

MET Standards for Electro-Technical Officers

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ABSTRACT: The paper deals with one of the most important changes in the STCW 1978 as amended in 2010 Convention, from the point of view of the watchkeeping officers responsible for control, maintenance, diagnostic and repair of electrical and electronic installations on board of ships. Some reasons, why the MET Standards for Electro-Technical had to be developed and implemented are shortly analyzed and described. A legislative way towards and a short description of the minimum standards competence for ETO are presented. Next, new tools supporting ETO's standards implementation are appointed. Finally, the future works as well as the concluding remarks concerning discussed issue are formulated and commented on.

1 INTRODUCTION: WHY THE MET STANDARDS FOR ETO HAD TO BE DEVELOPED AND IMPLEMENTED?

Today and tomorrow challenges in front of maritime universities cover, among other things, a full implementation of the STCW 1978 as amended in 2010 Convention in the teaching and training programs of the universities [1], [2]. One of the new elements of the updated version of STCW Convention and Code [3] are MET (Maritime Education and Training) standards for Electro-Technical Officers. Why the MET Standards for ETO had to be developed and implemented? A fundamental reason of this process is a rapid and continuously running progress in electrical and electronic engineering on ships. This progress covers two layers: a technical, related to complexity of the marine electrical and electronic devices construction and control as well as a personal, competence - related and connected with new requirements for watchkeeping officers responsible for control, maintenance, diagnostics and repair of electrical and electronic installations on board of

ships. The first one is based mainly on the development of the new - technology based, sophisticated ships, like passenger ships, large ferries, chemical and gas tankers, container vessels, oil rigs suppliers and large offshore structures. In many cases they are all electric ships, ships equipped with dynamic positioning system or ships with main engine without camshaft with electronic control injection - commonrail system. A significant component of these technologies is based on the assumption, that the computer control systems are generally used in engine room, on the bridge and in cargo loading and discharging systems and are supervised by distributed ship systems. Nowadays, on many kinds of vessels, including previously mentioned, numerous frequency converters are applied both to the main propulsion motors and auxiliary drives. It is worthy to add that presently not only the number of power converters in ship systems increases, but also the power of a single electrical motor rises, which together with converter system used in main propulsion systems often exceeds 20MW. At the same time total power of electrical

energy receivers installed in these systems in many cases reaches the values up to 80...100MW. Such a great values of power cause a necessity to use a high voltage solutions, and a level of applied voltages reaches even 11kV. Under described conditions many new problems had been observed and new challenges, how to overcome them, appear. It is a starting point to second aspect concerning the new competences and KUP's (Knowledge, Understanding and Proficiency) for highly qualified staff, and dedicated mainly to electrical, electronic and control engineering issues. Safe operation of many sophisticated ships today is greatly dependent on satisfactory skills and qualifications in the electrical, electronic and control engineering field being at all times available and more and more developed onboard. That is why such a big power plants and electric motors used for propulsion of the vessel like previously mentioned, also very complicated computer control and monitoring systems on board of ships, should be maintained and repaired by really competent and well prepared to perform ETO duties person. Such a person, responsible for repair and maintenance of electrical and electronic installations on board of ships, must have thorough knowledge, which is not possible to obtain working for a long period in engine department of the ship only. A deep theoretical background and appropriately conducted training based on specialised laboratories and simulators is needed. It is worthy to add, that a majority of shipowners presently have employed electrical / electronic officers, but at the same time many contrary situations were noted. One of the strange and well analysed cases concerning a dead short caused the failure of generating set's circuit breaker during a voyage of passenger ship m/s STATENDAM was described in [4]. The most intriguing were the statements formulated by the Transport Safety Board of Canada: firstly, *"None of the senior engineers onboard had theoretical or practical education in 6,6 kV generation, distribution and trouble shooting"* and secondly, *"The seafarers Training, Certification and Watchkeeping (STCW) code however, does not identify electricians as a seafaring profession and does not specify a minimum internationally applicable standard for their education training and competence"* [4]. It is obvious, that this kind of thinking, based on the existing of that time version of the STCW Convention and Code [5], had to be changed. In fact, there were many important circumstances and reasons, which created a need for international qualification requirements for Marine Electro-Technical Officers (ETO), in the light of the continuous technological progress as well as the new required qualifications and skills for electrical/electronic installations operation in the field under consideration. More detailed information concerning ETO background, progress in related standards and legislative way may be found in [6], [7].

2 A LEGISLATIVE WAY TOWARDS MET STANDARDS FOR ETO'S

The first unsuccessful attempt of Poland, Norway and USA to introduce regulations for electro-technical officers to the STCW'95 Convention took place in the

years 1992 - 1995. In March 2008, Poland, France, United Kingdom and Bulgaria, submitted the definition and mandatory requirements for certification of Electro-Technical Officer (ETO) and Senior Electro-Technical Officer (SETO) [8]. In 2008 the representatives of Poland in cooperation with other countries have undertaken the initiative to create the international informal working group oriented to ETO works, named ETO Forum. The representatives of Bulgaria, France, IFSMA, Islamic Republic of Iran, ITF, Malaysia, Poland, Sweden, Ukraine, United Kingdom and United States of America have participated in this working group. A detailed list of persons involved may be found in [7]. This was followed by the formulation of the definition of training and certification requirements for the Electronic Officer submitted by the Islamic Republic of Iran [9] and a formulation of the proposal on the knowledge and skill requirements for Electronic Officer presented by The People's Republic of China in [10]. In the next step the delegations of Poland, France, the United Kingdom, Bulgaria and the Islamic Republic of Iran, in September 2009, consolidated from their previous documents the requirements for ETO at operation and management levels and presented them as a joint proposal issued as [11]. It is worthy to note a position of US and German delegates included in [12], that there should be two levels of training and related requirements, i.e. support and operational. After an in-depth discussion it was agreed a compromise solution to include to the STCW Convention and the Code the requirements for Electro-Technical Officers (operational level) and Electro-Technical Ratings (support level). The significant progress has taken place during the Conference of Parties to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers in Manila in 2010. The mandatory minimum requirements for certification of electro-technical officers were formally included in the Section A-III/6 and for certification of electro-technical ratings in A-III/4-7 [13], and later on 2011 Edition of STCW Convention and STCW Code [3]. These are the first in IMO history standards for electro - technical personnel and now international community of seafarers is just equipped with appropriate legal instruments in the discussed matter.

3 A SHORT DESCRIPTION OF THE MINIMUM STANDARDS COMPETENCE FOR ELECTRO-TECHNICAL OFFICERS

The minimum standards of competence for ETO, established in the STCW Convention and Code's Annex approved at the end of June 2010 by the Diplomatic Conference in Manila, and specified in [13] cover 18 competences divided into three functions: 1. Electrical, Electronic and Control Engineering, 2. Maintenance and Repair, as well as 3. Controlling the Operation of the Ship and Care for persons on Board. All functions are dedicated to the operational level. The competences of the first function concern the monitoring the operation of the electrical electronic and control systems, including propulsion and auxiliary machinery, the operation of generators and distribution systems as well the

operation and maintenance of high voltage (in excess of 1kV) power systems, and finally the usage of internal communication systems and English at the adequate level. The competencies of the second function cover the maintenance and repair KUP's related to electrical and electronic equipment, automation and control systems of main propulsion and auxiliary machinery, bridge navigation equipment and ship communication systems, and also electrical, electronic and control systems of deck machinery and cargo - handling equipment, and finally related to control and safety systems of hotel equipment. The competences of the third function are similar to the competencies for other engine and deck officers at the operational level and adequate KUP's describe the issues of pollution prevention requirements, prevention, control and fire-fighting on board, operation of life-saving appliances, medical first aid on board ship and finally, application of leadership and teamworking skills. All above presented standards of competence were the basis for the development of a new IMO Model Course on Electro-Technical Officer [14], presented and accepted in May 2013 in London during the 44th session of STW Sub-Committee.

4 NEW TOOLS SUPPORTING ETO'S STANDARDS IMPLEMENTATION

In result of the ETO forum and IMO members and official bodies activity two new tools supporting ETO's standards implementation were created. Firstly within the IMO procedures, in accordance with the decision of the STW 44, a new "Model course: Electro-Technical Officer, 2013 Edition, Code T708E, has been established [15] and introduced to IMO distribution channels. The content of the Model Course Draft for ETO [14] was updated this way, that in chapter 3.1 some requirements concerning the familiarization with MARPOL were added, and in chapter 3.5 a part related to "Application of leadership and teamworking skills" were deleted, but at the same time a decision about moving into operation a new model course "Leadership and Teamwork" [16], for all candidates certified in the Engine and Navigation Department was taken. Additionally, part of Appendices [14] has been enriched with complementary knowledge "Basic Electricity and Electronics". Finally, the content of the Model Course for ETO has been carefully designed in order to assure the full coverage of the necessary requirements. The structure of this model course consist of Introduction, part A, including Course Framework for all functions and Parts B, C and D (Course Outline, Detailed Teaching Syllabus and Instructor's Manual, respectively) prepared for three previously specified functions for ETO. The final parts of the ETO Model Course cover part E - Evaluation and Appendices as follow: Basic Engineering Science, Mathematics, Thermodynamics, Mechanical Science, Industrial Chemistry, and previously mentioned - Basic Electricity and Electronics. The second tool supporting ETO's standards implementation is On Board Training Record Book [17] for candidates for certification as Electro-Technical Officer. The On Board Training

Record Book [17], as a basis for the recognition of the officer's knowledge and experience, leading to obtain the certificate, shall contain five parts: 1. General Information, 2. Summary record of on board training, 3. On board training record for First, Second and Next Ship, 4. List of training tasks and record of achievements, and 5. Electro-Technical Operations Workbook Guidance. A detailed structure of the content of the Training Record Book, taking into account the division of the sections into related sub-sections is shown in [7].

5 FUTURE WORKS

It seems that the next essential step concerning "ETO issue" in the near future will be the adoption of appropriate standards of education and training for Senior Electro-Technical Officers [7]. The concept to include Course for Senior ETO in this project was originated from the Diplomatic Conference in Manila, where during the process of comprehensive review of STCW Convention and Code, delegations from large number of countries have been successfully supporting the idea of two level standards for ETOs. These delegations proposed to establish also standards for Senior Electro-Technical Officer at the management level. In this context, the Committee of the Whole of the STCW Conference in Manila agreed to invite the Maritime Safety Committee (MSC) to consider proposal of Senior ETO with a view to establishing a new work programme item for the STW Sub-Committee [18]. In the same queue MSC invited Member Governments and international organizations to submit proposals relating Senior ETO [19]. It is worthy to mention, that some activities of International Association of Maritime Universities (IAMU) were noted. In parallel with IMO procedures concerning an inclusion of ETO's standards in STCW Convention and Code, the IAMU research project was taking place in FY 2012-2013. Under the umbrella of this project, Poland and China, under the leadership of Ukraine, took part in the activities related to the development of IAMU Model Course for Electro-Technical Officers: Course for Electro-Technical Officer (ETO), Course for Senior Electro-Technical Officer (Senior ETO). Project has been positively completed and accepted. The partners of the project believe in positive impact of the project results for future IMO works.

6 CONCLUDING REMARKS

Due to the continuous technological development as well as new required qualifications and skills for maintenance and repair of electrical/electronic systems, equipment and installations, there is a significant increase in employment of properly qualified Electro-Technical Officers. Such specialists are the crew members of cruise vessels, large ferries and all kinds of special purpose vessels, and therefore their qualifications and competences had been standardised at the international level in the STCW Convention. As in the case of other officers, there is a need to implement and develop the newly established

IMO Model Course for Electro-Technical Officers and Onboard Training Record Book. These documents should be helpful to establish procedures for ETO's education and training. Taking into account a previous MSC announcement and recommendation, the next essential step should be oriented towards the adoption of appropriate MET standards for Senior Electro-Technical Officers. It is very important, to open a full track of their professional carrier, it means electro-technical rating, electro-technical officer and senior electro-technical officer for persons responsible for maintenance and repair of electrical and electronic systems, equipment and installations on board of ships.

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