


中华人民共和国海船船员适任考试培训教材

English for the Marine ETO

# 电子电气员英语

 中国海事服务中心组织编写



中华人民共和国海事局审定



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# 前言

船舶英语



《中华人民共和国海船船员适任考试和发证规则》(简称 11 规则)已于 2012 年 3 月 1 日起生效,新的《中华人民共和国海船船员适任考试大纲》也将于 2012 年 7 月 1 日开始实施。为了更好地指导帮助船员进行适任考试前的培训,进一步提高船员适任水平,在交通运输部海事局领导下,中国海事服务中心组织全国有丰富教学、培训经验和航海实际经验的专家共同编写了与《中华人民共和国海船船员适任考试大纲》相适应的培训教材。本套教材编写依据 STCW 公约马尼拉修正案,采用图文并茂的形式,改变了长期以来以文字为主的教材编写方式。本套教材的创新模式对今后的船员适任培训具有重要的指导意义。

本套教材知识点紧扣考试大纲,具有权威、准确、系统、实用的特点,重点突出船员适任考前培训和航海实践需掌握的知识,旨在培养船员具备在实践中应用知识的能力,并可作为工具书帮助船员上船工作使用。

本套教材由航海英语、船舶操纵与避碰、航海学、船舶结构与货运、船舶管理(驾驶)、(高级)值班水手业务、高级值班水手英语、轮机英语、船舶动力装置、主推进动力装置、船舶辅机、船舶电气与自动化、船舶管理(轮机)、(高级)值班机工业务、高级值班机工英语、电子电气员英语、船舶电气、船舶机舱自动化、信息技术与通信导航系统、船舶管理(电子电气)、电子技工业务、电子技工英语组成。

本套教材在编写、出版工作中,得到了各直属海事局、航海院校、海员培训机构、航运企业以及人民交通出版社、大连海事大学出版社等单位的关心和大力支持,特致谢意。

中国海事服务中心

2012 年 3 月

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## 编者的话

言 前



STCW 公约马尼拉修正案于 2012 年 1 月 1 日正式生效实施,修正案中增加了“电子电气员”的职位。受中华人民共和国海事局委托,中国海事服务中心组织编写了《中华人民共和国海船船员适任考试培训教材》,本教材就是这套系列教材之一。

《电子电气员英语》根据中华人民共和国海事局制定的《中华人民共和国海船船员电子电气员适任考试大纲》编写,满足 STCW 公约马尼拉修正案的要求,适合于 750 kW 及以上船舶电子电气员适任证书培训、考试使用,也可作为海事大专院校的教学用书。

按照中华人民共和国海船船员电子电气员适任考试大纲的要求,全书分为七章:第一章船舶概论,第二章船舶电气,第三章轮机自动控制技术,第四章船舶计算机网络,第五章通信与导航设备,第六章船舶管理,第七章船舶电子电气函电书写。

本教材由大连海事大学张晓峰、江苏海事职业技术学院莫丽琴、天津海运职业学院滕宪斌主编(主编排名不分先后),全书由张晓峰统稿,参加编写人员如下:侯淑芳、王冉然、宋冬冬、王楠、刘磊、葛涛、徐燕铭、高兴斌、刘蓓、张桂臣、白洪丹、孟庆楠、王寅春、吴雪花、赵英杰、薛士龙、王晓兰,大连海事大学刘彤、牛小兵,上海海事大学陈文涛主审,中国海事服务中心黄党和参加了主要审定工作。在编写过程中刘沅霏、王庆兰、王威、田畋、宛如、刘东参与了全书各章节、词汇表、试题的编写和校对等大量工作,可以说本书的出版是多所学校热爱该行业人士共同努力的结果,在付梓之际,吴志良教授从船舶自动化方面又给予了很多协助,在此一并表示感谢。

由于该科目在国内乃至国际上都尚在试验阶段,因此内容编排、组织、编写都可能存在不足之处,恳请专家、读者提出宝贵的意见,我们一定虚心接受,不断完善,为电子电气员英语的发展尽力。

编者  
2012 年 6 月



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# Chapter 1

## Familiarization of Ships



### Lesson 1 Types of Ships<sup>[1]</sup>

#### The Guideline for Chapter 1 本章导读:

本章的中文标题是“船舶概论”，从考试纲要内容看，该章节为一般性介绍，主要掌握电子电气员作为一名船员应该掌握和必须掌握的有关船舶的基本常识。

#### Text

Ships can be divided into different types according to their purposes. The great majority of ships that are neither military vessels nor pleasure crafts can be divided into several broad categories: cargo ships, passenger ships, work ships, auxiliary crafts, and so on. In Table 1-1 the types of ships are categorized. It's by no means a complete overview. Some ships can be placed in more than one category.

Table 1-1 Ship's types

Dry Cargo		Liquid Cargo	Passenger
Unit cargo • Container ship • Roll-on/Roll-off ship • Barge carrier • Refrigerated ship • General cargo ship • Cattle ship	Bulk cargo • Bulk carrier • Ore carrier	• Crude carrier • Oil tanker • Chemical tanker • LPG/LNG carrier	• Passenger liner • Car and Passenger ferry • Cruise ship



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Multi-purpose ship	OBO carrier		
Navy	Fishing	Dredger	Work ship
<ul style="list-style-type: none"> <li>• Aircraft carrier</li> <li>• Cruiser</li> <li>• Destroyer</li> <li>• Submarine</li> <li>• Frigate</li> <li>• Mine sweeper</li> </ul>	<ul style="list-style-type: none"> <li>• Trawler</li> <li>• Other types of fishing vessel</li> </ul>	<ul style="list-style-type: none"> <li>• Trailing hopper suction dredger</li> <li>• Cutter suction dredger</li> <li>• Dipper dredger</li> <li>• Grab dredger</li> <li>• Rock-dumper</li> </ul>	<ul style="list-style-type: none"> <li>• Crane vessel</li> <li>• Cable layer</li> <li>• Oil-recovery vessel</li> <li>• Buoy layer</li> <li>• Shearleg crane</li> </ul>
Service vessel	Pleasure craft	Various	Offshore construct
<ul style="list-style-type: none"> <li>• Seagoing tug</li> <li>• Harbor tug</li> <li>• Icebreaker</li> <li>• Pilot vessel</li> <li>• Coast guard vessel</li> <li>• Research vessel</li> </ul>	<ul style="list-style-type: none"> <li>• Motor yacht</li> <li>• Sailing yacht</li> </ul>	<ul style="list-style-type: none"> <li>• Hydrofoil</li> <li>• Floating dock</li> <li>• Submersible platform</li> <li>• Pontoon</li> <li>• Barge</li> </ul>	<ul style="list-style-type: none"> <li>• Drilling rig/Jack-up</li> <li>• Drill ship</li> <li>• Pipe layer</li> <li>• Floating ( production ) storage and offloading vessels F(P)SO</li> </ul>

Cargo carriers can also be classified into many different types according to the nature of the cargo they transport. There are dry bulk carriers, general cargo ships, refrigerator ships, tankers and so on. The three largest categories of cargo carriers are container ships, bulk carriers and tankers. The following are examples of common used cargo carriers:

### Container ship

Container ships are cargo ships that carry all of their load in truck-size containers, in a technique called containerization. They are designed in such a manner that no space is wasted. Their capacity is measured in TEU or FEU depending upon the sizes of containers. This is the number of containers that it can carry.

TEU is short for twenty-foot equivalent unit. The nominal length of these containers is:  $20 \times 0.305 = 6.10$  meters. The actual length is a little shorter, leaving some space between the containers. FEU means forty-foot equivalent unit, the nominal length of which is:  $40 \times 0.305 = 12.20$  meters.

Informally known as “box boats,” they carry the majority of the world’s dry cargo. Most container ships are propelled by diesel engines and have crewmembers of between 20 and 40 people. They generally have a large accommodation block at the stern, directly above the engine room. Container ships have grown from a capacity of 1500 containers (1996) to 13,798 (2011) on the oceans, right after crude oil carriers, or tankers.<sup>[2]</sup>

### Bulk carrier

Bulk carriers are ships especially designed to carry loose cargo in bulk. Possible cargos are:

- Coal
- Ore



- Grain and other agricultural products
- Fertilizer
- Cement
- Light minerals

Bulk carriers have large upper and lower ballast tanks, i. e. topside and hopper tanks to facilitate automatic grain stowage (eliminate free surface) and to give the empty vessel sufficient draught and a better behavior whilst empty in transit. Ships transporting ore have a special design. Ore is very heavy (stowage factor is approximately  $0.5 \text{ m}^3/\text{t}$ ) and thus ships only need small holds to be loaded completely.<sup>[3]</sup> To prevent too large stability the holds must not be situated too low or too close to the sides of the ship. Some bulk carriers can also function as tankers. This combination carrier is called an Ore Bulk Oil (OBO) carrier.

### LNG carrier

An LNG carrier is a tank ship designed for transporting liquefied natural gas (LNG). As the LNG market grows rapidly, the fleet of the LNG carriers continues to experience tremendous growth.<sup>[4]</sup>

These cargoes are liquid when pressurized or brought under low temperature. When liquefied, the space a gas takes is about 1/600 of the space needed under atmospheric conditions. Gasses are therefore transported in liquefied condition. Safety devices applicable to chemical tankers are also applicable on liquefied gas carriers. The cargo storage arrangement, however, is totally different. Cargo handling is somewhat different.

In all liquefied gas carriers the tanks are kept under at least a small positive pressure, to prevent air to enter the tank, which could create an explosive mixture.<sup>[5]</sup> Loading and unloading is carried out in a completely closed system, no venting or vapors can escape to the atmosphere. During loading of the LNG vapor return line is used, the vapor will be liquefied ashore and is not lost.

In order to facilitate transport, natural gas is cooled down to approximately  $-163$  degrees Celsius at atmospheric pressure, at which point the gas condenses to a liquid. The tanks on board an LNG carrier effectively function as giant thermoses to keep the liquid gas cold during storage. No insulation is perfect, however, and so the liquid is constantly boiling during the voyage. The boiloff is also allowed to keep the cargo cold.

In the past large LNG tankers were powered by steam turbines with boilers. The boil-off of the cargo can then be used as fuel in the boiler. Recent advances in technology have allowed liquefaction plants to be fitted to vessels, allowing the boiloff to be liquefied and returned to the tanks.

Due to the high gas prices nowadays this is feasible. Today the propulsion of LNG tankers is changing from steam into diesel-electric, where one or more diesel engines are dual-fuel: depending on the price of gas and of fuel they burn either heavy fuel or boiloff gas.<sup>[6]</sup>

(902 words)



## New Words & Expressions

category	[ˈkætɪgəri]	n.	类别
ore	[ɔ:]	n.	矿石
cruiser	[ˈkru:zə]	n.	巡洋舰, 豪华游船
yacht	[jɔ:t]	n.	快艇, 轻舟
propel	[prəʊˈpel]	v.	推进
fleet	[fli:t]	n.	舰队, 船队
be divided into			分成
passenger liner			客运班轮
LNG carrier (Liquefied Natural Gas carrier)			液化天然气(运输)船
dry bulk carrier			干散货船
general cargo ship			杂货船
refrigerator ship			冷藏船
diesel engine			柴油机
stowage factor			积载因数

### Notes:

- [1] 本课的中文标题是“船舶的种类”, 对应大纲位置是 1.1.1.1, 属于知识内容。
- [2] 该句话可以翻译为: 集装箱船已从 1996 年的 1500 箱的载货量增加到了 2011 年的 13 798 箱, 仅次于油船。
- [3] 该句话可以翻译为: 矿石很重(积载因数近似为  $0.5 \text{ m}^3/\text{t}$ ), 因此船舶仅需小的货舱即可满载。该句为并列关系的复合句。
- [4] 该句话可以翻译为: 随着液化天然气市场的迅速升温, 液化天然气船队不断地发展壮大。as 引导状语从句, 译为“随着……”。
- [5] 该句话可以翻译为: 在所有的液化气船中, 货舱至少加压到某一正压下, 防止空气进入舱内, 空气的渗入会产生易爆混合物。which 引导非限定定语从句修饰 air, 表示可产生的影响。
- [6] 该句话可以翻译为: 目前, 液化天然气船的推进力正由蒸汽向柴油-电力转换, 后者中, 一台或多台柴油机都是双燃料的: 燃烧的是重油还是天然气取决于它们的价格。



## Lesson 2 The Structure of Ships and Their Principal Dimensions<sup>[1]</sup>

### Text

#### Structure of ships

A ship is something like a grand mansion floating on water and with a number of “floors” called decks.<sup>[2]</sup> Among them is the upper deck or main deck that is upmost continuous deck from bow to stern.<sup>[3]</sup> Another continuous deck under the upper deck is referred to as the lower deck. Above the upper deck there are also a few other decks. They are the compass deck on which one good magnetic compass is put as far as possible from the ship’s magnetic field, the bridge deck where the wheelhouse is situated, the captain deck where the captain’s cabin is located, the boat deck on which lifeboats are fixed, and the accommodation deck where the living quarters for passengers and crew are located.

In virtue of the characteristics of hull construction, the construction above the upper deck is usually called superstructure while that under the upper deck is defined as main hull.<sup>[4]</sup> Superstructure can be divided into several types, depending on the location. At the fore end is the forecastle. At the after end is the poop. Bridge is at the midship. The forecastle on a ship is a small extra deck above the main deck, forward of number one hold, right up in the bows. It carries the anchors and their cables. The windlass is for raising and lowering the anchors. There are the port and starboard cable stoppers on the forecastle. The cable comes up from the cable locker through the spurling pipe, over the gypsy on the windlass, through the stopper and down through the hawse pipe. Right forward of the forecastle is the jack staff. An ensign staff is right aft of the poop.

Ship hull is the area between the main decks, the sides and the bottom. It is made up of frames covered with plating.<sup>[5]</sup> For the purpose of reasonable arrangement and full utilization of the inside space, the hull is divided up into a number of watertight compartments by decks and bulkheads. Bulkheads are vertical steel walls going across the ship and along. Decks divide the hull horizontally. The hull contains the engine room, cargo space and a number of tanks. In dry cargo ships the cargo space is divided into holds; in liquid cargo ships it is divided into tanks. At the fore end of the hull are the fore peak tanks and at the after end the after peak tanks. They are used for fresh water and water ballast. The space between the holds and the bottom of the hull contains double bottom tanks. These are used for ballast water and fuel.

The main deck covers the cargo spaces or holds. There are openings cut in the deck, and these openings are the hatches, one to each hold. Ships use either cranes or derricks to lift the cargo into the hold and discharge it. A derrick is simply a strong boom, made of steel or wood, which can swing from side to side. A wire from a powerful winch runs over a block at



the head of the derrick. It's quite a simple arrangement. A deck crane is usually a much more complicated and expensive piece of lifting machinery. But a lot of ships are fitted with cranes.

Main hull, by its different positions, will be separated into bow section, midship section and stern section. The foremost part is called the bow and the rearmost part is called stern. When standing in a ship and facing the bow, the left hand side is called port side and the right hand side is called starboard side.

Up to now, we have offered you a general description concerning the formation of hull. However, if you want to learn more of the hull construction, then you must go into detail of primary structures of hull. There are shell structure, bottom structure, side structure, deck structure, bulkhead structure, bow and stern structure, etc.

A traditional general cargo ship has her engine room and bridge superstructure amidships. There are enough lifeboats on the port and starboard side amidships.

### Principal dimensions

Different sea-keeping performances of ships have much to do with principal dimensions and ship forms. It is quite necessary to discuss the principal dimensions (shown in Fig. 2-1) and geometrical characteristics of hull here.

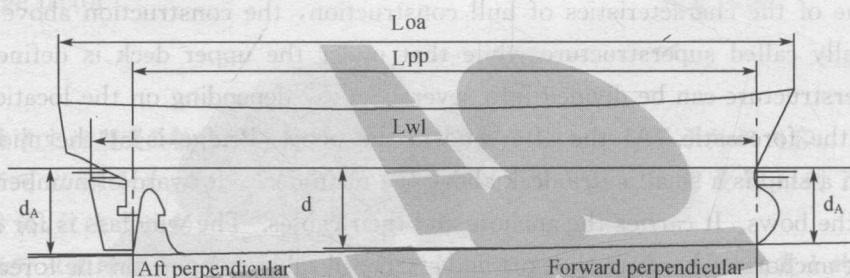


Fig. 2-1 Part principal dimensions of ships

### Three cross sections of hull vertical to one another

The middle longitudinal cross section — a longitudinal vertical plane along the centerline of ship length and a symmetrical plane between port and starboard.

The midship transversal cross section — a transversal vertical plane at midship.

The design water plane — a horizontal plane through design waterline.

**Length overall (Loa)** is the max. horizontal distance from bow to stern.

**Length between perpendiculars** of ship  $L_{pp}$  (m) is the horizontal distance between the two perpendiculars, i. e. stem and stern.

**Length on the water line (Lwl)** is the length of design waterline or the length of full-load waterline.

**Breadth or beam of ship B** (m) is the horizontal distance measured over the main frames at the widest part of the ship.

**Moulded depth D** (m) is the vertical distance measured at the middle of the length  $L$  from top of keel to top of the deck beam at side on the uppermost continuous deck.<sup>[6]</sup>

**Draught d** (m) is the vertical distance measured at the middle of the length  $L$  from top of