Tanker Familiarisation
IMO Model Course 1.01

Chapter 1-9

- Courseware Specification -

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Content

The Courseware 'Tanker Familiarisation' is certified by "Germanischer Lloyd".

It is available as paperwork (instructor & student manual) and E-version.

All chapters of the instructor manual contain a bibliography and rules & regulations index.

The manuals are divided into:

Instructor information (II),
Worksheets (WS),
Worksheets with solutions (WSS),
Handouts (HO) and
Tests (T)

Chapter 1 - Introduction

Required performance

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
1	Introduction	
1.1	Tanker history	0,5
1.2	Major features	0,5
1.3	Types of cargoes	0,5
1.4	Tanker terminology	1,0
1.5	Rules and regulations	1,5
1.6	Worksheets	1,0
1.7	Test	0,5
TOTAL		**5,5**

Introduction to Chapter 1

This Chapter gives is a brief review of the way in which tankers carrying oil, petroleum and its products have developed.

Major features of tanker vessels are described in view of size, engines, petroleum products carried etc.. Types of oil carriers are shown too.

Types of cargoes on oil, chemical and gas tankers are defined with a detailed overview of oil, vegetable and other products carried in bulk or in liquid form.

Tanker terminology is provided; covering the basic terms used for oil, chemical and gas tankers.

A short presentation of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1, 995 (STCW 1995), and the mandatory minimum requirements for training set out in the Convention is given at the end.

The expected learning outcome of this unit is that the student is able to:

- get a good knowledge of tankers in historical aspect and modern developments,
- take into consideration the variety of cargoes carried by tankers,
- explain commonly used terms and abbreviations on board tankers and in tanker terminals,
- understand the requirements of the STCW Convention.

Chapter 2 - Characteristics of cargoes

Required performance:

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
2	Characteristics of cargoes	
2.1	Basic chemistry, chemical elements and groups	2,0
2.2	Development of tankers	2,0
2.3	Physical properties of oil, chemicals and gases carried in bulk	2,0
2.4	Worksheets	1,0
2.5	Test	0,5
TOTAL		**7,5**

Introduction to Chapter 2

This Chapter brings forward the basics of physics and chemistry of oil, chemicals and gas.
The basic structure of atoms and molecules, the physical properties and simple laws of physics related to carriage of liquid cargo in bulk are explained in simple terms, i.e.
Basic physics explained in view of:

- Terms, linked to the physical properties of cargoes (List and explanation),
- Electrical charges and discharges and linked effects to these processes.

Basic chemistry, chemical elements and groups explained in view of:

- Chemical symbols, elements, reactions,
- Hydrocarbon structure – definition, properties, types, reactions.

Physical properties of oil, chemicals and gas explained in view of:

- Practical significance for tanker operations, hazards and safety.

Definitions of some of the terms are covered in Chapter 1 – Introduction.

The expected learning outcome is that the trainee will be able to:

- explain basic terms , linked to physical properties of cargoes,
- define basic properties of oil, chemicals and gas.

Chapter 3 - Toxicity and other hazards

Required performance:

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
3	Toxicity and other hazards	
3.1	General concepts and effects of toxicity	2,0
3.2	Fire hazards	1,0
3.3	Health hazards	1,0
3.4	Environmental hazards	1,0
3.5	Reactivity hazards	0,5
3.6	Corrosion hazards	0,5
3.7	Worksheets	1,0
3.8	Test	0,75
TOTAL		**7,75**

Introduction to Chapter 3

The toxic hazards to which personnel are exposed in tanker operations arise almost entirely from contact with gases of various kinds. As an indicator of the toxicity of gases and the avoidance of health hazards the Permissible Exposure Limits (PELs) and/or the Threshold Limit Value-Time-Weighted Average (TLV-TWA) are used. They are expressed as ppms - parts per million by volume of gas in air.

Knowledge of the toxic effects should be dealt with at some length to ensure that the trainees have a good appreciation of the dangers and hazards due to oil, chemicals and liquefied gas.

The expected learning outcome is that the trainee will be able to:

- appreciate all dangers and hazards due to oil, chemicals and liquefied gas,
- define the toxicity of cargoes, carried on board tankers in principle.

Fire hazards on board tankers are of particular importance. Personnel should be aware of the flammable limits of cargoes carried on board tankers and how to control them using the inert gas plant.

Fire hazards are engrossed by the availability of electrostatic charges during the handling of petroleum, and tanker operations.

In this part trainees are supposed to acquire competence in fire-fighting principles, such as :

- Fire triangle,
- Hydrocarbons, chemicals and liquefied gas cargoes as potential sources of fire,
- Prevention of fire on board tankers.

The material relating to fire theory and control is not fully covered as trainees, according to Regulation V/1 of STCW are supposed to have attended an approved fire-fighting course. Special attention is paid to the toxic effects of petroleum products on people on board tankers.

Another topic covered in this chapter relates to the environmental hazards. The expected learning outcome is that the trainee will be able to define in general pollution caused by tankers and to describe the consequences of pollution on the environment. Various effects of pollution on the environment are discussed too.

The next topic covered is about the possible chemical reactions of goods, carried on board with air, water etc.. The effects of temperature, impurities and other circumstances on reactivity of chemicals are discussed too.

Last but no least the corrosion hazards are reviewed as well as the ways how to control them.

Chapter 4 - Hazard control

Required performance:

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
4	Hazard control	
4.1	General concepts and effects of toxicity	1,0
4.2	Methods of controlling hazards on tankers	4,0
4.3	Worksheets	1,0
4.4	Test	0,5
TOTAL		**6,5**

Introduction to Chapter 4

The purpose of this Chapter is to make the trainees aware of the contents of the Safety Data Sheets and be able to read and understand the necessary data given in the ICS or other Cargo Data Sheets.

The expected learning outcome is that the student will be able to define hazards on board tankers as well as to define practice, methods and technologies for controlling hazards on board tankers.

Focus is placed on the entrance of enclosed areas and precautions to avoid fire, reactivity and corrosion hazards.

Chapter 5 - Safety equipment and protection of personnel

Required performance:

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
5	Safety equipment and protection of personnel	
5.1	Safety measuring instruments	2,0
5.2	Specialised fire-extinguishing appliances	1,0
5.3	Breathing apparatus, tank evacuating, rescue and escape equipment	2,0
5.4	Protective clothing and equipment	1,0
5.5	Resuscitators	1,0
5.6	Safety Precautions and Measures	1,0
5.7	Worksheets	1,5
5.8	Test	0,5
TOTAL		**10,0**

Introduction to Chapter 5

This chapter provides information on the safety equipment used on board tankers, reviewed in terms of:

- Measurement principles,
- Calibration,
- Acquiring data,
- Maintenance.

The various indicators used are assigned to several distinct groups, such as oxygen analysers, explosimeters, gas indicators as well as multi-gas analysers.

Several specialised fire extinguishing appliances are discussed, as well as used fire-fighting media. Procedures and methods for fire-fighting bring to a significant a priori knowledge on fire fighting on tankers. References to IMO MSC Circulars 849 and 1165 are made too.

The part “breathing apparatus” brings to a learning outcome such that the trainee will be able to:

- define procedures and safety measures for entry into closed spaces,
- demonstrate the use of self-contained compressed-air breathing apparatus and the use of use of a complete set of safety equipment stretcher and tank evacuating equipment.

The usage of protective clothing by tanker personnel is also reviewed with the objective to give an overview of personal protective clothing and equipment guaranteeing safety on board, e.g. head protection, hearing protection, face and eye protection, hand and foot protection.

The safety precaution measures are specified, related to:

- Entering enclosed or confined places on tankers,
- Testing the atmosphere of a space,
- Testing for oxygen deficiency, for flammable gases or vapours,
- Procedures taken before and during entry into enclosed spaces.

Hot work on board tankers is discussed, stating the necessary precautions to be taken.

Chapter 6 - Pollution prevention

Required performance:

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
6	Pollution Prevention	
6.1	Causes of marine (air and water) pollution	1,0
6.2	Prevention of marine pollution	1,0
6.3	Measures to be taken in the event of spillage	1,0
6.4	SOPEP	1,0
6.5	Ship/shore liaison	2,0
6.6	Worksheets	1,5
6.7	Test	0,75
TOTAL		**8,25**

Introduction to Chapter 6

This chapter is dedicated to the problems of pollution prevention in general, bringing forward the causes of marine pollution as statistics so that the trainees should be able to acquire adequate knowledge on how to prevent marine pollution.

In case of a real oil spill there has to be appropriate knowledge on the measures and procedures taken.

Basic prerequisite for these measures is the availability of SOPEP - Shipboard Oil Pollution Emergency Plan on board, which is a subject of a thorough discussion. Examples of Certificates, needed according to MARPOL Regulations are listed too, e.g. the Oil pollution prevention certificate, the Cargo ship safety equipment certificate, the Cargo ship safety construction certificate and the International load line certificate.

Oil pollution checklists are shown as well as the ship-shore liaison between the arriving ship and the tanker terminal. The essential message here is that safety regulations, good communication and the best possible co-operation between ship and terminal are fundamental to the safety of personnel and material when alongside a terminal.

Chapter 7 - Emergency operations

Required performance in hours

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
7	Emergency operations	
7.1	Emergency measures	1,0
7.2	Organisational structure	0,5
7.3	Alarms	0,5
7.4	Emergency procedures	1,0
7.5	First-aid treatment	2,0
7.6	Worksheets	0,5
7.7	Test	0,5
TOTAL		**6,0**

Introduction to Chapter 7

All tankers and terminals should have procedures ready for immediate implementation in the event of an emergency. The procedures must anticipate and cover all types of emergency that might be encountered in the particular activities of the tanker or terminal.

This Chapter refers to the appropriate measures in case of an emergency as formulated by the contents, including the preparation, emergency organisation, emitting the alarm signals, inspection and maintenance, training and drills.

Several situations are covered such as:

- Fire on a tanker at sea or at anchor,
- Fire on a tanker at a terminal,
- Fire or explosion on a berth,
- Jettison of cargo.

First aid treatment is an important factor of saving injured persons and it is due covered by this chapter in the sense of priorities in giving first aid treatment and the general principles of first aid treatment.

The expected learning outcome is that the trainees will be able to define the procedures in case of accidents.

Chapter 8 - Cargo equipment

Required performance:

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
8	Cargo Equipment	
8.1	General cargo-handling equipment on board oil tankers	6,0
8.2	General cargo-handling equipment on board chemical tankers	6,0
8.3	General cargo-handling equipment on board liquefied gas tankers	6,0
8.4	Worksheets	0,5
8.5	Test	1,5
TOTAL		**20,0**

Introduction to Chapter 8

This Chapter introduces a description of the cargo handling equipment on board oil, chemical and gas tankers.

The trainees are acquainted with:

- tank arrangements on crude oil tankers according to MARPOL regulations, including slop tanks,
- piping arrangements,
- line systems,
- valves used,
- pump lines, drop lines,
- pump room,
- deck lines,
- COW lines.

Pumps, playing a significant role in cargo operations are subject of special attention. Classification and selection of pumps is done on the basis of specific capacity needs and operational conditions. The separate types of pumps are reviewed in detail. The pump delivery is an important characteristic for determination of the optimal operation point.

Next come the draining and stripping systems on board the tanker.

Cargo level measurements play a very important role in estimating the overall amount of cargo on board. Different methods are shown based on manual, mechanical or electronic methods.
In addition to the provision of cargo compartments, pipelines and pumps for handling the oil, the oil tanker must also provide adequate heating systems for some types of oil and cooling systems for others. Properly constructed ventilation systems are necessary in all oil tankers in order to avoid excessive loss of cargo from evaporation and to control the escape of dangerous gases.

The same overview is applied for chemical and gas carriers, related to the general cargo handling equipment used with appropriate drawings and explanations.

Chapter 9 - Cargo operations

Required performance:

Knowledge, understanding and proficiency		Lectures, demonstrations and practical work in hours
9	Cargo Operations	
9.1	General awareness of safe cargo operational procedures on tankers	12,0
9.2	Worksheets	1,0
9.3	Test	1,5
TOTAL		**14,5**

Introduction to Chapter 9

This chapter provides details on cargo operational procedures on oil carriers, such as :

- Loading procedures,
- Loaded and ballast voyages,
- Tank cleaning,
- COW,
- Use of inert gas,
- Purging and gas freeing.

Procedures for chemical tankers are covered in terms of the specifics, such as:

- Cargo planning operations,
- Loading and unloading chemical cargoes,
- Tank cleaning and gas freeing,
- Slops and slops disposal.

For LNGs the operations refer to:

- Tank environmental control,
- Warming up the cargo,
- Inerting,
- Gas freeing,
- Cooling down when needed.