
- *Any other method, this is to include the level alarms, pressure alarms and temperature alarms.*

Should it become necessary to override any of these safety systems both the override and the restoration is to completed by chief officer and the Master must witness this event.
A separate log/Record sheet should be maintained for recording dates/times and the reason for the override and when they are reset/restored. This record acts as the Masters written approval.
In addition to this record as a double check the appropriate section of the print out from the IAS event log must be signed by both the Chief Officer and the Master whenever the system is overridden or restored.
If for any reason this is not possible an extract of the IAS event log for the override / restore is to be printed and signed and kept with the above log/record.
Whenever the safety system is overridden a notice is to be posted on the IAS operating console warning that the Alarm system is overridden.
While the system is overridden the cargo tanks / system must be monitored until the alarm system is brought back to normal status.
The system shall be returned to normal status as soon as possible

EMERGENCY PROCEDURES

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

During Cargo transfer operations, the vessel is sufficiently protected by automation and alarm systems to hopefully negate the possibility of a major incident. However, there remains the possibility of pipeline failure, relief valve failure, or similar drastic incident, which will require some input from ship staff to minimize the possibility of disaster. **In that case immediately activate ESDS. Do not wait for C/O.**

With any gas tanker, our first means of defence is the ESD. This will stop all cargo related machinery and shut manifold valves. This can be activated from CCR (push the ESD button on CCC) and various locations around the vessel; push buttons at tank domes, manifolds, Fire Control Station, Compressor Room, Motor Room and Bridge. Should a cargo leakage occur, releasing large quantities of vapour, then best course of action following ESD is to immediately start the deck spray pump at ballast console. Although this pump has large starting load, during port operations there should be sufficient power available to allow immediate starting without having first to inform Engine room. Plenty of water around the decks, ESD activated, then we have time to assess the situation & decide course of action. Call C/O.

HAZARDS OF CARGO

Extremely flammable ï follow the guidelines is the Cargo Handling Manual.

ACTIVATION OF ESD

Should a situation arise where an uncontrolled release of LNG occurs, then do not hesitate to use the ESD system. This will automatically stop the shore loading pumps, trip our cargo machinery and close all ESDS valves. ESDS can be manually activated from the following locations:

- Trunk deck right forward at base of foremast
- All cargo tank liquid domes (x4)
- Port &stbd manifold
- Compressor Room
- Electric Motor Room
- CCR console
- Fire Control Station
- Navigation Bridge
- ECR console

UNCONTROLLED VENTING / LNG LEAKAGE– EMERGENCY ACTION

Sound the general alarm and announce release of vapour/liquid over the vesselôs P.A. system.

Activate ESD, muster crew, ready for firefighting, advice terminal.

Direct visitors ashore or assemble in CCR-Office if access to gangway is dangerous.

Stop all cargo operations ï in a controlled manner to avoid shock loading of systems, otherwise ESD.

Stop all other operations e.g. ballasting bunkering, storing. Any small craft alongside should be removed.

Deploy and direct the emergency parties as required. Start the water spray pump and fire pump, use fire hoses if required. Close all external accommodation doors.

Try to determine reason for uncontrolled venting / LNG leakage and carry out the control measures.

Engine Room staff to don SCABA equipment in machinery spaces.

Follow release control procedures as for: Toxic Liquid release ï Casualty Manual.

Obligatory report by all means available in the format MOLNG 131.

Chief Officer / Master will make earliest assessment of:

- Location, extent and severity of spill.
- Any structural damage.
- Origin of spill, and is spill continuing after transfer pumps stopped.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT A F T	TRIM

In the event of toxic vapour / LNG release from the vessel:

1. Sound the general alarm and announce release of toxic gas or vapour over the vessel's P.A. system.
2. Trigger ESD.
3. Muster crew, if berthed advise Terminal.
4. If berthed: direct visitors ashore or assemble in CCR/Conference Room if access to gangway is dangerous.
5. Stop all cargo operations.
6. Stop all other operations e.g. ballasting bunkering, storing. Any small craft alongside should be removed.
7. Deploy and direct the emergency parties as required.
8. Change over the air conditioning to recirculation and start the water spray pumps.
9. Try to determine reason for uncontrolled venting and place control measures
10. Engine room staff to don SCBA equipment if entering or in machinery space.
11. Close all external accommodation doors.
12. Follow Release Control procedure as for: Toxic Liquid Release - Casualty Manual
13. Obligatory report by all means available in the format of MOL LNG 131.

ACTIONS TO BE TAKEN IN THE EVENT OF SPILL

Refer to MSDS posted in the CCR for all relevant information regarding flammability and toxicity, hazards of the cargo, first aid and firefighting measures and action to be taken in the event of a spill.
Most importantly, prevent oil spill overboard. Use SOPEP equipment available and follow the instructions laid out in the Contingency Manual and SOPEP.
Scuppers are required to be plugged whilst staying on berth all the time, especially when it is raining.
Oil absorbent mat is required to be placed in each drain outlet when it is raining.
Ship is to obtain acceptance from the terminal for disposal of paddled water from deck.

ESD FAILURE

If ESD system fails, Chief Officer is to be informed immediately.
Terminal operates on Fibre-Optic or Pneumatic (usually not connected) system.
If ESD system fails, shut down should occur. Special attention is to be paid on cargo tanks pressure as pressure will increase. Establish tanks pressure control by all available means (GCU burning or directing vapour to shore if ship's pressure is greater than shore pressure).
Additionally tank protection system in place is via fwd vent mast valve (opening at 23 kPa) and cargo tank safety valves (25 kPa).

FAILURE OF THE CUSTODY TRANSFER SYSTEM

Chief Officer must be informed immediately.
If the CTMS equipment fails, the tank levels can be measured by using the Whessoe float gauges. In that case the volume calculations and corrections have to be made ñby handò using the tank gauge tables. The gauging tables contain corrections for trim, list and thermal value (level gauge) of each tank in order to give the corrected level and volume in each tank.

LNG VAPOUR LEAKAGE TO THE BARRIERS

Continuous monitoring of gas detection system will alarm upon gas leakage in the barrier.

DETAILED DESCRIPTION OF TANK / LINE / VALVE OPERATION	QTY ROB	MAX SF	MAX BM	DRAFT FWD	DRAFT AFT	TRIM

Pressure rise, caused by warming up of cold vapour inside the barrier, will occur. Excess pressure will be released to Vent Mast through the relief valve. By reducing the tank pressure, leak in the barriers will reduce too. Barriers must be continuously swept by nitrogen.
Chief Officer must be informed immediately.

LNG LIQUID LEAKAGE TO THE BARRIERS

This is a major failure of primary barrier, allowing liquid entering into inter-barrier space. This will cause rapid increase of pressure inside inter-barrier space, alarm on gas detection system, low temperature alarm of inter-barrier space and possible low temperature alarm of inner hull.
Chief Officer must be informed immediately. Liquid leakage to insulation space may result in collapse of membrane - cargo operation must be stopped immediately. Prepare punching device from Amidships Store. Punching device is to be fitted once Whessoe gauge is removed. Primary membrane is to be punch holed for pressure equalization between barrier spaces. Cargo tank liquid may have to be transferred to maintain those limits.

BREAK AWAY FROM JETTY

In case of fire or any other emergency situation ship will be requested to depart as soon as possible.
Emergency signals will be sounded and cargo operation must be stopped if not already stopped by ESD system in use. ESD2 system will be triggered resulting in disconnections of all arms. Stay away from the manifold area. Water spray system should be started in case of fire. Vessel will have to be moved by its own power or using tugs. If operational, engine must be prepared as soon as possible. Assemble mooring teams for unmooring. Gas Engineer and Chief Officer must take care of cargo system.

DAMAGE STABILITY CALCULATIONS:

All related data for various cases of damaged ship's compartments can be found in 'Trim and Stability Calculations' book (grey file, kept in CCR). Alternatively, all data and calculations are available through Loading Computer ShipManager-88, which is also in the CCR, at the right side of the CCR console.

PPE REQUIREMENTS

All personnel on deck must wear following PPE equipment:

- Boiler suits
- Safety helmets
- Safety shoes
- Leather gloves
- 3M eye googles

In addition when approaching manifold platform cryogenic equipment must be worn:

- Helmet with full face shield
- Cryogenic gloves

For details please refer to company PPE matrix posted in CCR.

Cargo plans are only a guide, but give a good indication of the various stages of the operation.

Consult me if in any doubt.

Loading Plan	File:	
	Rev. No.	
	Rev. Date	
	Approved By	

Cargo plans are only a guide, but give a good indication of the various stages of the operation. Consult me if in any doubt.

A copy of Ship-Shore agreed Loading / ~~Discharge~~ Plan is to be inserted after this section.

Signatures				
	Chief Officer ↑	Date	Master ↑	Date
	Gas Engineer ↑		1st Officer ↑	
	2nd Officer ↑		3rd Officer ↑	
	Advisor ↑			