OCEAN Technologies Group

Basic Liquefied Gas Tanker
Workbook

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Contents

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. know the properties of liquefied gas and the hazards associated with it
2. be able to apply health, safety and environmental precautions and measures in working on liquefied gas tankers
3. be able to carry out safe liquefied gas tanker cargo operations

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

MODULE	LEARNING OUTCOMES ADDRESSED
Module 1 GAS TANKER CARGOES	1
Module 2 THE PHYSICS OF LIQUEFIED GASES	1
Module 3 HAZARDS AND THEIR MANAGEMENT	1 & 2
Module 4 SHIP DESIGN AND EQUIPMENT	1 & 3
Module 5 THE CARGO OPERATION CYCLE	2 & 3
Module 6 GAS DETECTION	2 & 3
Module 7 SAFETY AND POLLUTION PREVENTION	2 & 3
Module 8 CARGO FIRE FIGHTING	3
Module 9 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	1-3	75%
2. Module Assignments	Open questions – completed offline	1-3	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 2 3	15-20 25-30 List 3
2	1 2 3 4	20-30 50-60 70-80 50-60
3	1 2 3 4 5 6 7	50-100 List 16 40-50 + sketch 50-60 15-20 60-70 70-80
4	1 2 3 4 5 6	60-70 30-40 + sketch 30-40 + sketches 80-100 or sketch 50-60 80-100
5	1 2 3 4 5 6	60-70 80-100 80-100 120-150 120-150 + sketch 40-50
6	1 2	120-150 80-100
7	1 2 3	List 5 List 7 120-150

	4 5	50-70 50-70
8	1 2 3 4 5	40-50 15-25 15-25 40-50 40-50
9	1 2 3 4 5	10-20 List 10-17 40-50 40-50 List 7

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. Basic Liquefied Gas Tanker Assignments

Module 1: Gas Tanker Cargoes

1. What is the definition of a 'liquefied gas'?
2. Explain the difference between the abbreviated terms LNG and LPG.
3. Provide three examples of chemical gases which are frequently carried on liquefied gas carriers.

Module 2: The Physics of Liquefied Gases

1. Briefly describe what you understand as 'the phases of matter'.
2. Consider a gas within a container and explain the relationship between pressure (P) and temperature (T).
3. State the three Gas Laws and give the simple formula for each.
4. What are the First and Second Laws of Thermodynamics?

Module 3: Hazards and Their Management

1. What responsibilities do Senior Officers have in maintaining the ship's Safety Management System (SMS)?
2. What information is provided by the sections of the MSDS?
3. Draw a 'Fire Triangle' and explain how it is used in fire prevention.
    a) What do you understand as the 'Flash Point' of a liquid?
    b) What do the terms 'LFL' and 'UFL' stand for?
4. Explain the meaning of 'Reactive Hazards' and give four examples of possible reactions that could be encountered on a liquefied gas carrier.
5. What are the main health hazards to be encountered in liquefied gas cargoes?
6. What is the difference between 'intrinsically safe' and 'flame proof' equipment?
7. What is the purpose of 'grounding' pipelines and cargo hoses?

Module 4: Ship Design and Equipment

1. Explain the differences in the design of cargo tanks for:
    a) 'fully pressurised' ships, and
    b) 'fully refrigerated' ships.
2. With the aid of a diagram, explain the operation of one type of cargo pump that may be installed on a liquefied gas carrier.
3. Provide a sketch or diagram and explain the operation of two types of valve used in the cargo system of a liquefied gas carrier.
4. Briefly explain your understanding of a cargo tank pressure relief system.
5. Describe a closed gauging system used on liquefied gas carriers.
6. Explain the purpose of an inert gas system for cargo operations.
    a) Identify two different types of inert gas systems that may be installed on board liquefied gas carriers.

Module 5: The Cargo Operation Cycle

1. Give a brief description of the contents of the 'Cargo Operations Manual'.
2. List the items that will be considered and discussed when planning a loading operation.
3. What is required to achieve safe operations whilst alongside a terminal?
4. Considering 'atmosphere preparation', explain the process to take cargo tanks from being gas free through to ready for loading.
5. Using a simple diagram of equipment, explain the process of re-liquefaction.
6. Prior to arrival at the discharge port, a Pre-Arrival Checklist will be completed to prepare the ship for discharge; list the checks that will be addressed.

Module 6: Gas Detection

1. List and briefly explain the operation of portable gas detectors that are carried on board.
    a) Choosing one instrument, describe the test and calibration procedure to be carried out on board.
2. Explain the operation and maintenance requirements of a fixed gas detection system.

Module 7: Safety and Pollution Prevention

1. The IGC Code requires that 'extra safety equipment' be carried on board. List the items that must be carried for both non-toxic and toxic cargoes.
2. When entering an enclosed space, dedicated rescue equipment must be on stand-by at the entrance; list the items of equipment.
3. Define an 'enclosed space' and give examples of such spaces.
    a) List the safety checks that must be addressed prior to entering an enclosed space.
4. List and briefly explain the minimum requirements as set out in the columns of IGC Chapter 19.
5. List the MARPOL Annexes and give a brief description of each.

Module 8: Cargo Firefighting

1. What are the IGC requirements for structural fire protection?
2. When activating the ship's ESD, what equipment will be shut down?
3. What are the methods of removing 'sources of fire'?
4. Gas carriers which carry 'flammable products' are required to be fitted with a fixed dry chemical powder type extinguishing system. Describe the operation and list the areas to be covered by such a system.
5. Cargo compressor and pump rooms are required by SOLAS to be protected by a 'carbon dioxide system', describe such a system and the safety procedures that are in place.

Module 9: Emergency Procedures

1. What is the ‘duty’ of all persons on board with respect to the onboard emergency organisation?
2. Under the requirements of the ISM Code, ships are required to have ‘emergency scenarios’ identified. List the scenarios that must be addressed by carrying out training drills.
3. What will a ship’s ‘emergency organisation’ consist of?
    a. What details must be specified within the muster and emergency instructions?
    b. What is the purpose of providing ‘emergency plans’?
4. What is the procedure to be followed for an ‘enclosed space rescue’?
5. In the event of an emergency whilst in port, what information should be made available to port emergency and rescue services?

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
V2	2	New Assessment Guidelines with Annex A inserted incorporating some existing information on referencing. Subsequent paragraphs renumbered.