

**ΑΚΑΔΗΜΙΑ ΕΜΠΟΡΙΚΟΥ ΝΑΥΤΙΚΟΥ  
ΜΑΚΕΔΟΝΙΑΣ**

**ΠΤΥΧΙΑΚΗ ΕΡΓΑΣΙΑ**

**ΕΠΙΒΛΕΠΩΝ ΚΑΘΗΓΗΤΗΣ: ΠΑΝΑΓΟΠΟΥΛΟΥ ΜΑΡΙΑ**

**SOLAS AND LSA CODE**

**ΤΗΣ ΣΠΟΥΔΑΣΤΡΙΑΣ: ΦΑΚΙΟΛΑ ΣΤΑΜΑΤΕΛΑ**

**A.G.M: 4096**

**Ημερομηνία ανάληψης της εργασίας: 16/05/2020**

**Ημερομηνία παράδοσης της εργασίας:**

**Ο ΔΙΕΥΘΥΝΤΗΣ ΣΧΟΛΗΣ : Cpt. ΤΣΟΥΛΗΣ ΝΙΚΟΛΑΟΣ**

## **CONTENTS:**

➤ SOLAS Introduction.....	3
➤ I.M.O Introduction.....	4
➤ Chapter I – General provisions, Inspections and Certificates.....	6
➤ Chapter II-1 -Construction, sub vision, stability machinery and electrical installations.....	11
➤ Chapter II-2 – Fire protection, fire detection and fire extinguishing.....	15
➤ Chapter III- Life saving appliances and arrangements (L.S.A code).....	21
➤ Chapter IV -Radiocommunications.....	27
➤ Chapter V- Safety of navigation.....	30
➤ Chapter VI- Carriage of Cargoes.....	31
➤ Chapter VII- Carriage of dangerous goods.....	32
➤ Chapter VIII- Nuclear ships.....	34
➤ Chapter IX- Management for the Safe Operation of Ships.....	34
➤ Chapter X- Safety measures for high-speed craft.....	35
➤ Chapter XI-1-Specila measures to enhance maritime safety.....	35
➤ Chapter XI-2- Special measures to enhance maritime security.....	36
➤ Chapter XII- Additional safety measures for bulk carriers.....	36
➤ Chapter XIII- Verification of compliance.....	37
➤ Chapter XIV- Safety measures for ships operating in polar waters.....	37
➤ Epilogue.....	38
➤ References.....	39

## SOLAS and LSA introduction

The **International Convention for the Safety of Life at Sea (SOLAS)** is an international maritime treaty (maritime law) which sets minimum safety standards in the construction, equipment and operation of merchant ships. The convention requires signatory flag states to ensure that ships flagged by them comply with at least these standards. After the sinking of the RMS Titanic in 1914, the first edition of SOLAS was presented prescribing numbers of lifeboats, other emergency equipment along with safety procedures and including continuous radio watches, but due to First World War never actually released.

Later in 1929 a second international conference was convened to take into account the accidents that took place during WWII, which came into force in 1933 and was the first to be implemented.

On June 17<sup>th</sup> 1960 the convention approved and entered into force on May 26<sup>th</sup> 1965, this edition was actually the fourth. In 1974 a completely new Convention was adopted and that was the first major achievement of IMO (International Marine Organization)\*. In 1978 new conversions were made to its protocol, 1981 and 1983 there were some amendments to the convention which was adopted by the IMO. A set of important amendments to the SOLAS and various codes enter into force once in a while, the latest was on 1 January 2020.

The SOLAS consists of the convention, which has legal issues and includes fourteen chapters.

- **Chapter I:** Contains general provisions, applications, definitions, exemptions, inspections, certificates and controls of maritime accidents.
- **Chapter II.1:** Construction, Stability, machinery and electrical installations.
- **Chapter II.2:** Fire protection, fire detection and fire extinction.
- **Chapter III:** Life-saving appliances and arrangements.
- **Chapter IV:** Radio communications.
- **Chapter V:** Safety of navigation.
- **Chapter VI:** Carriage of Cargoes and Oil Fuel.
- **Chapter VII:** Carriage of dangerous goods.
- **Chapter VIII:** Nuclear ships.
- **Chapter IX:** Management for the Safe Operation of Ships (ISM).
- **Chapter X:** Safety measures for high-speed craft.
- **Chapter XI-1:** Special measures to enhance maritime safety.
- **Chapter XI-2:** Regulations for special rules to improve maritime security.
- **Chapter XII:** Safety measures for bulk carriers.
- **Chapter XIII:** Verification of Compliance.
- **Chapter XIV:** Safety Measures for Ships Operating in Polar Waters.

The LSA (Life saving Appliances) are those appliances that protect human life at sea, the LSA Code also include the common and special requirements for both passenger and cargo ships. In these except from the definitions and detailed rules for the application of the regulations shall be as follows construction details of lifeboats, their size and transport capacity as well as their equipment. The corresponding data for inflatable rafts as well as specifications for related to lifebuoys and in general requirements of the rescue devices.

## **I.M.O INTRODUCTION**

### **General**

The International Maritime Organization (I.M.O) and creator of SOLAS is a specialized UN body which is also responsible for maritime affairs. It was founded in Geneva in 1948 and is based in London.

Preponderant and superior body of I.M.O is the Assembly to which the Council dealing with economics and administrative matters. The Assembly is attended by all the member states of the I.M.O. For the promotion of maritime safety, the competent body is the Maritime Safety Committee (MSC). By 1978 there were 14 member states of MSC, of which 8 had to have large merchants fleets. The Commission accepts all States as its members in accordance with Article 28 of the IMO Convention.

For the better performance of its work, the Maritime Safety Committee set up some sub-committees, to which is assigned specific tasks in specific fields. Each subcommittee studies the proposals made by each country and refers them to MSC for taking measures. As soon as these various proposals were accepted they took form of the International Conventions or issued in the form of recommendations to the included countries.

These sub-committees are as follows:

1. The subcommittee of Stability and Load Lines, deals with study of ships from a shipbuilding point of view, on issues of stability, subdivision and loading lines.
2. The subcommittee of Ship Design and Equipment, deals with the study of design problems and means of mechanical and electrical equipment of ships.
3. The subcommittee of Navigation and Safety,
4. The subcommittee of Radio Communications, deals with inter-ship-land communication.
5. The subcommittee of Search and Rescue,
6. The subcommittee of Standards of Training Watchkeeping, whose object of work is the organization of watchkeeping and the training of crew.
7. The subcommittee of Carriage of Dangerous Goods by Sea, deals with the safety and classification of dangerous goods in categories at sea.
8. The subcommittee of Containers and Cargoes, deals with the safety of containers and cargoes for their transport by ships.

9. The subcommittee of Fire Protection, deals with ship fire safety regulations.
10. The subcommittee of Fishing Vessels Safety, deals with regulations for fishing vessels as known from the provisions of the International Convention for the Safety of Life at Sea.
11. The subcommittee of Bulk Chemicals ,
12. The subcommittee of Preventing Collisions at Sea,

Other sections of I.M.O are:

1. Legal Committee, the work of the committee concerns the study of legal issues in the following areas:
  - Liability and compensation for cases of marine pollution from oil and other substances.
  - Shipwreck elimination issues and maritime assistance.
  - Merchant ships in foreign ports.
  - Passengers and luggage.
  - Implementation of IMO regulations.
2. Marine Environment Protection Committee (MEPC), is responsible for preparing the contract for its Prevention Marine Pollution from Ships (MARPOL 1973/78).
3. Technical Cooperation Committee, deals with the provision of expertise and technical assistance to develop countries requesting it.
4. Facilitation Committee, deals with the minimization bureaucracy at ports and terminals.
5. The Secretariat of I.M.O. contributed to the creation of International Conventions. It has offered a lot important work to promote maritime safety and maritime transport. Some of the International Conventions that have been drafted by the I.M.O are the following:
  - Convention for the Safety of Life at Sea (SOLAS).
  - Convention of Load Lines.(CLL).
  - Convention of Regulations for Preventing Collision at Sea (COLREG).
  - Convention for the Prevention of Pollution from Ships (MARPOL).
  - Convention for Safety of Fishing Vessels.



# CHAPTER I

## GENERAL PROVISIONS

### PART A'

In this chapter of the Convention, the cases of its application are defined and given various definitions of the applications of the individual regulations. The first regulations of this chapter apply only to vessels performing international voyages and also make clear the great details of the categories of ships to which the provisions are applied.

General definitions are given in the second regulation of this chapter:

1. "Regulations ", means the regulations listed in the regulation annex.
2. "Authority ", means the government of the country whose ship bears its flag.
3. "Approved ", is considered to be any approved by the respective authority.
4. "International voyage ", means voyage from a country to which the Convention applies to any port outside that country.
5. "Passengers", are considered all persons, except children less than one year, as well as the Captain and members of the crew or other persons deal with the needs of the ship.
6. "Passenger ship", means a ship which carries more than twelve (12) passengers.
7. "Cargo ship", means any ship other than a passenger ship.
8. "Tanker", is the cargo ship that is specially built to carry bulk liquid loads.
9. "Fishing boat", is the vessel engaged in the fishing of all living species of the sea.
10. "Nuclear ship", is the ship whose propulsion takes place nuclear energy.
11. "New ship", means a ship which is built on or after implementation of the SOLAS.
12. "Existing ship", is any ship that is not new.
13. The "nautical mile" is equal to 1852 meters or 6080 feet.
14. "Age", of a ship means the period that has elapsed from the time the ship's registration document are shown.

The third and fourth regulations refer to the exception for ships that do not apply the contract. These are the following:

- The warships and transporting personnel warship.
- Cargo ships with capacity of less than 500 gross tonnage.
- All ships that do not have engine.
- The wooden boats of primitive construction.
- Fishing vessels.
- Pleasure boats that do not engage in commercial transport.

Unless otherwise specified the above ships do not apply with SOLAS. Also exempt from the provisions of the convention vessels exclusively in the Great Lakes region of North America, of the river Saint Laurent and in a few areas of the planet.

They are still exempt from its provisions ships that do not make international voyages normally and there is a need for international travel to be exempted from the principle for certain provisions of the regulation, provided that they comply with the safety provisions required for specific trip.

The authority may also exclude a particular ship from application of certain regulations of the Convention, when from its construction it applies innovations and features to promote the development of technology provided that complies with the applicable safety provisions and are accepted by the countries the ship is to visit. Any principle for allow ship exemptions from SOLAS must state the details and the reasons for the IMO exemption for informing other countries.

At the end of Part A of this chapter we talk about the regulations that require a special instrument or device for their application and the authority will be convinced of its suitability for testing or replacement. The principle that one accepts must notify the Agency (I.M.O.) as well as the reports of the tests performed.

Finally, the obligation of the I.M.O. is to inform about the above contracting states.

## **PART B'**

### **INSPECTIONS AND CERTIFICATES**

**Regulation 6** deals with inspections and the examination of their airworthiness carried out by bodies of the Authority, which are inspectors appointed for this purpose or organizations recognized from the outset.

The authorities shall draw up a plan for carrying out extraordinary inspections which will ensure the suitability of both the equipment and the ship. The extraordinary inspections are carried out by appointed and recognized organizations as well as from other contracting states and are not mandatory. When a ship is deemed unsuitable for sailing on the high seas without risk to passengers, will make sure that there will be rehabilitation and information to principle, to be able to sail.

If an authority body informs the competent authorities of the port country, the government of that country shall designate an institution so that it meets the obligations set out in this Regulation. Responsibility for the effectiveness of the inspection always has the authority that conducts it.

**Regulation 7** refers to passenger ship inspections to be carried out before the ship is put into operation, annual inspections carried out whenever deemed necessary. The above inspections should include the following:

1. In the inspection that takes place before the ship is put into operation, a check is made of hull, the boat externally and internally, the fittings and

the engine of the ship and all means of extinguishing life-saving equipment and marine equipment, the navigation lights, shapes, distress signals and sound emitting means such as provided for in the provisions of the contract.

2. In the annual inspection, all the above are checked and the ship should prove competent for intended purpose.
3. The general, partial inspection is carried out after a repair designated by research. This inspection should ensure that repairs are made satisfactorily and that the materials used are correspondingly satisfactory. So the ship meets and is compatible with the provisions of the contract.
4. Laws, decrees and regulations should ensure from all sides the safety of human life at sea and the ship's ability to travel.
5. Rules should be followed for the tests to be submitted by principals and auxiliary boilers, fittings, steam transfer pipes, high pressure manifolds and fuel tanks of the ICE's (Internal Combustion Engines ) which will include how they are conducted as well as time interval between two consecutive tests.

**Regulation 8** deals with inspections of life-saving equipment and other equipment of cargo ships. So the life jackets inside except the portable radio equipment of the motorized lifeboat, the sounding device, gyro compass, fire extinguisher should be inspected as specified and for passenger ships. The inspection includes the rest of the kit cargo ship.

Also in accordance with the regulations there will be performed annually on tankers older than ten (10) years in three months before or after the anniversary date of issue of the Cargo Ship Deck Safety Certificate to determine if the kit is in good condition. These intermit inspections were re recorded behind Cargo Ship Deck Safety Certificate.

**Regulation 9** refers to radiotelegraph inspections installations and installation of RADAR cargo ships.

**Regulation 10** analyses the inspections of the vessel, the machinery and the cargo ships. The boat, the machinery and the equipment must be inspected and the authority must determine if their condition is satisfactory and at intervals of less than five years and periodic inspections tankers older than ten years. The initial and periodic inspection will ensure that the materials and strength of the boat construction, the boilers machinery and generally other equipment are in good condition. The intermediate inspection for tankers over ten years of age includes inspection of its rudder, load piping systems, ventilation piping, pumping station systems for cargo and oi fuel, valves vacuum pressure, flame retardant grids, electrical installation in hazardous zones as well as the outer surface of the hull.



Depending on the circumstances, the general or partial inspection should indicate clarity that the necessary repairs and renovations that needed to be done were done effectively, the material used is capable and that the ship is in good condition sails safely for the ship or its occupants.

**Regulation 11** refers to the maintenance of the ship's condition after inspection was carried out. More specifically the machinery, the construction of the boat and all other equipment must not be subjected to any change without the permission of the inspecting authority.

When an accident occurs defects are found on board the ship, the ship owner or the master is obliged to notify the authorities as soon as possible or to the inspector or body issuing the relevant certificates so that they decide whether an inspection is required in accordance with the regulations of the Convention.

**Regulation 12,13,14** of the chapter refer to the issuance, duration and validity of the certificates are the following:

1. Cargo Ship Safety Certificate which covers the shipbuilding machinery sector and electrical installations. It is covered by Chapter 2 of the contract and applies to five (5) years.
2. Safety Equipment Certificate which covers the ship's equipment such as fire detection and extinguishing systems, ventilation systems and fire pumps. It also covers the maintenance and operation of media extinguishing and fire warning signs. It is mentioned in its third chapter SOLAS and its validity is two years.
3. Cargo Ship Safety Radiotelegraphy Certificate.
4. Cargo Ship Safety Radiotelegraphy Certificate.
5. Exception Certificate, this certificate is provided for ships performing international voyages and issued when necessary as permitted by the relevant regulations. Also a ship that performs inland voyages if requested to perform an international voyage, this ship may be exempted from obligation to comply with the provisions of the SOLAS and Convention on Loading Lines (CLL) that it complies with safety provisions indicated by the issuing authority. The Exemption Certificate can refer to one or all parts of the ship and may be also valid for one trip for the rest of the year until its expiration.
6. Passenger Ship Safety Certificate, which is covered by Chapters 2.1, 2.2, 3, 4 of the contract and covers construction (subdivision and stability, mechanical and electrical installations and fire protection), rescue equipment, radiotelephony-radiotelegraphy and which, has a power two (2) years.

**Regulations 15 to 20** state that all certificates must be written in the international language and the language of the issuing state and their type certificates must be the same as the specimens in the annex regulations. All certificates or certified copies therefor must be hung on a visible and accessible part of the ship. The issued certificates of contracting States must be recognized by the other contracting states and must be considered equal to those issued by them.

The government or organization can issue an annex to the Certificate Passenger Ship Safety, if during the execution of a voyage a ship has a number of people lower than the maximum permissible number then this ship may have a lower number of lifebuoys and lifeboats. This annex is attached to the certificate and replaces it with regard to rescue equipment. Its power is only for travel which has been issued.

Any ship in a port of another Contracting State may be subject to control by competent government bodies and verify that its certificates are in force. If his certificates are valid they will be accepted by the authorities while unless there are clear indications that the ship does not comply with the provisions of Regulation 11 thereof that is, changes have been made to the ship and its equipment since inspection without permission of the authority if the certificates have expired, the body conducting should take all necessary measures to ensure that the ship is capable of performing travel.

The country authority concerned should disclose this information to contracting countries and in the beginning of the port of arrival. When checked will be done, every effort is made to avoid unjustified ship delays, finally the provisions of the contract are not accepted on ships which do not have valid and regular certificates.

## **PART C**

**Regulation 21** refers to maritime accidents on board. According to the regulation, each authority has the obligation to investigate the accident that has happened to the ship. Each Contracting state shall inform the Agency of the conclusions carried out. In any report of the agency they should not reveal the identity or nationality of the ships, nor attribute its responsibility accident on board or in person.

**CHAPTER II-1**  
**CONSTRUCTION-SUBDIVISION AND**  
**STABILITY, MACHINERY AND ELECTRICAL**  
**INSTALLATIONS**

**PART A'**

The first part of this chapter defines the application of the regulation based mainly on the distinction between new ships and existing ships (i.e. ship that have been constructed since its application (S.O.L.A.S). The definition of terms are also given are essential for the application of the regulations of the chapter.

**Regulation 1** of this chapter refers to their application provisions of the contract. The contract will apply to their passenger and cargo ships whose keels were inserted after 1<sup>st</sup> of July 1986.

For ships constructed before 1<sup>st</sup> of July 1986 the authorities shall ensure that the provisions of the contract are applied by these ships. In a ship on which repairs, alterations or conversions are made must be applies the requirements of the contract in force prior to the commencement of the works. The authority may exclude certain ships or categories of ships from the application certain provisions of the Convention provided that they are not removed during their voyage beyond 20 miles by land and if it deems that safety conditions and travel allow this.

The authority may also exclude passengers ships which are specially engaged to traveling and the transport of special passengers from the application of the regulation as long as they comply with the provisions of:

- Rules annexed to the 1971 agreement “Special passenger travel ships”
- Rules annexed to 1973 protocol “Requirements for special passenger ship travel”

On the second Regulation definition is given in the second regulation:

1. “Load-bearing subdivision line” is the waterline that is taken when determining the subdivision of the ship.
2. “Maximum load-bearing water subdivision line” is the water load line that corresponds to the maximum allowable draft.
3. “Length of the ship” is the length measured between the perpendiculars taken at the extremities of the deepest subdivision load line.
4. “Breadth” is the maximum width measured between its sides maximum load of subdivision water line.
5. “Draught” is the vertical distance in the middle of the ship, measured from the keel to the loaded water line.
6. “Waterproofing deck” is the maximum deck that meets the transverse barriers.
7. “Immersion limit line” is a line drawn at least 76mm below from the upper surface of the bulkhead deck on the side of the ship.

8. “Space resolution” is the percentage of the space where it can be filled with water. The volume of a space is measured only to the height of the line sinking limit.

9. **“Engine room”** is the space between the keel and the sinking line vertical and between the main transverse seals diaphragms horizontally. In this area there are the main propulsion engines, the boilers and auxiliary equipment. If there is no usual layout of the premises, the authority can determine the boundaries of the spaces of machinery spaces.

10. “Passenger spaces” are the spaces intended for use and accommodation passengers. Luggage and food storage areas are excluded.

11. In all cases the volumes and surfaces will be calculated up to the lines ship design.

12. “Temporary” means that in any sea condition water will not penetrate into ship.

The 3<sup>rd</sup> Regulation explains the definitions used in Parts C,D and E and in Regulation 3.1, 3.2, 3.3, 3.4 stipulates that all boards must be constructed and maintained under the supervision of a classification society recognized by the authority and that all oil tankers and bulk carriers should be disposed of in the tanks used exclusively for the sea to have an effective corrosion prevention system. Also all tankers must be equipped with means to ensure safe access to the even in adverse weather conditions and all tankers over 20.000 tones of DWT should have an emergency towing device in each end.

## **PART B**

The second part of this chapter deals mainly with passengers ships but also applies to cargo ships. Briefly covers the areas:

1. Requirements regarding the length of the ship’s watertight compartments.
2. Special regulations regarding the watertight subdivision of passenger ships.
3. Stability requirements when the ship is damaged, i.e when one or more watertight compartments of the ship are found (due to damage to the enclosure) in communication by sea.
4. Ballasting.
5. Requirements for the configuration of the bow and stern tank balance (forepeak, afterpeak), for the configuration of double bottom tanks, cargo areas and access in these places.
6. Requirements and data for the construction and initial testing of watertight fences, openings, watertight doors, portholes, watering decks of passenger ships.
7. Reference is made to the pumping devices of the water collectors and to the requirements that govern.

Particular interest to ship operators are Regulations 22 and 23 which refer to the stability elements that must be present on ships and in the drawing respectively fault

management. According to Rule 22, the results of the stability test, as well as the elements that will allow it to be easily ascertained the stability of the ship in any condition to the construction or remonstrations.

## PART C'

### MECHANICAL INSTALLATION

The third part of this chapter contains details on mechanical installation of the ship, requirements for cargo and passenger ships, as well as the minimum necessary performance for main machinery and the way in which the movement is transmitted. In the next regulation it mentions the media the ship and in particular each ship must be able to return to normal conditions. For passenger ships and only the reversal of the propeller direction will be done in sufficient time under normal operating conditions for the ship to be loaded at a standstill from the maximum speed.

This section is later referred to in Regulation 29 as the steering gear of the rudder for each category of ship. Thus in ships the main rudder mechanism should be able to set the rudder from 35 on one side to 30 on the other as the ship is moving at maximum speed in no time longer than 28 seconds.

The auxiliary gear must be able to turn the rudder from 15 on the same side in the 15<sup>th</sup> of the other 60 sec in the maximum load condition and in the half of this service speed. It is also stated that the rudder power unit can be operated from the bridge and restart automatically. Still if a ship has two or more of the same power units for the main rudder mechanism required to carry an auxiliary rudder mechanism as long as they can operate independently and to agree with the requirements.

The last part of this regulation refers to steering systems of different types of tankers and of various capacities in excess of 10.000 etc. It appears as a requirement to tankers 10000 grt and above must have two rudder control systems and each of which must operate independently of the bridge. In the event of a malfunction of the control system the other system must be capable of being operated from the bridge, also its main rudder will operate with power supply as specified in the requirements of the regulation. A supplement to the previous regulation is Regulation 30 which presents the additional requirements for electric and electro-hydraulic steering gear.

**Regulation 31** makes extensive reference to controls and systems warning of the engine and the propulsion system and the requirements laid down to govern them. Regulations 32 to 36 refer to the operation of its auxiliary machines engine room which are the boilers, the air pressure systems, the ventilation systems of the engine room in their supply as well as in their piping. Reference is also made to noise protection.

The last three regulations of the third part of the chapter refer to communication between the bridge and the engine room, the engineers warning and the location of hazardous installations on passenger ships. It is further stated that on all ships there must be two ways of transmitting orders from the bridge to engine room one

another checkpoint one of each will be the telegraph. There will also be a system of engineers warning which will be clearly heard in their accommodation areas.

## **PART D'**

### **ELECTRICAL INSTALLATIONS**

In this section of the chapter reference is made to electrical installations, in the sources of electricity in case of danger, in the precautions to be taken are taken for hazards of electrical origin.

According to **regulation 40 and 41** on each ship, the electrical facilities should be such as to ensure its normal operation of basic electrical safety services and safety of passengers from electrical hazards. It is specified that each ship should be equipped with at least two power pairs and the power pairs and the power of both couples should be able to ensure the operation of the auxiliaries services. The requirements regarding its distribution devices are also mentioned electric power.

According to **Regulation 42** this part of the chapter, n passenger ships must be an autonomous source of emergency electricity that is enough to supply all services, for the safety of the crew and passengers in case of emergency. The hazard energy source should supply for 36 emergency lighting at the lifeboat stations of his deck ship and outside the sides of the ship. It must also feed every ship corridor, stairs and exits and engine compartments the pump the fire detection system, the intake manifold pump, the navigation lights and other lights required by COLREG and systems communications. For ships that make small voyages, in which case the authority will designate a smaller duration of the electrical energy source of danger. The source of the hazardous energy may be an electric generator driven by a suitable motor or a battery pack capable of withstanding the ship's ancillary services.

## **PART E'**

### **ADDITIONAL REQUIREMENTS FOR PERIODICALLY UNKEEPING ENGINE AREAS**

This part of the chapter applies to cargo ships and refers specifically to requirements of a fully automated engine which does not require human presence (shifts) constantly because it can be self-controlled for any malfunction to do the default for each case and to alerts its operators who must always check for malfunctions and act accordingly.

In general, the safety of the ship in all cruising conditions must be ensured including maneuvering, the proper operation of the equipment and each ship must be provided with a written indication that the authority is satisfied with the equipment provided operates in periodically unprotected areas of engine areas.

The requirements of the following areas are being developed:

1. Fire precautions.
2. Protection from bed rest.
3. Control of the engine from the bridge.
4. Communication at the engine room.
5. Warning system.
6. Security system.
7. Special requirements for engine, boiler and electrical facilities.

## CHAPETR II-2

# FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINGUISHING

### PART A'

The first part of this chapter determines which ships will apply to regulations of the contract and in particular what will happen to ships built before and after the validity of the contract and with the exceptions. The basic principles are stated given each type of ship seek to reach the ship in the best possible condition for detection and response and fire protection and these are:

- 1.Division of the ship into main vertical zones – thermal and construction limits.
- 2.Separation of accommodation from the rest of the ship thermally and construction boundaries.
3. Limited use of combustible materials.
4. Detection of any fire in its area of origin
5. Reduction and extinguishing of any fire within its place of origin.
6. Protection of means of escape or access to combat fire.
7. Immediate availability of firefighting equipment.
8. Minimization of the possibility of ignition of flammable charge.

**Regulation 3** deals with the explanation of various definitions that affect details of the application of the regulations, such as the definitions of non-combustible materials, fire protection and other requirements related to the requirements fire protection.

#### **Regulation 4:**

- Passenger ships over 4.000 gross tonnage must be equipped with at least 3 fire pumps.
- Less than 4.000 gross tonnage and bulk carriers over 1.000 gross tonnage, must be equipped with 2 pumps.
- Bulk carriers under 1.000 gross tonnage must be equipped at the direction of the authority Also defined that the emergency fire pump will be located in an area outside the engine room.

Nozzle diameters should be 12mm 16mm 19mm or larger nozzle diameters if permitted by the authority. For the areas of the machines diameter of the nozzles should not be greater than 19mm and for accommodation areas no greater than 12mm , also requirements for the intakes, the pumps, their hoses and piping in general.

**Regulation 5** deals with fixed fire extinguishing systems which may be carbon dioxide (CO<sub>2</sub>), HALON gas, steam, or any other gas and piping. The installation of extinguishing system with HALON or other allogenic hydrocarbon has been banned since 1994.



**Regulation 6** reference is made for the portable fire extinguishers which should have capacity of 9 to 13.5 ltrs. Fire extinguishers of 13.5 ltrs should be equivalent in terms of fire extinguishing efficiency to fire extinguisher of 9 ltrs. There should be a portable foam unit fitted appropriately air tube nozzle and the portable container must have a capacity of 20 ltrs.

The nozzle should be capable of foaming the sample and extinguishing fire 1.5 m<sup>2</sup> per minute. It is stated that one of the fire extinguishers intended for a dance will located at the entrance of the site as well as that the authority will be competent to judge the suitability of the extinguishing material and the required number of spare charges. Finally, fire extinguishers must be inspected periodically and tested by principle.

**Regulations 7 to 10** refer to fire extinguishing devices in engine rooms which are:

- Gas systems analyzed in Rule 5
- High swelling foam system, more specifically the foam that will be used to extinguish the fire should have a flow of at least 1m depth per minute and the amount of liquid available for foaming should be enough to produce foam equal to 5 times the volume of the protected space.
- Water-sprinkler pressure system in accordance with regulation 10 of this throughout the chapter, fixed automatic sprinkler systems should consist of the feed pump of the system and nozzles approved type. The nozzles must provide 51 m<sup>2</sup> per minute. The system must be kept under constant pressure and the pump of the system must be switched on automatically due to the pressure drop in the mains. This pump should be operated by an independent I.C.E. and turn on automatically in case fault of the main engine.

In the next 4 regulations the special provisions in the premise become known and requirements for automatic sprinklers, permanent detection systems and fire alarm and their placement in engine rooms. This defines that the system detection will consist of smoke detectors heat detectors and only additional flame detectors. There will also be at least 2 ways to power the system energy. It can be controlled from bridge or the main fair control station, the system must be periodically checked for proper operation.

The last regulations of this chapter present the provisions on flammable petroleum products, ventilation systems and of particular interest Regulations 17,19 and 20, which refer to fire fighting equipment, in international connection to land and fire control plans.

So according to **Regulation 17**, the fire-fighter's dependence must include the as follows:

- Protective clothing suitable for protection against heat and burns from fire and steam should be waterproof.
- Footwear and gloves and gloves which will be a bad conductor of electricity
- Helmet that will ensure the effective protection.
- Axe if the authority allows it.
- Security lens approved type that can operate continuously for 3 hours.
- Respiratory device approved type.

The breathing apparatus is distinguished into autonomous and into a device with air pump and pipe of sufficient length. For each automatic respiratory device there will be at least 2 spare wires and all cylinders must be able to be replaced and have sufficient air for at least 30 minutes.

Any ship over 500 grt shall have at least one international connection to in accordance with Regulation 19. The International Shore Connection must be made of a material suitable to withstand operating pressure 10.5 kg/cm. The link should be kept in a suitable on the ship together with 4 screws of diameter 11 6mm and length 16mm and 8 washers.

Finally, **Regulation 20** states that in different parts of the ship there must be drafts of a general layout with the details related to protection and proper fire management.

## **PART B'**

In this part of the chapter there are presented great details the measurements of fire safety for passenger ship carrying more than 36 passengers, and for passenger ships, ships carrying less than 36 passengers. Detailed constructions are also given requirements of the ship to ensure the protection and non- spread of fire. In these items are included such as steel construction, fire barriers and the definition of zones, the provision of alternative escape costs by the various premises, the type of ventilation and ventilation networks, the installation requirements and the details of iconic extinguishing systems, detector sprinkler systems fire, as well as restricting the use of flammable materials. Especially for passenger ships must comply with the following provisions:

- There must be at least two escape means of which at least one will be free of watertight doors. The authority may allow only one medium escape.
- Stairs that serve only one space, are not considered as a means of escape.
- Elevators should not be considered as an effective means of escape.
- Dead ends not exceeding 13 meters will be allowed.
- Two means of escape are provided in each area of machinery space.
- The protection of the exit from the closed spaces of the staircase leading to boarding stations of lifeboats and drawings should be compliant with the requirements of the authority.
- The fans to be used must be properly installed in the various areas and the ducts should be made of suitable fire-hazardous material and should be placed no closer than 60 cm in length to the "A" and "B" class sections and be able to close from a point outside the space.

Also passenger cars like other ships must be equipped with pumps fire main pipes and fire extinguishers in accordance with Regulation 5 of the capital. They must still be equipped with approved portable fire extinguishers in accommodation, service areas and stations where the authorities will if they are suitable and adequate, they will be provided with at least 1 International land-type connection, appropriate information system. It must support a water sprinkler system to extinguish the fire, CO2 gas system and high foam expansion system. There must

still be permanent fire extinguishing system inside the premises of the machinery spaces.

Two fire extinguishers should be located in each vertical zone of the ship and each firefighter kit includes a self-contained breathing apparatus device, these kits must be stored in a suitable place ready for immediate use. They must also have a detection and alarm system fire alarm, manual fire alarm points, special alarm and system intercom as well as an adequate patrol system so that the explosion of fire to be detectable immediately.

There should also be a central fire control station where it should be collect the following controls and function indicators.

1. Permanent fire detection and alarm system.
2. Automatic sprinklers.
3. Fire door indicators.
4. Closing fire doors.
5. Waterproof door indicators
6. Ventilation fans.
7. General fire alarm.
8. Communication system including telephones.
9. Microphone system.

## PART C'

- **Regulation 42 to 54** set out the requirements for cargo ship. All components are presented (strength of materials, types of materials, ways their use, etc.) and fire safety. Special mention is made of three methods of protection that can be adopted for the protection of accommodation and service. These are:
- **Method IC:** Provides the construction of internal bulkheads from materials Class B and C and the installation of a permanent detection and alarm system fire in all corridors, stairs, escape routes.
- **Method IIC:** Provides the installation of an automatic sprinkler, a permanent system fire detection and alarm in all areas that may start fire without restriction on the type of internal bulkheads.
- **Method IIIC:** Provides for the installation of a permanent detection system and fire alarms in all dormitories and ancillary areas except areas that do not display a significant fire hazard such as voids places, toilets, etc.

A subsequent regulation states that cargo spaces for ships of 2000 grt. and above, will be protected by a permanent fire system. The authority may exempt the ship from application for the permanent fire system in cargo areas when the ship has constructed for the transport of only iron ores, coals and grains, non-combustible cargoes or low fire hazards and vapors are provided with steel covers that close effectively.

On the last regulation of this part analyzes the specific requirements that must be met by ships carrying dangerous goods. These special requirements refer to the following areas:

1. Water supplies.
2. Ignition sources.
3. Detection systems.
4. Ventilation.
5. Hull pumping.
6. Personnel protection.
7. Portable fire extinguishers
8. Insulation of the walls of the countries of the engine.
9. Water spray system.

The authorities should provide the ships with a document of compliance when it meets the requirements of the regulation

### **PART D'**

The fourth part of this chapter contains specific requirements for oil tankers, which determine their form, layout and operating systems. The locals that are analyzed are:

1. Location and separation of countries.
2. Construction, constructions details and durability in bulkhead fire
3. Ventilation and aeration.
4. Protection of cargo tanks.
5. Permanent deck foam systems.
6. Inert gas systems.
7. Pump room.

Each tanker for the protection of tanks will be equipped with a foam system. The fixed extinguishing foam system on deck must distribute the foam through the deck area and in each tank. It should also be simple and fast operation and its control station should be located away from the tanks and be accessible. The foam must be injected through nozzles (cannons) and they should be able to maneuver. Finally taking and hoses must be located left and right along the deck length. The tankers above 20000 DWT and the ships with tank washing machines will be additionally equipped with permanent inert gas system (inert gas) that can be supplied to the premises double walls through suitable connections.

## **CHAPTER III**

### **LIFE-SAVING APPLIANCES AND ARRANGEMENTS**

#### **(LSA APPLIANCES)**

In the first part of the fourth chapter reference is made to the ships they find the provisions of this chapter shall apply.

The second and third parts of this chapter include the common and special requirements for both passenger and cargo ships. In these except from the definitions and detailed rules for the application of the regulations shall be as follows construction details of lifeboats, their size and transport capacity as well as their equipment. The corresponding data for inflatable rafts as well as specifications for related to lifebuoys and in general requirements of the rescue devices.

It is necessary to emphasize that all life jackets should be:

- In operating condition and be ready for any use during the voyage.
- The boarding of lifeboat and plans should be done quickly and the order of life-saving equipment should be such that the handling of other lifebuoys is impeded.

According to the regulations, lifeboats should be:

- Constructed in such a way so as to have positive cruising stability and adequate rim style.
- Must be perceived by spare buoyancy and have a strong outer casing.

The lifeboats must be:

- Strong enough to be launched into the sea at full load.
- The side seats will be placed as low as possible inside the life lifeboat
- The number of people in lifeboats, the dimensions, the name of the port of registration of the ship should be indicated on the boat.
- The color of the lifeboat must be clear and be discern from far away.

The following apply to the carrying capacity of lifeboats:

- The number of people who can take a lifeboat should be equal to or less than the number of people each weighing an average of 75kg, all wearing life jackets and who can sit without interfering the functions of the lifeboat but in no case the number of passengers will not exceed 150.

It should be noted that every passenger ship is required to carry lifeboats on each side of the ship capable of carrying not less that 50% of the total number of passengers and comply with the requirements of the chapter. Every bulk carrier will carry one or more lifeboats on each side of such total capacity that to accept the total number of people aboard on ship.

A lifeboat with engine must be equipped with I.C.E and its fuel must be efficient for one day (24 hours) continuous operation. The speed of lifeboat in normal conditions must be 6 kts. If it tow a life raft of 25 persons completely equipped and with the number of passengers completed, the speed must be at least 2 kts.

Particular emphasis should be placed of the regulation that speaks of the lifeboat supplies and according to which are the following:

- Sufficient floating paddles with their equipment (metal or wooden hinges) and two pins attached to chains in the lifeboat.
- Two poles
- 2 axes, one at each lifeboat
- 1 compass in her compass case
- 1 floating anchor of approved size
- 2 ropes of sufficient length at each lifeboat
- 1 stainless steel spoon on a rope
- 1 stainless steel calibrated water cup
- Food portion not less than 10.000 kj for each occupant in which will be airtight packaged
- Waterproof 3 ltr drinking water containers or containers 2 ltr of drinking water if there is a desalination device.
- 4 approved type parachute flares which produce red light
- 6 red light hand torches
- 2 approved type smoke canisters
- 1 watertight first aid kit
- 1 mirror approved type for making signals on day
- 2 floating life buoys attached to a rope that floats not less than 30 meters
- 1 knife
- 1 survival manual
- 1 copy of the rescue signs in a waterproof case
- 3 tools for opening cans
- 1 waterproof electric lamp used for making Morse code
- 1 manual pump of approved type
- 1 floating pump and 2 buckets
- 1 whistle or similar sound device
- Fishing tackle
- Adequate tools for micro-adjustments on the engine
- 6 anti-nausea bag for each person
- 1 portable fire extinguisher of approved type for extinguishing petroleum products
- 1 efficient RADAR reflector
- 1 projector capable of illuminating light object at a distance of 180 meters
- Thermal protection assistance that is sufficient for 10% of passengers

The above supplies must be properly supported inside the lifebuoy and should be packaged in an appropriate and compact manner. It will also should be emphasized that all ships are required to carry 2 radar transmitters, to have 2 emergency beacons one on each side of the ship as well as at least 3 portable VHF's. These devices must be stored in convenient and safe location and will be ready for use in case of risk.

According to **regulation 39** the inflatable lifebuoys must be constructed in such a way that it has to be thrown into the sea from a height of 18 meters without damaging the raft and its equipment. It must also be equipped with housing that protects occupants from the weather conditions and there must be the appropriate means and its total weight to not exceeds 185 kg. The floor of the raft will be waterproof and should acts as insulating in the cold. In addition, it must be able to operate throughout temperature range and in particular as a reference point at -30 C should is completed within 3 minutes. It must be easy to tow and can be towed at a speed of 3 kts. Also in life rafts will must indicate the number of persons name and port of registration of the ship. Also it should be emphasized that the requirements for rigged life rafts are identical to those of the requirements of them.

The following are the supplies of life rafts and rigged life rafts. So the supplies are as follows:

1. A life buoy with a rope length of at least 30m.
2. Two sponges
3. Two floating anchors, one of which is permanently attached to the lifebuoy rafts and to have a spare anchor
4. Waterproof electric lamp used for making Morse sings
5. Tools for the repair of holes in buoyance spaces
6. Two small oars
7. An air pump or blower
8. Three can openers
9. A watertight first aid kit that must be approved type
10. A stainless steel cup for drinking water with measure
11. A mirror sign for the day
12. A marking whistle
13. Two approved parachute flares that produce red light
14. Six approved sparks plugs that produce red light
15. Fishing gear
16. Food portion not less than 10.000 kl for each person
17. Six tablets to treat nausea in each occupant
18. Waterproof containers 1.5 liters of water corresponding to each boarding person in accordance with the authority
19. Instructions on how to board the lifeboat
20. A copy of the life sign board

21. Instructions for immediate action
22. Instructions on how to survive
23. Thermal protection assistance that is sufficient for 10% passengers



Specifications are referred to in the following regulations of this chapter of circular and individual lifebuoys.

Ring life buoy should have an outer diameter not larger than that of 800 mm and internal not less than 400 mm, to be made of solid cork or other similar material, to be painted in a distinct color (orange) and be able to float in fresh water for 24 hours, exercising them weight 14.5 kg of iron and weight not less than 2.5 kg. They still have to have written on the ring life buoys, the name and the port of registration of the ship. All ring buoys should have a rope attached and those that are fitted with an extra lifeline to have a length of 30 meters. The automatic lights will must be on an approved type, watertight and operate for at least 2 hours with the lighting of 2 candles and a frequency of not less than 50 flashes per minute. It must be securely fastened to circular lifebuoys. Finally circular lifebuoys that are equipped with a smoke signal, they will be able to produce distinct color (orange) for at least 15 minute and can be easily thrown from the deck of the ship's deck.



REQUIRED RING LIFE BUOYS ON BULK CARRIERS ON CARGO SHIPS

Length of ship in meters	Minimum number of ring life buoys
> 100 m	8
100 m and under 150 m	12
< 200 m	14

REQUIRED RING LIFE BUOYS ON BULK CARRIERS ON PASSNGER SHIPS

Length of ship in meters	Minimum number of ring life buoys
>60 m	8
60 m and > 120 m	12
120 m and > 180 m	18
180 and > 240 m	24
< 240 m	30

Individual lifebuoys should cover the number of people and each person should have his own life buoy. There should be an additional number of life jackets from all persons. Their construction needs to be based on suitable and approved materials and can be worn properly without assistance within 1 minute.

The color of the life buoy should be clear and have approved type whistle well attached to a rope. It must have sufficient buoyancy in calm fresh water to keep the person's face out of the water by 12 cm at least with the body tilted backwards and capable of rotating unconsciously persons in the water from any position out of water in no time longer than 5 seconds. It should still have a light that is activated by the fall of the life buoy in the sea or activated by a special switch and illuminate for at least 8 hours. Individual lifebuoys must be placed and stacked in conspicuous places on deck. As long as the passengers ships their places must be accessible to all persons.

As for the parachute flares, the hand fireworks and the floating smoke signals the regulations refers that all must be in watertight compartments, have a complete ignition device, clear comprehensible instructions for use printed on the case and to be designed to not cause discomfort to the person using them. Particularly:

Parachute flares must reach a height of 300 meters, to burn red light color not less than 30.000 candles, having burning period not less than 40 sec and fall speed not more than 5m/sec. Hand sparklers should burn evenly in bright red intensity not less than 15.000 candles, having a burning period of at least 1 minute and continue to burn for 10 seconds when submerged under 100 mm water.

Floating smoke signals (smoke canisters) must emit high color smoke for a period of not less than 3 minutes, not to emit any flame during operation, to do not rinse from the sea and continue to emit smoke for 10 sec when submerged under 100 mm water. The throwing life line device is mandatory on ships and the rope length used to be not less than 300 meters. The device should include four bullets and four strength ropes not less than 2 kts.

Particular reference is made to the crew division table as well as the drills who have take place. In the division table of drills the duties of each crew member in the event of an emergency are indicated. It must also indicate the assembly station to which the members will go and the tasks to be performed. This table together with a training manual must be hung in various prominent and busy parts of the ship (crew- officers dining rooms) as well as in the rooms of its member. As far as passenger ships are concerned the table should indicate the tasks of all crew regarding passengers in case of emergency.

In passenger ships , drills of lowering the lifeboats and fire drills must be performed every week, on cargo ships these drills must be performed once in a month. If it changes 25% of crew composition is necessary the execution of the firefighting drill and lifeboat lowering drill to be done within 24 hours of the departure of the ship. On drills, equipment should be tested and be recorded in detail.

## CHAPTER IV

# RADIOCOMMUNICATIONS

In 1988 member states of IMO adopted the SOLAS amendments, which refer to radio communications by improving the contractual system radiotelegraphy and radiotelephony, in such a way as to design and developed a new communication system in shipping, known as GMDSS (Global Maritime Distress and Safety System). On part A of the fourth chapter of SOLAS references are made that are applied to all ships, the pre-existing regulations also apply to cargo ships above 300 gross tonnage, except ships sailing in the lakes of North America and in the sea passages that connect or enter them. After 1/2/1999, each ship is required, regardless of the date of its construction to apply all applicable requirements of this chapter.

The authority has the right to exempt, partially or conditionally, certain ships, but each authority shall submit to the IMO, as soon as possible after January 1 each year, a reference to all exemptions granted in the previous year calendar year.

The following are some of the definitions in this Chapter:

- **Digital selective Call (DSC)**, is a technique that uses digital codes and tables radio station to contact and transmit information to another station or group of stations, applying them recommendation of the International Advisory Committee on radio communications (International Radio Consultative Committee- CCIR)
- **INMARSAT**, is the International Maritime Satellite Organization, which was established by the relevant international Convention in 1976.
- **International Service NAVTEX**, means coordinated emissions and automatic receiving at 518 KHz, maritime safety information via telegraphy print free-zone in English language.
- Radiolocation means locating a ship in danger aircraft or shipwrecks from rescue units.
- **Maritime safety information**, means maritime and meteorological warnings, weather reports and other messages, urgent emitted to ships.
- **Polar orbit satellite service**, means service based on polar orbiting satellites, which receive and transmit distress signals from the EPIRB (Emergency Position Indicating Radio Beacon) devices and which provides their position.
- **Radio communication regulations**, means the regulations that are attached or deemed to be annexed to the most recent amendments on Radio communications, which apply each time.
- **Marine area A1**, means any marine area covered by at least one installed VHF (Very High Frequency) station and capability digital selective call, as determined by the signatory state on SOLAS.
- **Marine area A2**, means any marine area excluding area A1, covered by MF (Medium Frequency) and there is the possibility of digital dialing, as defined by the state that has signed SOLAS.
- **Marine area A3**, means any marine area, excluding areas A1 and A2, covered by geostatic emissions INMARSTA satellites.

- **Sea area A4**, means any sea area which does not included in the sea areas A1, A2 and A3.

It is stipulated that each ship during the voyage will be able to:

1. To transmit ship-land warning signals in at least two different ways instantly independent of each other, using a different service radio communication.
2. Receive land-ship distress signals, signals communication, search and rescue coordination, local maritime safety information communications, general radio communications from and to terrestrial radio systems or bridge-to-bridge communication networks.

## **PART B'**

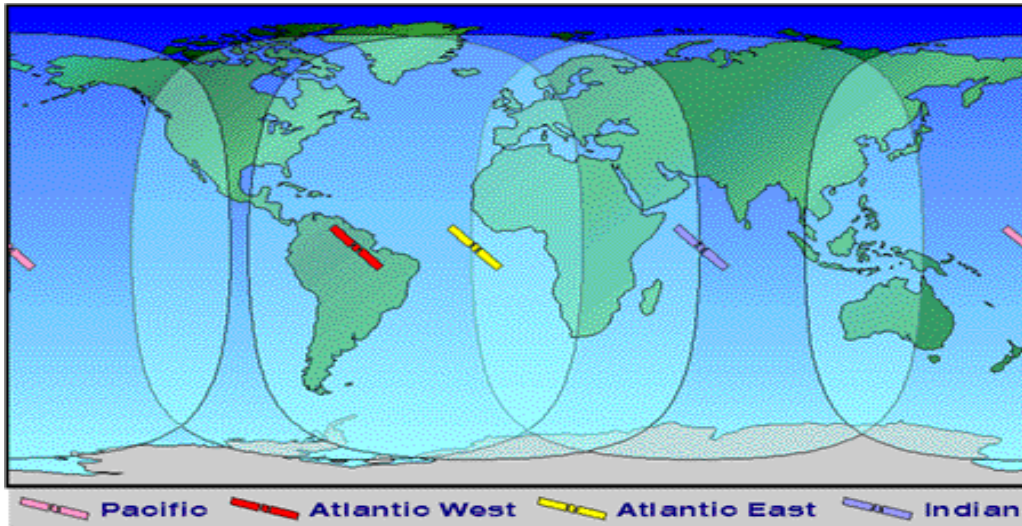
Part B states that each ship must maintain continuous watches when under way in all frequencies of danger, digital selective call, radiotelephony and the transmission of maritime safety information. Each ship will have specially trained operators for radio communications risk and safety which satisfy the authority. Operators will have certificates set out in the radio regulations. One of will be designated as the main radio communications operator during incidents.

## **PART C'**

On this chapter it is stipulated that each ship will have radio installations commensurate with functional requirements specified by regulation, and suitable for the maritime area or areas through which it will sail during voyage. The radio facilities will be approved by the authority to ensure that they are not affected by their position from interference, water effect, and extreme temperatures and will be ensured maximum possible degree of security and operational availability.

The approved and necessary radio equipment for ships is:

1. VHF/DSC capable of maintaining a continuous prison on channel 70.
2. 9 Ghz radar transmitter.
3. One NAVTEX receiver.
4. One EPIRB 406 Mhz or 1.6 Ghz. Depending on the cruising range.



The regulation then separates the sea areas A1, A2, A3, A4 and determines the additional requirements for each area. The fourth and last part refers to the keeping of a diary and mentions that: Records of all incidents, related to radio communication and where appear to be important for the safety of life at sea, would be recorded in accordance with the requirements of the Radio Regulations in the logbook. The equipment used: HF radio (shortwave or frequencies) of service as well as the equipment of areas A1, A2 and A3.

## CHAPTER V

### SAFETY OF NAVIGATION

This chapter refers to the master's obligation to notify ships that are near it and the nearest land service for any shipping risks encountered. These risks include dangerous volumes of ice, thunderstorms, very low temperatures and winds of intensity above 10 Beaufort. The same chapter defines the obligation of states to maintain service collection of meteorological information from ships, which could contribute to in general in the safety of navigation, but also especially in the definition of special lines in busy and restricted areas.

**Regulation 3** refers to the information required for distress signals

- A) For ice, abandoned shipwrecks and other immediate risks of navigation. The information is as follows:
- The type of ice, abandoned shipwreck or danger as last remark.
  - The location of the ice, abandoned shipwreck or danger as last remark.
  - The time and date when the danger was last observed.
- B) Regarding the tropical storms the information that should be provided is following:
- Tropical storm forecast.
  - The time, the date, the moment of the ship of the moment of observation.
  - The prognosis will include other information such as barometric pressure corrected, the seasickness, (swell) the power of the unstable under the gravitational tendency, the actual direction of the ship, the true course and speed of the ship, the state of the sea. When the master announces the tropical or other dangerous storm, it would be good to make more remarks per hour if possible and not at intervals longer than 3 hours.

## CHAPTER VI

### CARRIAGE OF CARGOES

This chapter covers all types of cargo transported in bulk except liquids and gases. According to the regulation all the necessary information about the cargo must be provided by the master. Special reference is made to grain due to their ability to move in a state of turbulence at sea resulting in generate transverse torques on the ship. The following definition are given:

- a. “Grain” means wheat, rye, soybeans, barley, seeds as well as all processed forms thereof.
- b. “Complete division” means the division where bulk grain are their loading is at their highest possible level.
- c. “Partially paid division” means that bulk grains have been loaded in accordance with the procedure set out in the preceding paragraph.
- d. “Angle of inclination” is the angle of inclination at which its openings can not be closed normally and are baptized.

**Regulation 4** sets out the requirements for the stability of bulk grain. So according to the regulation, the angle of inclination due to the movement of grains will not be must be greater than twelve degrees in each case. In the static diagram the residual surface between the sloping lever arm curve and the return lever up to 40 degrees or should not be less than 0.075 detroactin (m-rad) for any charging condition. The original metacentric height GM, after correcting the free surfaces of the liquids in the tank, should not be less than 0.30 meters.

The master must demonstrate the ship’s ability to meet the criteria stability requirements required by this regulation to the competent authority concerned.

After loading the master must ensure that the ship is able to travel on the high seas.

Displacement of grain load is a very serious risk and means to its avoidance is the construction of interlocking bulkheads. The diaphragm must is constructed in the middle of the spaceship. If the hull is fully loaded, the diaphragm must extend from the top of the power supply to a depth equal to 1/3 of the depth of the hull. If the hull is partially filled, the diaphragm should extends from the diaphragm should extends from the bottom to a height of at least 0.60m above the surface of the bulk cargo.

## CHAPTER VII

### CARRIAGE OF DANGEROUS GOODS

This chapter of the S.O.L.A.S. includes the following regulations:

In the first regulation, it determines in which cases this chapter applies the Convention as well as that the carriage of dangerous goods by ships is prohibited, if the regulations are not followed.

The second regulation distinguishes cargo into the following categories:

- Class 1: Explosives
- Class 2: Gases under pressure or liquified.
- Class 3: Flammable liquids
- Class 4-1: Flammable solids
- Class 4-2: Flammable solids or substances which may undergo spontaneous self-ignition or ignition combustion
- Class 4-3: Flammable solids or substances which emit hazardous gases when found in contact with water.
- Class 5-1: Oxidizing substances.
- Class 5.2: Organic peroxides.
- Class 6-1: Toxic substances.
- Class 6-2: Infectious substances.
- Class 7: Radioactive materials.
- Class 8: Corrosive.
- Class 9: Various hazardous substances and packages.

Regulation 3 contains general instructions on how to package them dangerous goods.

The fourth regulation contains instructions for the proper labeling of dangerous loads and these are:

1. Packages containing dangerous goods will be permanently marked with the correct technical name of the content.
2. These signs will be provided with distinctive labels or inscriptions colored so that the dangerous properties of the cargoes they contain become clear.
3. The above marking methods should be such that they are identifiable even if the bond remains in the sea for at least three months.

Regulation 5 which deals with the documents required for the transport of dangerous goods loads indicate the following:

1. All documents will indicate the correct technical name of the product and will be done correct description of it.



2. The shipping documents issued by the shipper will be accompanied by a signed one certificate that the consignment is properly packaged and marked and marked.
3. Each vessel carrying dangerous goods shall have a special list or these routes and a detailed plan for their position on the ship.

The 6<sup>th</sup> regulation refers to the stowage requirements and 7<sup>th</sup> to the transport of explosives from passenger ships which can carry only cartridges, explosives that the total their weight does not exceed 10 kg fireworks and danger signs for use on ship or aircraft with a total mass not exceeding 1 tone. Additional quantities and types explosives can be transported by passengers after approval by the authority and receipt additional safety rules.

The following regulations set out the requirements for chemical tankers and liquified petroleum gas where they must comply with the International Chemicals Bulletin Code and International LPG Code respectively and have the appropriate certificates according to the codes.

## **CHAPTER VIII**

### **NUCLEAR SHIPS**

This chapter analyzes the details of installation approval reactor, the suitability of the ships, the safety from radioactivity, its operating manuals and inspections and are generally defined safety measures for the release of radioactivity.

According to Regulation 10 of this chapter, certificates which may be issued for nuclear- powered ships are the following:

1. Nuclear Freight Cargo Ship Safety Certificate, which should granted after examination and inspection of the nuclear- powered cargo ship.
2. Nuclear Passenger Ship Safety Certificate, which should issued after inspection on the nuclear-powered passenger ship. The above certificates will be valid for one year.

**Regulation 11** refers to the specific control of nuclear ships. Thus according to any nuclear-powered vessel to enter a Port of the Contracting Parties States, should be subject to special scrutiny and it should be confirmed that the Certificate Nuclear ship security is in place and that there is no unjustified radioactivity.

Finally, in accordance with **Regulation 12**, the master must notify in a timely manner the competent authority of the country in which the ship is or is a bout to arrive at inn the event of an accident where danger is possible in the area.

## **CHAPTER IX**

### **MANAGEMENT FOR THE SAFE OPERATION OF SHIPS (I.S.M)**

In May 1994, during the S.O.L.A.S. conference, it was decided that addition to the Annex to the International Convention S.O.L.A.S. 74, of the mandatory implementation of the I.S.M. Code. The code gradually began to be applied to various types ships and so today applies to all passenger, tankers, chemical tankers, L.P.G. and from 1 July 2002 and in all bulk carriers 500grt and above.

The I.S.M. sets objectives for ensuring safety at sea prevention human injury or loss of life, the avoidance of damage to the environment, the protection of property to ensure a safe working environment, this is an environment that would satisfy and achieve its goals.

## **CHAPTER X**

### **SAFETY MEASURES FOR HIGH-SPEED CRAFT**

Chapter X of S.O.L.A.S. states that the certificates and licenses that issued in accordance with the High Speed Ship Code shall have the same effect and the same recognition as the certificates of Chapter I of the convention. The regulation states that the requirements of the Code are mandatory and not advisory.

This Chapter applies to all high-speed vessels built on or after 1/1/1996 and later. Any ship regardless of day undergoing repairs, alterations, modifications or equipment, continues to comply at least with the requirements previously applied. Each ship built before 1/1/1996, should conform to the requirements of the Code as if it was constructed on or after that date.

## **CHAPTER XI-1**

### **SPECIAL MEASURES TO ENHANCE MARITIME SAFETY**

On this chapter of S.O.L.A.S. entered into force on 1/1/1996 and applies to all passenger ships over 100 grt and all cargo ships over 300 grt. Determines increased inspections for ships over 300 kg. Specifies increments inspections for tankers and bulk carriers.

Also according to this each ship will be provided with an identification number, which will comply with the I.M.O ID number. This number will be recorded in the certificates and their certified copies.

A ship located in a port is subject to operational control claims by officers duly authorized by their government on ship safety and when they have good reasons to believe that the master and the crew are not familiar with the basic safety procedures of the ship's.

## **CHAPTER XI-2**

### **SPECIAL MEASURES TO MEASURES TO ENHANCE MARITIME SECURITY**

On this regulation of the chapter enshrines the International Ship and Port Facilities Security Code (ISPS Code). Part A of the code is mandatory and part B contains guidance as to how best to comply with the mandatory requirements.

The main objectives of the ISPS Code include:

1. Establishment of an international framework that fosters cooperation between Contracting Governments, Government agencies, local administrations and the shipping and port industries, in assessing and detecting potential security threats to ships or port facilities used for international trade, so as to implement preventive security measures against such threats.
2. Determining the respective roles and responsibilities of all parties concerned with safeguarding maritime security in ports and on board ships, at the national, regional and international levels.
3. To ensure that there is early and efficient collation and exchange of maritime security-related information, at national, regional and international levels.
4. To provide a methodology for ships and port security assessments, which facilitates the development of ship, company and port facility security plans and procedures, which must be utilized to respond to ship's or port's varying security levels.
5. To ensure that adequate and proportionate maritime security measures are in place on board ships and in ports.

## **CHAPTER XII**

### **ADDITIONAL SAFETY MEASURES FOR BULK CARRIERS**

In the relatively recent Chapter of SOLAS, which entered into force in 1999 reference is made to the structural possibility of transverse sealing of the two first or second-hand bulk carriers, which have a height of over 150 meters and carry loads within certain limits density. The decision to make additional measures to strengthen their tires congestion of bulk carriers, resulted from a comprehensive I.M.O. study prepared by the International Chartered Accountants Unity (I.C.A.S.).

## **CHAPTER XIII**

### **VERIFICATION OF COMPLIANCE**

1. Every Contracting Party shall be subject to periodic audits by the Organization in accordance with the audit standard to verify compliance with and implementation of the present Convention.
2. The Secretary- General of the Organization shall have responsibility for administering the Audit Scheme, based on the guidelines developed by the organization.
3. Every Contracting Party shall have responsibility for facilitating the conduct of the audit and implementation of a programmed of actions to address the findings, based on the guidelines developed by the organization.
4. Audit of all Contra
5. Audit of all Contracting Parties shall be:
  - Based on an overall schedule developed by the Secretary-General of the Organization, taking into account the guidelines developed by the organization.
  - Conducted at periodic intervals, taking into account the guidelines developed by the organization.

## **CHAPTER XIV**

### **SAFETY MEASURES FOR SHIPS OPERATING IN POLAR WATERS**

IMO's International Code for Ships Operating in Polar Waters (Polar Code) is mandatory under both the international Convention for the Safety Of Life At Sea (SOLAS) and the International Convention for the Prevention Of Pollution from Ships (MARPOL). The Polar Code covers the full range of design, construction, equipment, operational, training search and rescue and environmental protection matters relevant to ships operating in the inhospitable waters surrounding the two poles. The polar Code entered into force on 1 January 2017.

The Code will require ships intending to operate in the defined waters of the Antarctic and Arctic to apply for a Polar Ship Certificate, which would classify the vessel as Category A ship.

The issuance of a certificate would require an assessment, taking into account the anticipated range of operating conditions and hazards the ship may encounter in the polar waters.

Chapter 12 of the Polar Code on manning and training says that companies must ensure that masters, chief mates and officers in charge of a navigational watch on board ships operating in polar waters have completed appropriate training, taking into account the provisions of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW) and its related STCW Code.

## **EPILOGUE**

The International Convention for the Safety of Human Life at Sea (S.O.L.A.S.) promotes the safety of the occupant of the ships is of the utmost importance international convention concluded by the IMO. With the tool available to the organization for in depth studies on various topics and with the help and assistance of remarks even from you it is certain that SOLAS with its continuous development leads and will lead to the creation and operation of safer ships.

## **REFERENCES**

### **Websites & Photos:**

- [https://en.wikipedia.org/wiki/SOLAS\\_Convention](https://en.wikipedia.org/wiki/SOLAS_Convention)
- <https://www.imo.org/>
- [https://www.marineinsight.com/maritime-law/safety-of-life-at-sea-solas-convention-for-prevention-of-marine-pollution-marpol-a-general-overview/#SOLAS\\_Chapter\\_I](https://www.marineinsight.com/maritime-law/safety-of-life-at-sea-solas-convention-for-prevention-of-marine-pollution-marpol-a-general-overview/#SOLAS_Chapter_I)
  
- Teachers Notes Mr. Ioannis Sideris from the lesson International Maritime Policy and Maritime Law :  
<https://maredu.hcg.gr/modules/document/?course=MAK324>
- Photo IMO SOLAS :  
<https://crewtraffic.com/page/1153-msc-1-circ-1557-hazardous-area-classification-application-of-solas-regulation-ii-145-11-secreta.html>
- Photo of liferaft:  
<https://www.marineinsight.com/marine-safety/life-raft-on-ships-a-general-overview/>
  
- <https://cultofsea.com/colregs/part-f-verification-of-compliance-with-the-provisions-of-the-convention/rule-41-verification-compliance/>
- <https://www.imo.org/en/OurWork/Security/Pages/SOLAS-XI-2%20ISPS%20Code.aspx>
- [https://en.wikipedia.org/wiki/Life-saving\\_appliances](https://en.wikipedia.org/wiki/Life-saving_appliances)
- [https://l.facebook.com/l.php?u=https%3A%2F%2Fpxhere.com%2Fen%2Fphoto%2F1331194%3Ffbclid%3DIwAR1fje9C2\\_wd3uqn2aNj\\_plqVohUjF7iuVbcz8E\\_ZdpMNX5kO\\_akXWZmpgCs&h=AT2zAvDE3I9PBvtc0SK6smtMpkOfrsXTL6qhATvTR9zAS406qZW6mgN8tqt4XuWFaeIG3R0ymbheWh7oSPbm9Ps-nNY9seRIkDIH5MPeTOh\\_GCZ-peSMJgEclRO-PmlvYEUJar75yQqsUN-95yzLg](https://l.facebook.com/l.php?u=https%3A%2F%2Fpxhere.com%2Fen%2Fphoto%2F1331194%3Ffbclid%3DIwAR1fje9C2_wd3uqn2aNj_plqVohUjF7iuVbcz8E_ZdpMNX5kO_akXWZmpgCs&h=AT2zAvDE3I9PBvtc0SK6smtMpkOfrsXTL6qhATvTR9zAS406qZW6mgN8tqt4XuWFaeIG3R0ymbheWh7oSPbm9Ps-nNY9seRIkDIH5MPeTOh_GCZ-peSMJgEclRO-PmlvYEUJar75yQqsUN-95yzLg)