

Advanced Liquefied Gas Tanker Workbook

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1. Information

Please read the following notes carefully before carrying out the assignments.

The assignments have been written on the assumption that you have experience on this type of tanker and/or working on this type of tanker with the appropriate Safety Management System (SMS) in place.

You may find that some questions do not apply directly to the ship type or size that you are familiar with, however you must attempt to answer these. Use the learning from all course modules, recommended industry publications, the Company SMS and advice from fellow officers onboard to present your answers. All questions must be attempted as incomplete portfolios will be returned unassessed.

Health, Safety and Protocol

Much of the work will require you to research information from your current or most recent ship. Always comply in full with all Health and Safety protocols and seek permission from the Master and/or relevant officers where your work takes you away from your ordinary routine. Take care not to interfere with shipboard operations and time your work to fit in with the work of others.

2. Assessment Guidelines

Learning Outcomes of the Course

On successful completion of the course you will:

1. understand the chemical and physical properties of liquefied gas and the hazards and control measures associated with carrying liquefied gas on board tankers
2. know what is involved in the safe operation and monitoring of cargo on board a liquefied gas tanker
3. be able to apply health, safety and environmental precautions in working on a liquefied gas tanker
4. be able to perform and monitor safe liquefied gas tanker cargo operations in compliance with legislative requirements

There are eleven modules in this course mapped to the learning objectives, as follows:

MODULE	LEARNING OUTCOMES ADDRESSED
Module 1 INTRODUCTION	1
Module 2 THE CHEMISTRY OF LIQUEFIED GASES	1
Module 3 THE PHYSICS OF LIQUEFIED GASES	1
Module 4 HAZARDS AND THEIR MANAGEMENT	1 & 3
Module 5 REGULATIONS	4
Module 6 SHIP DESIGN AND EQUIPMENT	2 & 3
Module 7 THE CARGO OPERATIONAL CYCLE	2
Module 8 GAS DETECTION	2
Module 9 SAFETY AND POLLUTION PREVENTION	2, 3 & 4
Module 10 CARGO FIRE FIGHTING	3
Module 11 EMERGENCY PROCEDURES	3

Assessment

On this course, you are assessed in two ways:

Assessment	Delivery	Learning Outcomes Assessed	Minimum Pass mark
1. Final Test	Closed questions - onscreen	1-4	75%
2. Module Assignments	Open questions – offline	1-4	Grade A

- You must achieve at least 75% in the final test and Grade A or higher in all module assignments. If you do not achieve this result in any one element, you will be required to review the course material and re-attempt that element. Note that a re-assessment fee may be payable.
- All onscreen tests are automatically marked and the result displayed onscreen. You will be required to print your final test result immediately after you complete it. The course documentation checklist refers.
- Criteria marking is used to mark all module assignments. The marking scheme used is provided in **Annex A**.
- A grading sheet will be completed by the course assessor when your module assignments are marked. This will be sent to you. Where necessary the course assessor will provide feedback or notes for your attention.

Completing Module Assignments

The following word count is suggested for each of the module assignments of the course.

Module	Question(s)	Suggested Word Count
1	1	40-50
	2	30-40
	3	20-30
2	1	150-200
3	1	20-30
	2	80-100
	3	80-100
4	1	30-40
	2	50-60 + sketch
	3	Sketch + List 10
	4	50-60
	5	List 16
5	6	100-120
	1	230-250
	2	List 10
	3	15-20
6	4	50-60
	1	List 5 + table
	2	Sketch
	3	Table
	4	4 sketches
	5	100-120 + sketch
6	50-60 + sketch	

	7	50-60
7	1	List 10
	2	200-250 or attachment
	3	100-120
	4	5
	5	Calculation
	6	80-100
	7	Attachment
8	1	5-10
	2	80-100
	3	60-70
9	1	List 7 + 7
	2	230-250
10	1	80-100
	2	130-150
	3	80-100
11	1	80-100 + attachment
	2	List of 17
	3	List of 7
	4	120-150

Module assignments should be completed electronically (font size 12) or by hand in clear handwriting. Where required or as appropriate, you may provide diagrams or sketches to illustrate your answers. SMS procedures and documents are accepted as scans/attachments. The course assessor reserves the right to reject work that is not presented clearly and legibly.

You are reminded that the final test and module assignments **must** be completed under 'exam conditions'. This means under the direct supervision of an authenticating person who will attest that your assessments have been completed unaided and solely by you. You are strongly advised to keep a back-up of all your work before sending it to us for Assessment. Anything you quote or paraphrase from a publication or other source must be referenced in your work, by giving the following information:

- Author's name
- Title of Publication
- Year (and day/month if a newspaper article or magazine) published
- Page reference
- Name of Publisher
- Place of Publication

Method of acknowledging other's work

- a) Use "quotation marks" round the actual words you have copied and insert a brief reference in brackets () at the end. The brief reference should contain author's name and publication year only.
- b) Supply the full reference in a list at the end of your answer.
 - i. Example
 "Crude Oil is any oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes:..." (SOLAS 1997 p148)

and then, at the end of the answer, supply the full reference thus:

SOLAS, Consolidated Edition 1997, Ch II-2 Para 28, International Maritime Organization, London.

ANNEX A - GRADE CRITERIA FOR MODULE ASSIGNMENTS

Notes

- Percentage marks shown under each grade are for guidance only. The assessor will only issue a grade for each module assignment.
- All module assignments must achieve a pass grade for a course certificate to be issued.

MARKING CRITERIA:	GRADE CRITERIA				
	Grade D Refer (0-24%)	Grade C Refer (25-49%)	Grade B Refer (50-74%)	Grade A Pass (75-85%)	Grade A+ Pass (86-100%)
Submitted answer fully addresses the assignment question	Poor, significant missing or inaccurate information	Unsatisfactory, mostly inaccurate or missing information	Satisfactory, planning and structure but key elements missing or inaccurate	Good, any errors or omissions are within acceptable limits	Excellent, all key criteria included with no factual errors
Comprehensive knowledge of relevant taught material has been demonstrated	Poor, core modules information missing or superficial coverage	Unsatisfactory, superficial, inaccurate or weak description of taught content	Mainly satisfactory, but some elements of relevant content missing	Good description of relevant content appropriate to question. Some use of additional information sources used	Excellent description of relevant content appropriate to question. Additional information sources used to good effect
Knowledge of industry best practice, Codes and/or Regulations has been demonstrated where applicable	Token attempt. Poor, missing or inaccurate information	Incorrect or limited application of Codes or regulations used. Little use of best practice applied to question	Answer is satisfactory with some limited use of Codes, regulations or best practice in answering the question	Good knowledge of relevant industry best practice, Codes and/or Regulations demonstrated	Thorough knowledge of relevant industry best practice, Codes and/or Regulations fully demonstrated
Work shows evidence of further reading beyond the taught content	Poor, little or none is evident	Some evidence shown	Satisfactory in some respects, but limited in scope	Good use of further reading shown in answer	Excellent, consistent evidence of further reading has been used
Word count for each question has been complied with	Little attempt made to meet word count limits	Word count limits not met for majority of modules	Word count limits have been met for majority of modules	Word count limits met	Word count limits met

3. Advanced Liquefied Gas Tanker Assignments

Module 1: Introduction

1. Define the term “Liquefied Gas”.
2. Define the term “Saturated Vapour Pressure”.
3. For a liquefied gas cargo of your choice state, as appropriate:
 - a) The Critical temperature / pressure
 - b) Where this information can be found
 - c) The relevance of this information to the Cargo Officer

Module 2: The Chemistry of Liquefied Gases

1. List the reactivity hazards of liquefied gas cargoes – give a brief description of each.

Module 3: The Physics of Liquefied Gases

1. Define the terms:
 - a) Solid
 - b) Liquid
 - c) Gas
2. State Boyle’s Law, Charles’ Law and the Pressure constant law. State the 1st & 2nd Laws of Thermodynamics.
3. Use the above definitions and laws to describe the operation of a simple cargo system on a liquefied gas ship.

Module 4: Hazards and their Management

1. Define the terms:
 - a) Flash Point
 - b) Auto Ignition Temperature
2. Sketch a Flammable range diagram and explain the terms:
 - a) Lower Flammable Limit
 - b) Upper Flammable Limit
3. Provide a diagram of the fire triangle.
List the likely sources of ignition onboard a gas carrier.
4. Outline the information you would include in a safety “briefing” to crew members prior to cargo transfer operations.
5. State the information contained on a Material Safety Data Sheet.
6. The main health hazards posed by the cargoes onboard liquefied gas tankers are:
 - a) Toxicity
 - b) Asphyxia
 - c) Anaesthesia
 - d) Frostbite
 - e) Corrosivity

Give a brief description of each with respect to gas carrier operations.

Module 5: Regulations

1. Explain briefly (250 +/- 10% words) the role of the International Maritime Organization (IMO) in gas carrier operations. Include reference to the relevant Conventions and Codes.
2. List all the statutory certification and documentation carried onboard a gas carrier, specific to its type.
3. State the duration of an International Certificate of Fitness for the carriage of Liquefied Gases in bulk. State the surveys that are required to maintain the certificate and any circumstances that will invalidate the certificate.
4. The IGC Code specifies minimum requirements for the construction of gas carriers. Explain briefly the terms:
 - a) Ship Type 1G
 - b) Ship Type 2G
 - c) Ship Type 3G

Include two examples of cargo carried on each Type.

Module 6: Ship Design and Equipment

1. List the following information for the gas carrier you are currently on or for the last gas carrier you sailed on:
 - a) Ship's name, Flag, Classification Society
 - b) Year & place built
 - c) Details of cargo tank type & capacity
2. Provide a midships cross section diagram for your current or last gas carrier, showing the construction of the cargo tanks stated in Q1.

Or

Provide midships cross section diagrams showing the differences between Independent type A, B & C cargo tanks.

3. For each of the following items of equipment on your current or last gas carrier, state the number, the type, and the capacities of:
 - a) main cargo pumps
 - b) compressors
 - c) heat exchangers
4. Provide simple sketches of the following types of valve:
 - a) Butterfly
 - b) Rising spindle gate
 - c) Globe
 - d) Ball
5. Describe different methods of producing and supplying inert gas on gas carriers.
 - a) state how IG is produced on your current or last gas carrier
 - b) provide a simple schematic diagram of the IG system
 - c) list the alarms built into the system.
6. Describe with the aid of a diagram a primary method/type of pressure relief fitted to the cargo tanks of a gas carrier.
7. State the methods of monitoring the cargo tank levels on your current or last gas carrier, and describe any safety precautions that may be necessary.

Module 7: The Cargo Operational Cycle

1. List the checks that a cargo officer would carry out of the cargo system prior to arrival and prior to commencing a cargo operation on a gas carrier.
2. Provide a copy, or write a report in the form of a loading plan describing a loading operation.
3. Describe the Emergency Shut Down procedures to be adopted during cargo operations.
4. State where you would find information on the maximum filling limits for cargo tanks on a gas carrier.
5. For a cargo of your choice, show by a worked example how the "total cargo quantity" is calculated.
6. Explain the term "Cargo Condition Maintenance".
 - a) Describe briefly the operation of the re-liquefaction plant
7. Consider that you are a Chief Officer, meeting with the shore Loading Master immediately prior to a liquefied gas cargo transfer operation. As an example copy, complete the relevant sections of a Ship Shore Safety Check List.

Module 8: Gas Detection

1. State where you would find out how many portable gas-detecting devices there should be onboard a gas carrier.
 - a) State the actual number onboard your current or last gas carrier
2. Briefly describe the procedure for testing portable gas detection equipment, stating the frequency of such tests, and state the frequency required for testing this equipment ashore.
3. State the type, make and model of any fixed gas detection equipment fitted on your current or last gas carrier.
 - a) Describe the on-board servicing/maintenance required

Module 9: Safety and Pollution Prevention

1. Discuss the personal protective equipment available onboard your current or last gas carrier for use:
 - a) in "routine" ship board duties
 - b) in "emergency" situations
2. Define the term 'enclosed space'. Explain the safety procedures to be followed prior to, and during, an entry into an enclosed space.

Module 10: Cargo Firefighting

1. Outline the “structural” fire protection measures taken on your current or last gas carrier to comply with Chapter 11 of the IGC code.
2. Describe a fire drill in which you have personally been involved. Include:
 - a) The part of ship in which the drill took place
 - b) The nature of the simulated incident
 - c) The size and number of the firefighting parties involved
 - d) The methods used to contain and extinguish the fire
3. Comment on the effectiveness of the drill and suggest ways in which it might be improved.

Module 11: Emergency Procedures

1. Produce a copy of your current or last gas carrier’s Emergency Muster list, showing ranks/ratings and responsibilities.
2. Briefly describe the core roles of each of the Emergency parties.
3. List the drill scenarios that are required by SOLAS to be carried out on board
4. When the ship is in port, state the emergency information which would be made available to shore rescue agencies.

If you need assistance or clarification on the contents of this workbook, do not hesitate to contact us at courses@oceantg.com

4. Document status

Issue no.	Date	Author
V1	17 Nov 2020	IG
V2	9 June 2021	SG

5. Changes in the document

Issue no.	Paragraph no.	Description
V2	1	Minor amends to wording
	2	New Assessment Guidelines with Annex A inserted incorporating some existing information on referencing. Subsequent paragraphs renumbered.