Model Course 1.06

Specialized Training for Liquefied Gas Tankers
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Liquefied Gas Handling Principles on Ships and in Terminals

Tanker Safety Guide (Liquefied Gas), International Chamber of Shipping
Witherby & Co. Ltd., London

Gas Carriers, R. Ffooks, Fairplay Publications Ltd., London

Anderson Greenwood and Co., Bellanix, Texas

Moss Rosenberg, Moss Verft, Moss, Norway

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Foreword

Since its inception the International Maritime Organization has recognized the importance of human resources to the development of the maritime industry and has given the highest priority to assisting developing countries in enhancing their maritime training capabilities through the provision or improvement of maritime training facilities at national and regional levels. IMO has also responded to the needs of developing countries for postgraduate training for senior personnel in administration, ports, shipping companies and maritime training institutes by establishing the World Maritime University in Malmo, Sweden, in 1983.

Following the earlier adoption of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, a number of IMO Member Governments had suggested that IMO should develop model training courses to assist in the implementation of the Convention and in achieving a more rapid transfer of information and skills regarding new developments in maritime technology. IMO training advisers and consultants also subsequently determined from their visits to training establishments in developing countries that the provision of model courses could help instructors improve the quality of their existing courses and enhance their effectiveness in meeting the requirements of the Convention and implementing the associated Conference and IMO Assembly resolutions.

In addition, it was appreciated that a comprehensive set of short model courses in various fields of maritime training would supplement the instruction provided by maritime academies and allow administrators and technical specialists already employed in maritime administrations, ports and shipping companies to improve their knowledge and skills in certain specialized fields. IMO has therefore developed the current series of model courses in response to these generally identified needs and with the generous assistance of Norway.

These model courses may be used by any training institution and the Organization is prepared to assist developing countries in implementing any course when the requisite financing is available.

W. A. O'NEIL

Secretary-General
Introduction

• Purpose of the model courses

The purpose of the IMO model courses is to assist maritime training institutes and their teaching staff in organizing and introducing new training courses, or in enhancing, updating or supplementing existing training material where the quality and effectiveness of the training courses may thereby be improved.

It is not the intention of the model course programme to present instructors with a rigid "teaching package" which they are expected to "follow blindly". Nor is it the intention to substitute audio-visual or "programmed" material for the instructor’s presence. As in all training endeavours, the knowledge, skills and dedication of the instructors are the key components in the transfer of knowledge and skills to those being trained through IMO model course material.

Because education systems and the cultural backgrounds of trainees in maritime subjects vary considerably from country to country, the model course material has been designed to identify the basic entry requirements and trainee target group for each course in universally applicable terms, and to specify clearly the technical content and levels of knowledge and skill necessary to meet the technical intent of IMO conventions and related recommendations.

This is the first major revision to this Model Course. In order to keep the training programme up to date in future, it is essential that users provide feedback. New information will provide better training in safety at sea and protection of the marine environment. Information, comments and suggestions should be sent to the Head of the STCW and Human Element Section at IMO, London.

• Use of the model course

To use the model course the instructor should review the course plan and detailed syllabus, taking into account the information provided under the entry standards specified in the course framework. The actual level of knowledge and skills and the prior technical education of the trainees should be kept in mind during this review, and any areas within the detailed syllabus which may cause difficulties because of differences between the actual trainee entry level and that assumed by the course designer should be identified. To compensate for such differences, the instructor is expected to delete from the course, or reduce the emphasis on, items dealing with knowledge or skills already attained by the trainees. He should also identify any academic knowledge, skills or technical training which they may not have acquired.

By analysing the detailed syllabus and the academic knowledge required to allow training in the technical area to proceed, the instructor can design an appropriate pre-entry course or, alternatively, insert the elements of academic knowledge required to support the technical training elements concerned at appropriate points within the technical course.

Adjustment of the course objective, scope and content may also be necessary if in your maritime industry the trainees completing the course are to undertake duties which differ from the course objectives specified in the model course.
Within the course plan the course designers have indicated their assessment of the time which should be allotted to each area of learning. However, it must be appreciated that these allocations are arbitrary and assume that the trainees have fully met all entry requirements of the course. The instructor should therefore review these assessments and may need to re-allocate the time required to achieve each specific learning objective or training outcome.

- **Lesson plans**

  Having adjusted the course content to suit the trainee intake and any revision of the course objectives, the instructor should draw up lesson plans based on the detailed syllabus. The detailed syllabus contains specific references to the textbooks or teaching material proposed to be used in the course. Where no adjustment has been found necessary in the learning objectives of the detailed syllabus, the lesson plans may simply consist of the detailed syllabus with keywords or other reminders added to assist the instructor in making his presentation of the material.

- **Presentation**

  The presentation of concepts and methodologies must be repeated in various ways until the instructor is satisfied, by testing and evaluating the trainee’s performance and achievements, that the trainee has attained each specific learning objective or training objective. The syllabus is laid out in learning objective format and each objective specifies what the trainee must be able to do as the learning or training outcome. Taken as a whole, these objectives aim to meet the knowledge, understanding and proficiency specified in the appropriate tables of the STCW Code.

- **Implementation**

  For the course to run smoothly and to be effective, considerable attention must be paid to the availability and use of:

  Properly qualified instructors,
  Support staff,
  Rooms and other spaces,
  Equipment,
  Textbooks, technical papers, and
  Other reference material.

  Thorough preparation is the key to successful implementation of the course. IMO has produced a booklet entitled "Guidance on the implementation of IMO model courses", which deals with this aspect in greater detail.

  In certain cases, the requirements for some or all of the training in a subject are covered by another IMO model course. In these cases, the specific part of the STCW Code which applies is given and the user is referred to the other model course.
**Guidance for course developers and instructors**

This specialised liquefied gas tanker training course comprises two main parts. These are liquefied gas tanker safety and cargo operations.

The first, liquefied gas tanker safety, covers the hazards involved in cargo operations and the systems, equipment and constructional features of gas tankers that exist to control the hazards.

Cargo operations covers loading and ballasting including the use of the inert gas system.

These two aspects are necessarily interlinked. One approach to achieving the standard of competence is through properly supervised on board training. Where this is the case, and suitable records kept, then the extent of the training delivered in the specialised liquefied gas tanker course may reflect this.

Instructors should emphasise in their teaching the hazards involved in the operations on board liquefied gas tankers. They should explain, in as much detail as is necessary to ensure these operations are undertaken safely, the systems, equipment and constructional features that exist to control those hazards.

The lessons delivered during the course should be tailored to the needs of the trainees. Officers with extensive experience on board liquefied gas tankers and those that have received guided instruction on board may need less classroom teaching than those with simply the minimum sea experience on gas tankers generally.

Instructors should keep in mind that some of the topics in this model course are also introduced in model course for the officer in charge of a watch in the function Controlling the Operation of the Ship and Care for the Persons on Board. These topics may therefore be treated as a revision of earlier learning.

Physical properties of vapours are covered in the Tanker Familiarisation model course and can also be found in the basic physics of the officer in charge of a watch model course (for both navigation and marine engineering functions), therefore the basic physics in section 2.1 of this model course is a revision and extension of that training. Similarly, entrants should have completed an approved shore-based fire-fighting course (STCW Regulation V/1, para 1) and hence the fire-fighting principles in section 3.4 are a very brief revision of this topic.

Ship construction (section 5.1) and regulatory matters (section 4) are also covered in the model course on officer in charge of a watch in the function Controlling the Operation of the Ship and Care for the Persons on Board. These topics may similarly be treated as a revision of earlier learning.

**Training and the STCW 1995 Convention**

The standards of competence that have to be met by seafarers are defined in Part A of the STCW Code in the Standards of Training, Certification and Watchkeeping for Seafarers Convention, as amended in 1995. This IMO model course has been revised and updated to cover the competences in STCW 1995. It sets out the education and training to achieve those standards.
SPECIALIZED TRAINING FOR LIQUEFIED GAS TANKERS

Special training requirements for masters, chief engineer officers, chief mates, second engineer officers and any person with immediate responsibility for loading, discharging and care in transit or handling of cargo on liquefied gas tankers, are detailed in Section A-V/1 of the STCW Code. This model course aims to provide a specialized training programme referred to in paragraph 2.2 of regulation V/1, appropriate to those duties.

For ease of reference, the course is divided into separate sections.

Part A provides the framework for the course with its aims and objectives and notes on the suggested teaching facilities and equipment. A list of useful teaching aids, IMO references and textbooks is also included.

Part B provides an outline of lectures, demonstrations and exercises for the course, together with a suggested sequence and timetable. From the teaching and learning point of view, it is more important that the trainee achieves the minimum standard of competence defined in the STCW Code than a strict timetable for each topic is followed. Depending on their experience and ability, some students will naturally take longer to become proficient in some topics than in others.

Part C gives the Detailed Teaching Syllabus. This is based on the theoretical and practical knowledge specified in the STCW Code. It is presented in a logical sequence starting with basic knowledge and information on chemistry and physics of gases, and liquefied gas hazards, safety, pollution prevention, and concluding with inert gas systems and operations. Each subject area is covered by a series of required performances, in other words what the trainee is expected to be able to do as a result of the teaching and training. In this way the overall required performance of knowledge, understanding and proficiency is met. IMO references, textbook references and suggested teaching aids are included to assist the teacher in designing lessons.

Part D contains an Instructor Manual with additional explanations, an example lesson plan and an example of a simulator exercise for instructors that may have access to a liquid cargo handling simulator.

The Convention defines the minimum standards to be maintained in Part A of the STCW Code. Mandatory provisions concerning Training and Assessment are given in Section A-I/IB of the STCW Code. These provisions cover: qualification of instructors; supervisors as assessors; in-service training; assessment of competence; and training and assessment within an institution. A corresponding Part B of the STCW Code contains non-mandatory guidance on training and assessment.

A separate IMO Model Course addresses Examination and Assessment of Competence. This course explains the use of various methods for demonstrating competence and criteria for evaluating competence as tabulated in the STCW Code and may be helpful in developing any necessary assessments.
• **Responsibilities of Administrations**

Administrations should ensure that training courses delivered by colleges and academies are such as to ensure officers completing training do meet the standards of competence required by STCW Regulation V/1 paragraph 2.2.

• **Validation**

The information contained in this document has been validated by the Sub-Committee on Standards of Training and Watchkeeping for use by technical advisers, consultants and experts for the training and certification of seafarers so that the minimum standards implemented may be as uniform as possible. **Validation** in the context of this document means that no grounds have been found to object to its content. The Sub-Committee has not granted its approval to the document, as it considers that this work must not be regarded as an official interpretation of the Convention.

In reaching a decision in this regard, the Sub-Committee was guided by the advice of a Validation Group comprised of representatives designated by ILO and IMO.
Objective
Provided they hold an appropriate certificate and are otherwise qualified in accordance with regulation V/1-2.2 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended 1995, those successfully completing the course should be able to take immediate responsibility for loading, discharging and care in transit or handling of cargo on liquefied gas tankers.

Entry standards
This course is open to seafarers who have completed a shore-based fire-fighting training course approved by the Administration, and who have relevant experience appropriate to their duties on liquefied gas tankers, as stipulated in STCW regulation V/1, para 2.1, and sub-paragraphs 1.1 or 1.2. See chart on page 10.

Course certificate
The specialized liquefied gas tanker training programme must be approved by the Administration. Masters and officers who are qualified in accordance with regulation V/1 paragraphs 1 or 2 as appropriate, that is they have experience appropriate to their duties on tankers, and complete this training programme, shall be issued with an appropriate certificate.

Any of this training may be given on board or ashore. It should be supplemented by practical instruction on board and, where appropriate, in a suitable shore-based installation.

Course intake limitations
The number of trainees should not exceed 20, and practical training should be undertaken in small groups of not more than four.

Staff requirements
The instructor shall have appropriate training in instructional techniques and training methods (STCW Code A-I/6, para 7). It is recommended that all training and instruction is given by qualified personnel experienced in the handling and characteristics of gas cargoes and the safety procedures involved.

Staff may be recruited among deck and engineer officers of gas tankers, fleet superintendents and personnel in freight departments, cargo survey bureaux or laboratories, as appropriate.

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1 Refer to Section A-VI/3 STCW Code