

**GUIDELINES FOR CONDUCTING BRIDGING COURSE FOR EXISTING
ELECTRICAL OFFICERS TO ELECTRO-TECHNICAL OFFICERS FOR
MERCHANT SHIPS**

TABLE OF CONTENTS

Sr. No.	Topic	Page Nos.
1.	Preamble	1
2.	Basic Details Of The Course 2.1 Aims 2.2 Objectives 2.3 Scope for approval of the institute 2.4 Infrastructure & other requirements	1-2
3.	Eligibility	2
4.	Age & Medical fitness	2
5.	Education & Training	2
6.	Faculty requirements	3
7.	Standards of Competence	3
8.	Evaluation And Certification	3
9.	Bridging course for EO to Electro technical Officer	3
10.	Annexure I	

GUIDELINES FOR CONDUCTING BRIDGING COURSE FOR EXISTING ELECTRICAL OFFICERS TO ELECTRO-TECHNICAL OFFICERS FOR MERCHANT SHIPS

1. PREAMBLE

- 1.1 The International Maritime Organization [IMO] adopted the International Convention of Standards of Training, Certification and Watch keeping in 1978. The Govt. of India has accordingly implemented the STCW 78 by amending the Merchant Shipping Act in recognizing STCW 78 under Part VI of the Merchant Shipping Act. The said International Convention underwent major Amendments in the year 1995. The said STCW Convention Amendments amounted to a new code of STCW, maintaining its link with STCW 78 by retaining 17 Articles of the STCW 78. STCW 95, through its Resolution 1, adopted detailed and exhaustive Annexes prescribing the complex education, training and assessment criteria towards Human Resource Development for Merchant Ships. It has now been 15 years since STCW 95 has been implemented internationally.
- 1.2 A conference was held in Manila in June 2010 and that Conference adopted a fresh set of amendments to the STCW 78 as amended in 1995. The 2010 amendments to the STCW and STCW Code (2010 amendments) were adopted on 25th June 2010 and will enter into force on 1st January 2012.
- 1.3 Also, considering that the existing MS (STCW) 1998 Rules are being revised to incorporate the amendments due to the revision of STCW 78, and provision to include training and certification for the Electro-Technical Officers (ETO) has been made in the draft rules, the Director-General of Shipping has formulated the following guidelines for conducting the bridging course to facilitate and enable desirous existing Electrical Officers to obtain Certificate of Competency as Electro-Technical Officers.

2. Basic Details of the course

2.1 Aims

To facilitate and enable desirous existing Electrical Officers to obtain Certificate of Competency as Electro-Technical Officers in compliance with the requirements of regulation III/6 (*Mandatory minimum requirements for certification of electro-technical officers*) of STCW convention as amended in 2010

The ETO is responsible for the maintenance and repair of all electrical and electronic equipment, installations and machinery. This also includes radio communications and electronic navigation aids.

2.2 Objectives

To conduct the bridging course for existing Electrical officers with relevant sea service experience by imparting systematic practical training and experience in the additional tasks, duties and responsibilities of an electro-technical officer that would, enable him to comply with the competencies specified for ETO in the STCW code Section A-III/6 (Mandatory minimum requirements for certification of electro-technical officers) and same being incorporated in Maritime Education, Training and assessment (META) manual, Volume II.

2.3 Scope for Approval of the institute

Approval for training of electro technical officers for the Bridging course shall be granted to Maritime Training Institutes owned and operated by ship owning companies or companies directly engaged in technical management of the ships. Existing DGS approved pre-sea/post-sea institutes conducting Electro -Technical Officer's Course, currently and having prior approval of the Directorate may also apply for approval to conduct this Bridging Course.

2.4 Infrastructure and other requirements

Infrastructure and other requirements to be in line with the requirements of the post sea courses.

3. Eligibility

3.1 Existing Electrical officers: Candidates shall have at least 12 months of sea service in the relevant capacity in last 5 yrs (preceding 1st Jan 2012) needs to do a bridging course of 3 weeks duration at any of the approved maritime institutes. (Reference para 4 of Regulation III/6 of STCW 2010)

3.2 For Ex Indian Navy personnel's 30 months sea service in Navy + 6 months in Merchant navy as Electrical officer and to complete TAR book + 3 week bridging course.

4. Age & Medical fitness:

Candidate shall not be less than 18 years of age, and should be certified by DG approved Medical Examiner as medically fit.

5. The education and training required as per STCW regulation III/6 and as prescribed in the Maritime Education, Training and Assessment (META) Manual Vol II & rule shall include 3 week course.

6 Faculty Requirements

- 6.1 Electrical Officer having 10 [ten] years of total professional experience of which 3 [three] years on board merchant sea going ships.
- 6.2 Electrical Engineer with B.E. degree and 2 [two] years teaching experience.
- 6.3 Electrical Engineer with experience in High Voltage Engineering [visiting faculty]
- 6.4. Electrical, Electronics, Communication Engineer with 3 years experience at an Undergraduate Engineering College [visiting faculty]
- 6.5 Marine Engineer [MEO Class I]

Faculty members at 6.1 or 6.5 may be designated as the 'Course-in-Charge'

7. Standard of competence

Every candidate for certification as electro-technical officer shall be required to demonstrate the ability to undertake the tasks, duties and responsibilities listed in column 1 of table A-III/6.

The minimum knowledge, understanding and proficiency required for certification is listed in column 2 of table A-III/6 and it shall take into account the guidance given in part B of this Code.

Every candidate for certification shall be required to provide evidence of having achieved the required standard of competence tabulated in columns 3 and 4 of table A-III/6.

8. Evaluation and Certification

Periodic evaluation shall be carried out by the institutes conducting the course. Certificate of competency shall be issued by the Chief Examiner of Engineers, after satisfactory completion of the course and the sea service requirement and assessment of competency. The Certificate of competency shall be issued after the Gazette notification is issued, as required by section 78 (4) of the M.S. act 1958 as amended.

9. Electro technical Officer (ETO) Course

The Bridging Course for existing Electrical Officer to Electro Technical Officer as per STCW 2010 has been developed and is attached as Annexure-I.

10. Annexure -I

Bridging Course for existing Electrical Officer to Electro Technical Officer
(Course layout)

BRIDGING COURSE FOR EXISTING ELECTRICAL OFFICERS TO ELECTRO TECHNO OFFICER AS PER STCW 95 AS AMENDED

COMPETENCY AND COURSE SUBJECTS	Methods for demonstrating competence	Criteria for evaluating competence	Hrs of training	
			Theory	Practical
<i>FUNCTION 1 : Electrical, electronic and control Engineering at the operational level</i>				
<p>Competency No.1 : Monitor the operation of electrical, electronic and control systems</p> <p>Basic understanding of the operation of mechanical engineering systems, including:</p> <ol style="list-style-type: none"> 1) prime movers, including main propulsion plant 2) engine-room auxiliary machinery 3) steering systems 4) cargo handling systems 5) deck machinery 6) hotel systems <p>Basic knowledge of heat transmission, mechanics and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro-technology and electrical machines theory Fundamentals of electronics and power electronics Electrical power distribution boards and electrical equipment Fundamentals of automation, automatic control systems and technology</p> <p>Instrumentation, alarm and monitoring systems</p> <p>Electrical drives Technology of electrical materials Electro-hydraulic and electro-pneumatic control systems</p> <p>Appreciation of the hazards and precautions required for the</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training 	<p>Operation of equipment and system is in accordance with operating manuals</p> <p>Performance levels are in accordance with technical specifications</p>	4	4

operation of power systems above 1,000 volts				
<p>Competency No.2 : Monitor the operation of automatic control systems of propulsion and auxiliary machinery</p> <p>Preparation of control systems of propulsion and auxiliary machinery for operation</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training 	<p>Surveillance of main propulsion plant and auxiliary systems is sufficient to maintain safe operation condition</p>	6	6
<p>Competency No.3 : Operate generators and distribution systems</p> <p>Coupling, load sharing and changing over generators Coupling and breaking connection between switchboards and distribution panels</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training 	<p>Operations are planned and carried out in accordance with operating manuals, established rules and procedures to ensure safety of operations Electrical distribution systems can be understood and explained with drawings/instructions</p>	4	6
<p>Competency No. 4 : Operate and maintain power systems in excess of 1,000 volts</p> <p><i>Theoretical knowledge</i></p> <p>High-voltage technology Safety precautions and procedures Electrical propulsion of the ships, electrical motors and control systems</p> <p><i>Practical knowledge</i></p> <p>Safe operation and maintenance of high-voltage systems, including knowledge of the special technical type of high voltage systems and the danger resulting from operational</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training 	<p>Operations are planned and carried out in accordance with operating manuals, established rules and procedures to ensure safety of operations</p>	10	10

voltage of more than 1,000 volts				
Competency No. 5 : Operate computers and computer networks on ships Understanding of: 1) main features of data processing 2) construction and use of computer networks on ships 3) bridge-based, engine-room-based and commercial computer use	Examination and assessment of evidence obtained from one or more of the following: 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training	Computer networks and computers are correctly checked and handled	2	2
Competency No. 6 : Use English in written and oral form Adequate knowledge of the English language to enable the officer to use engineering publications and to perform the officer's duties	Examination and assessment of evidence obtained from practical instructions	English language publications relevant to the officer's duties are correctly interpreted Communications are clear and understood	1	0
Competency No. 7 : Use internal communication systems Operation of all internal communication systems on board	Examination and assessment of evidence obtained from one or more of the following: 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training	Transmission and reception of messages are consistently successful. Communication records are complete, accurate and comply with statutory requirements	1	1
FUNCTION 2 : Maintenance and repair at the operational level				
Competency No. 8 : Maintenance and repair of electrical and electronic equipment Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment	Examination and assessment of evidence obtained from one or more of the following: 1) approved in-service	Safety measures for working are appropriate Selection and use of hand tools, measuring instruments, and testing equipment are	8	8

<p>required before personnel are permitted to work on such equipment Maintenance and repair of electrical system equipment, switchboards, electric motors, generators and DC electrical systems and equipment</p> <p>Detection of electric malfunction, location of faults and measures to prevent damage</p> <p>Construction and operation of electrical testing and measuring equipment</p> <p>Function and performance tests of the following equipment and their configuration: 1) monitoring systems 2) automatic control devices 3) protective devices The interpretation of electrical and electronic diagrams</p>	<p>experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training</p>	<p>appropriate and interpretation of results is accurate</p> <p>Dismantling, inspecting, repairing and reassembling equipment are in accordance with manuals and good practice Reassembling and performance testing is in accordance with manuals and good practice</p>		
<p>Competency No. 9 : Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery</p> <p>Appropriate electrical and mechanical knowledge and skills.</p> <p><i>Safety and emergency Procedures</i></p> <p>Safe isolation of equipment and associated systems required before personnel are permitted to work on such plant or equipment</p> <p>Practical knowledge for the testing, maintenance, fault finding and repair. (Auxiliary Machines including PLC controlled Boiler)</p> <p>Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition</p>	<p>Examination and assessment of evidence obtained from one or more of the following: 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training</p>	<p>The effect of malfunctions on associated plant and systems is accurately identified, ship's technical drawings are correctly interpreted, measuring and calibrating instruments are correctly used and actions taken are justified</p> <p>Isolation, dismantling and reassembly of plant and equipment are in accordance with manufacturer's safety guidelines and shipboard instructions and legislative and safety specifications. Action taken leads to the restoration of automation and control systems by the method most suitable and appropriate to the prevailing</p>	6	6

<p>Competency No. 10 : Maintenance and repair of bridge navigation equipment and ship communication systems</p> <p>Knowledge of the principles and maintenance procedures of navigation equipment, internal and external communication systems</p> <p><i>Theoretical knowledge:</i></p> <p>Electrical and electronic systems operating in flammable areas</p> <p><i>Practical knowledge:</i></p> <p>Carrying out safe maintenance and repair procedures</p> <p>Detection of machinery malfunction, location of faults and action to prevent damage</p>		<p>circumstances and conditions</p> <p>The effect of malfunctions on associated plant and systems is accurately identified, ship's technical drawings are correctly interpreted, measuring and calibrating instruments are correctly used and actions taken are justified</p> <p>Isolation, dismantling and re-assembly of plant and equipment are in accordance with manufacturer's safety guidelines and shipboard instructions, legislative and safety specifications. Action taken leads to the restoration of bridge navigation equipment and ship communication systems by the method most suitable and appropriate to the prevailing circumstances and conditions</p>	6	6
<p>Competency No. 11 : Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo-handling equipment</p> <p>Appropriate electrical and mechanical knowledge and skills</p> <p><i>Safety and emergency procedures</i></p> <p>Safe isolation of equipment and associated systems required before personnel are permitted to work on such plant or equipment</p> <p>Practical knowledge for the testing, maintenance, fault finding and repair</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> 1) approved in-service experience 2) approved training ship experience 3) approved simulator training, where appropriate 4) approved laboratory equipment training 	<p>The effect of malfunctions on associated plant and systems is accurately identified, ship's technical drawings are correctly interpreted, measuring and calibrating instruments are correctly used and actions taken are justified</p> <p>Isolation, dismantling and re-assembly of plant and equipment are in accordance with manufacturer's safety</p>	4	4

<p>Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition</p>		<p>guidelines and shipboard instructions, legislative and safety specifications. Action taken leads to the restoration of deck machinery and cargo-handling equipment by the method most suitable and appropriate to the prevailing circumstances and conditions</p>		
<p>Competency No. 12 : Maintenance and repair of control and safety systems of hotel equipment</p> <p><i>Theoretical knowledge:</i> Electrical and electronic systems operating in flammable areas</p> <p><i>Practical knowledge:</i> Carrying out safe maintenance and repair procedures Detection of machinery malfunction, location of faults and action to prevent damage</p>		<p>The effect of malfunctions on associated plant and systems is accurately identified, ship's technical drawings are correctly interpreted, measuring and calibrating instruments are correctly used and actions taken are justified</p> <p>Isolation, dismantling and re-assembly of plant and equipment are in accordance with manufacturer's safety guidelines and shipboard instructions, legislative and safety specifications. Action taken leads to the restoration of control and safety systems of hotel equipment by the method most suitable and appropriate to the prevailing circumstances and conditions</p>	<p>2</p>	<p>2</p>
<p><i>FUNCTION 3: Controlling the operation of the ship and care for persons on board at operational level</i></p>				
<p>Competency No. 13 : Ensure compliance with pollution prevention requirements</p> <p><i>Prevention of pollution of the marine environment</i> Knowledge of the precautions to be taken to prevent pollution of the marine environment Anti-pollution procedures and all associated equipment</p>	<p>Examination and assessment of evidence obtained from one or more of the following: 1) approved in-service experience 2) approved training ship experience</p>	<p>Procedures for monitoring shipboard operations and ensuring compliance with pollution-prevention requirements are fully observed. Actions to ensure that a</p>	<p>2</p>	

Importance of proactive measures to protect the marine environment	3) approved training	positive environmental reputation is maintained.		
Competency No. 14 : Prevent, control and fight fire on board <i>Fire prevention and fire-fighting appliances</i> Ability to organize fire drills Knowledge of classes and chemistry of fire Knowledge of fire-fighting systems Action to be taken in the event of fire, including fires involving oil systems	Assessment of evidence obtained from approved fire-fighting training and experience as set out in section A-VI/3, paragraphs 1 to 3 of STCW Code	The type and scale of the problem is promptly identified and initial actions conform with the emergency procedure and contingency plans for the ship Evacuation, emergency shutdown and isolation procedures are appropriate to the nature of the emergency and are implemented promptly. The order of priority, and the levels and time-scales of making reports and informing personnel on board, are relevant to the nature of the emergency and reflect the urgency of the problem	1	
Competency No. 15 : Operate life-saving appliances <i>Life-saving</i> Ability to organize abandon ship drills and knowledge of the operation of survival craft and rescue boats, their launching appliances and arrangements, and their equipment, including radio life-saving appliances, satellite EPIRBs, SARTs, immersion suits and thermal protective aids	Assessment of evidence obtained from approved training and experience as set out in section A-VI/2, paragraphs 1 to 4 of STCW Code	Actions in responding to abandon ship and survival situations are appropriate to the prevailing circumstances and conditions and comply with accepted safety practices and standards	1	
Competency No. 16 : Apply medical first aid on board ship <i>Medical aid</i> Practical application of medical guides and advice by radio, including the ability to take effective action based on such knowledge in the case of accidents or illnesses that are likely to	Assessment of evidence obtained from approved training as set out in section A-VI/4, paragraphs 1 to 3 of STCW Code	Identification of probable cause, nature and extent of injuries or conditions is prompt and treatment minimizes immediate threat to life	1	

occur on board ship				
<p>Competency No. 17 : Application of leadership and team working skills</p> <p>Working knowledge of shipboard personnel management and training Ability to apply task and workload management, including:</p> <ol style="list-style-type: none"> 1) planning and co-ordination 2) personnel assignment 3) time and resource constraints 4) prioritization <p>Knowledge and ability to apply effective resource management:</p> <ol style="list-style-type: none"> 1) allocation, assignment, and prioritization of resources 2) effective communication on board and ashore 3) decisions reflect consideration of team experiences 4) assertiveness and leadership, including motivation 5) obtaining and maintaining situational awareness <p>Knowledge and ability to apply decision-making techniques:</p> <ol style="list-style-type: none"> 1) Situation and risk assessment 2) Identify and consider generated options 3) Selecting course of action 4) Evaluation of outcome effectiveness 	<p>Assessment of evidence obtained from one or more of the following:</p> <ol style="list-style-type: none"> 1) approved training 2) approved in-service experience 3) practical demonstration 	<p>The crew are allocated duties and informed of expected standards of work and behaviour in a manner appropriate to the individuals concerned</p> <p>Training objectives and activities are based on assessment of current competence and capabilities and operational requirements.</p> <p>Operations are planned and resources are allocated as needed in correct priority to perform necessary tasks.</p> <p>Communication is clearly and unambiguously given and received.</p> <p>Effective leadership behaviours are demonstrated</p> <p>Necessary team member(s) share accurate understanding of current and predicted vessel state and operational status and external environment.</p> <p>Decisions are most effective for the situation</p>	3	2

<p>Competency No. 18 : Contribute to the safety of personnel and ship</p> <p>Knowledge of personal survival techniques</p> <p>Knowledge of fire prevention and ability to fight and extinguish fires</p> <p>Knowledge of elementary first aid</p> <p>Knowledge of personal safety and social responsibilities.</p> <p>Security and related Regulations</p>	<p>Assessment of evidence obtained from approved training and experience as set out in section A-VI/1, paragraph 2 of STCW Code</p>	<p>Appropriate safety and protective equipment is correctly used</p> <p>Procedures and safe working practices designed to safeguard personnel and the ship are observed at all times</p> <p>Procedures designed to safeguard the environment are observed at all times</p> <p>Initial and follow-up actions on becoming aware of an emergency conform with established emergency response procedures.</p>	<p>1</p>	
<p>Total hours :</p>			<p>63</p>	<p>57</p>
<p>Evaluation hours :</p>			<p>1</p>	<p>2</p>
<p>Total no. of days @ 8 hours / day</p>			<p>16 days (3 weeks)</p>	