

Assessment Guidelines for Electro-Technical Officer on Ships Powered by Main Propulsion Machinery of 750 kW/1,000 HP or More

Standard of Competence

Each candidate for an endorsement as Electro-Technical Officer (ETO) on Ships Powered by Main Propulsion Machinery of 750 kW/1,000 HP or More must provide evidence of having achieved the standard of competence specified in Table A-III/6 of the STCW Code (46 CFR 11.335(a)(2)). The table in this enclosure is adopted from Table A-III/6 of the STCW Code (found in Enclosure (4)) to assist the candidate and assessor in the demonstration of competency.

Practical Skill Demonstrations

These assessment guidelines establish the conditions under which the assessment will occur, the performance or behavior the candidate is to accomplish, and the standards against which the performance is measured. In addition, for this table and its competencies, the unique requirements of different manufacturers for operating, maintenance, and repair; the different generations and configurations of systems; and the specific nature of the shipboard installation do not permit the development of detailed performance criteria. As a result, many of the criteria in these guidelines call for direct reference to the manufacturers' instructions, recommendations, and specifications or the ship's standard operating procedures to determine whether the candidate's actions were appropriate, complete, timely, and executed in the proper sequence.

Qualified Assessors

A shipboard Qualified Assessor (QA) who witnesses a practical assessment may sign the appropriate blocks and pages in the Record of Assessment in Enclosure (3) or an equivalent record. All assessments must be signed by a QA approved by the Coast Guard in accordance with 46 CFR 10.405. In order to facilitate the transition to this new requirement, the Coast Guard will accept assessments that have been demonstrated in the presence of and signed by an assessor who has not been Coast Guard approved until December 31, 2016, provided that the assessor meets the professional requirements in 46 CFR 10.405(a)(3) to assess competence for the specific endorsement. Assessors must be in possession of the level of endorsement, or other professional credential, which provides proof that he or she has attained a level of experience and qualification equal or superior to the relevant level of knowledge, skills, and abilities to be assessed (46 CFR 10.405(a)(3)). In the interim, the Coast Guard will accept assessments signed by mariners who hold an appropriate national endorsement and have at least 1 year of experience as Chief Engineer and/or Second Engineer Officer (national First Assistant Engineer) on vessels of the applicable propulsion mode(s) of at least 750 kW/1,000 HP. After December 31, 2016, QAs must be approved by the U. S. Coast Guard National Maritime Center to conduct assessments (46 CFR 10.405).

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence in Section A-III/6 of the STCW Code. Use of these Guidelines is not mandatory and alternative means of achieving the competence in the STCW Code will be considered. In accordance with 46 CFR 11.301(a)(1)(i), alternative Assessment Guidelines must be approved by the National Maritime Center before use.

Assessment Guidelines for Electro-Technical Officer on Ships Powered by Main Propulsion Machinery of 750 kW/1,000 HP or More

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.A	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems including prime movers including main propulsion plant</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate monitors and interprets shipboard electrical, electronic, and control systems operations, as related to main propulsion systems and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that <ol style="list-style-type: none"> a. Operations of the remote and local control systems and related components are in accordance with the manufacturer's recommended specifications; and b. Instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Analog and digital alarm and automatic control functions for proper operation in accordance with the manufacturer's specifications; and b. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.B	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems including prime Movers including main propulsion plant</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel with diesel or turbo-electric main propulsion, or on a simulator, or in a laboratory or workshop,	the candidate monitors and interprets shipboard electrical, electronic, and control systems operations, as related to diesel or turbo-electric main propulsion systems and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that: <ol style="list-style-type: none"> a. Operation of the remote and local control systems and related components are in accordance with the manufacturer's recommended specifications; and b. Instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications; and b. Alarm and automatic control functions for proper operation in accordance with the manufacturer's specifications.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.2.A	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems including engine room auxiliary machinery</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate monitors and assesses shipboard electrical, electronic, and control systems operations, as related to auxiliary and ancillary machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that: <ol style="list-style-type: none"> a. Operation of the remote and local control systems and related components are in accordance with the manufacturer's recommended specifications; and b. Confirms that all instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications; and b. Alarm and automatic control functions for proper operation in accordance with manufacturer specifications. <p>Operational parameters should include:</p> <ul style="list-style-type: none"> • Pressure; • Temperature; • Flow; • Level; • RPM; • Vibration; • Position; • Motion; and • Direction.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.3.A	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems including steering systems</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate monitors and assesses shipboard electrical, electronic, and control systems operations, as related to vessel steering systems and machinery	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that: <ol style="list-style-type: none"> a. Operation of the remote and local control systems and related components are in accordance with the manufacturer's recommended specifications; and b. Instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications; and b. Alarm and automatic control functions for proper operation in accordance with the manufacturer's specifications. <p>System types used in this assessment should include:</p> <ul style="list-style-type: none"> • Ram Type; • Rotary Vane; • Azipod Drive; and • Directional Water-Jet.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.4.A	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems including cargo handling systems</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate monitors and analyzes the operations of control system components and electrically controlled or driven machinery associated with the cargo handling system.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that: <ol style="list-style-type: none"> a. Operation of the remote and local control systems and related components are in accordance with the manufacturer's recommended specifications; and b. Instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications; and b. Alarm and automatic control functions for proper operation in accordance with the manufacturer specifications. <p>Equipment used in this assessment should include:</p> <ul style="list-style-type: none"> • Cargo winches or derricks; • Cranes; • Ramps; and • Variable and constant speed pumps.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.5.A	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems including deck machinery</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate monitors and assesses shipboard electrical, electronic, and control systems operations, as related to deck systems and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that: <ol style="list-style-type: none"> a. Operation of the remote and local control systems and related components is in accordance with the manufacturer's recommended specifications; and b. Instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications; and b. Alarm and automatic control functions for proper operation in accordance with the manufacturer specifications. <p>Equipment used in this assessment should include:</p> <ul style="list-style-type: none"> • Tension winches; • Windlass; • Capstans; • Hatch covers; • Ramp controls; and • Segregation doors.

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1.6.A	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems including hotel systems</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate monitors and assesses shipboard electrical, electronic, and control systems operations, as related to hotel systems and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that: <ol style="list-style-type: none"> a. Operation of the remote and local control systems and related components are in accordance with the manufacturer's recommended specifications; and b. Instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications; and b. Alarm and automatic control functions for proper operation in accordance with the manufacturer specifications. <p>Equipment used in this assessment should include:</p> <ul style="list-style-type: none"> • Vent dampers; • Accommodation heating; • Air conditioning and ventilation; • Sanitary systems and equipment; • Potable systems and equipment; • Sewage treatment systems and equipment; • Galley equipment; • Laundry equipment; • Communication devices; and • Entertainment systems.

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1.7.A	Monitor the operation of electrical, electronic and control systems	<p>Basic understanding and knowledge of the operation of mechanical engineering systems</p> <p>Basic knowledge of heat transmission, mechanics, and hydromechanics</p> <p><i>Knowledge of:</i></p> <p>Electro technology and electrical machine theory</p> <p>Fundamental Electronics and power electronics</p> <p>Electrical power distribution and electrical equipment</p> <p>Fundamentals of automation, automatic control systems and control technology</p> <p>Instrumentation, alarm, and monitoring systems</p> <p>Electrical drives</p> <p>Technology of electrical materials</p> <p>Electro-hydraulic and electro-pneumatic control system</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate monitors and assesses shipboard electrical, electronic, and control systems operations, as related to bridge operations, and navigation systems and equipment.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Confirms that: <ol style="list-style-type: none"> a. Operation of the remote and local control systems and related components are in accordance with the manufacturer's recommended specifications; and b. Instrumentation components are functional and operating within recommended technical specifications; and 2. Tests: <ol style="list-style-type: none"> a. Operation of electro-hydraulic and electro-pneumatic control system components in accordance with technical specifications; and b. Alarm and automatic control functions for proper operation in accordance with the manufacturer specifications. <p>Equipment should include:</p> <ul style="list-style-type: none"> • Remote propulsion controls; • Steering controls and feedback systems; • Communications systems, including GMDSS; • Recorders; • Radars and ARPA; • Fire detection and suppression; • Remote system controls; • AIS; and • ECDIS.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.8.A	Monitor the operation of electrical, electronic and control systems	Basic understanding and knowledge of the operation of mechanical engineering systems <i>Knowledge of:</i> Hazards and precautions required for the operation of power systems above 1,000 volts	On board a vessel, or in a laboratory or workshop,	the candidate monitors and assesses shipboard electrical, electronic, and control systems operations, as relate to high voltage power systems and machinery.	The candidate: <ol style="list-style-type: none">1. Identifies the hazards associated with high voltage systems and equipment;2. Describes the precautions taken when operating and performing maintenance on high voltage systems and equipment; and3. Demonstrates the proper use of specialized tools, protective gear and procedures associated with the operation and maintenance of high voltage power systems and machinery.
2.1.A	Monitor the operation of automatic control systems of propulsion and auxiliary machinery	Preparation of control systems of propulsion and auxiliary machinery for operation	On board a vessel, or in a laboratory or workshop,	the candidate monitors and assesses the main propulsion and auxiliary machinery control systems sufficient to maintain safe operating conditions.	The candidate: <ol style="list-style-type: none">1. Performs scheduled tests of automatic control devices in accordance with the manufacturer's guidelines and vessel operational requirements; and2. Observes all automatic control functions and takes appropriate actions to ensure continued vessel and personnel safety if the operations are outside of the manufacturer's guidelines.

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3.1.A	Operate generators and distribution systems	Coupling, load sharing, and changing over generators.	On board a vessel, or in a laboratory or workshop,	the candidate plans and conducts operation of electrical generation and distribution systems.	<p>The candidate develops a prioritized plan and schedule of tasks and operates the power generation control system for the following:</p> <ol style="list-style-type: none"> 1. Synchronizing and connecting offline generators to the main bus, ensuring all operating parameters remain within manufacturer's specifications; 2. Paralleling and equalizing load distribution between on-line generators, ensuring all operating parameters remain within the manufacturer's specifications; and 3. Shifting load distribution and the disconnection of generators from the main bus, ensuring all operating parameters remain within the manufacturer's specifications.
3.1.B	Operate generators and distribution systems	Coupling and breaking connection between switchboards and distribution panels	On board a vessel, or on a simulator, or in a laboratory or workshop, using manufacturer's drawings, schematics and instructions for coupling and disconnecting switchboards and distribution panels;	the candidate describes and demonstrates the proper operation of electrical distribution control systems under the supervision of the cognizant engineer.	The candidate describes and then connects and releases load sources to switchboards and distribution panels in accordance with the manufacturer's guidelines and vessel operational requirements.

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4.1.A	Operate and maintain power systems in excess of 1,000 volts	<i>Theoretical knowledge</i> High-voltage technology Safety precautions and procedures	On board a vessel, or in a laboratory or workshop, or in approved course,	the candidate identifies and describes safety precautions for a high voltage power system.	The candidate's description includes: <ol style="list-style-type: none">1. Safety precautions to be observed when performing operations or maintenance on or in the vicinity of electrical machinery utilizing a system voltage of 1,000 volts or greater; and2. Procedures to be followed prior to, during and immediately following maintenance and start up or shutdown of machinery utilizing a system voltage of 1,000 volts or greater.
4.1.B	Operate and maintain power systems in excess of 1,000 volts	<i>Theoretical knowledge</i> Electrical propulsion, electric motors and control systems	On board a vessel, or in a laboratory or workshop, or in an approved course,	the candidate describes the operation of a high voltage main propulsion power system.	The candidate's description includes: <ol style="list-style-type: none">1. Construction and operating parameters of main propulsion components and support machinery associated with electric propulsion utilizing a system voltage of 1,000 volts or greater; and2. Procedures for the start up, use and securing of main propulsion system components and control systems utilizing a system voltage of 1,000 volts or greater.
4.1.C	Operate and maintain power systems in excess of 1,000 volts	<i>Theoretical knowledge</i> Electrical propulsion, electric motors and control systems	On board a vessel, or on a simulator, or in a laboratory or workshop, or in an approved course,	the candidate operates and maintains high voltage power systems in accordance with manufacturer's technical specifications and established rules and procedures.	The candidate: <ol style="list-style-type: none">1. Describes the scheduled and preventive maintenance on system components with a system voltage of 1,000 volts or greater, including all relative safety precautions and procedures; and2. Properly uses specialized equipment and machinery associated with high voltage electric propulsion plants in excess of 1,000 volts.

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5.1.A	Operate computers and computer networks on ships	Understanding of: <ol style="list-style-type: none"> .1 Main features of data processing; .2 Construction and use of computer networks on ships; and .3 Bridge based, Engine-room based and commercial computer use 	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate initializes, and operates shipboard data processing systems, computer networks.	The candidate: <ol style="list-style-type: none"> 1. Installs and initializes software for data communications and data processing systems; 2. Installs hardware and performs system initiation on shipboard computer networks; and 3. Operates computers and networks used during bridge, engine room, and other commercial ship operations.
6.1.A	Use English in written and oral form	Adequate knowledge of the English language, in: written forms and oral forms to enable the officer to use engineering publications and to perform officer's duties	On board a vessel, or in a laboratory or workshop, given technical manuals and engineering publications,	the candidate uses technical publications written in English, and communicates orally in English.	The candidate demonstrates efficient and correct: <ol style="list-style-type: none"> 1. Use of technical manuals and engineering publications for the performance of prescribed shipboard duties; and 2. Oral communications regarding the performance of prescribed duties.
7.1.A	Use internal communication systems	Operation of all internal communication components and systems on board	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate correctly operates shipboard communications systems.	The candidate clearly transmits and correctly receives messages and keeps communication records that are complete, accurate, and comply with statutory requirements.

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8.1 A	Maintenance and repair of electrical and electronic equipment	Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are permitted to work on such equipment	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate demonstrates safety procedures performed on electrical machinery and equipment prior to, during and after maintenance and relative operations.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Isolates machinery prior to the performance of maintenance tasks in accordance with the manufacturer's guidelines and vessel operational requirements; and 2. Performs test and verification procedures to ensure acceptable machinery operations and integrity after maintenance tasks are completed. <p>Procedures demonstrated should include:</p> <ul style="list-style-type: none"> • Lock Out / Tag Out Procedures; • Procedures to obtain and fill out work permits; • Proper communications; and • Use of appropriate personal protective equipment.
8.2.A	Maintenance and repair of electrical and electronic equipment	Maintenance and repair of AC electrical systems equipment, switchboards, electric motors, generators, and DC electrical systems, equipment and motors	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate demonstrates the correct selection and safe use of tools and instruments related to the maintenance and repair of electrical and electronic equipment.	<p>The candidate correctly selects and uses tools, measuring instruments, and test equipment, and ensures that:</p> <ol style="list-style-type: none"> 1. Inspection and repairs of electrical equipment and machinery will be conducted in the most efficient and accepted manner; 2. Electrical schematics and technical drawings are interpreted and used correctly in the maintenance and repair procedures; 3. Inspection, maintenance and repairs of electrical equipment and machinery are effective and are conducted in the safest and most efficient manner in accordance with the manufacturer's guidelines; and 4. Electrical equipment functions properly after maintenance and repair tasks are completed.

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8.2.B	Maintenance and repair of electrical and electronic equipment	Maintenance and repair of AC electrical systems equipment, switchboards, electric motors, generators, and DC electrical systems, equipment and motors	On board a vessel, or in a laboratory or workshop, given an electrical component or piece of electronic equipment,	the candidate dismantles, inspects, repairs and reassembles the unit.	The candidate: <ol style="list-style-type: none"> 1. Disassembles, inspects, repairs, and re-assembles the equipment within manufacturer's specifications; and 2. Ensures that the procedures for the inspection and repair of electrical equipment and machinery are appropriate and are performed correctly to ensure that all parameters remain within the manufacturer's specifications.
8.2.C	Maintenance and repair of electrical and electronic equipment	Maintenance and repair of AC electrical systems equipment, switchboards, electric motors, generators, and DC electrical systems, equipment and motors	On board a vessel, or in a laboratory or workshop, given an electrical component or piece of electronic equipment,	the candidate performs testing procedures to ensure proper condition and operation.	The candidate: <ol style="list-style-type: none"> 1. Tests the performance of electrical equipment and machinery after a maintenance procedure has been completed using good practices to ensure that all parameters remain within the manufacturer's specifications; and 2. Correctly uses and interprets electrical schematics and technical drawings associated with the maintenance and repair of shipboard electrical equipment and machinery.
8.3.A	Maintenance and repair of electrical and electronic equipment	Detection of electrical malfunctions, location of faults, and measures to prevent damage	On board a vessel, or in a laboratory or workshop, given an electrical component, a piece of electronic equipment, or a distribution switchboard,	the candidate troubleshoots malfunctions and corrects faults.	The candidate: <ol style="list-style-type: none"> 1. Detects (troubleshoots) faults indicated by operations outside normal parameters; 2. Locates faults indicated by operations outside normal parameters; and 3. Eliminates faults and correctly follows accepted repair procedure and protocols.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.4.A	Maintenance and repair of electrical and electronic equipment	Construction and operation of electrical testing and measuring equipment	On board a vessel, or in a laboratory or workshop, given an electrical component, a piece of electronic equipment, or a distribution switchboard,	the candidate properly uses electrical testing and measuring equipment.	The candidate: <ol style="list-style-type: none"> 1. Identifies the construction details and operating parameters of electrical test and measuring equipment; and 2. Properly uses testing and measuring equipment as a part of an electrical and electronic equipment troubleshooting or maintenance operation.
8.5.A	Maintenance and repair of electrical and electronic equipment	Function and performance tests of the following equipment and their configuration: <ol style="list-style-type: none"> .1 Monitoring systems .2 Automatic control devices .3 Protective devices 	On board a vessel, or in a laboratory or workshop, given an electrical component, a piece of electronic equipment, or a distribution switchboard,	the candidate tests the functionality and performance of automatic control, parameter measuring, and system protective devices and equipment.	The procedures followed by the candidate ensure that: <ol style="list-style-type: none"> 1. Monitoring system and equipment are within manufacturer's operating parameters and technical specifications; 2. Automatic control systems and equipment are within manufacturer's operating parameters and technical specifications; and 3. System protective devices and equipment are within manufacturer's operating parameters and technical specifications.
8.6.A	Maintenance and repair of electrical and electronic equipment	The interpretation of schematics and electronic diagrams	On board a vessel, or in a laboratory or workshop, given an electrical or electronic circuit and appropriate documentation,	the candidate interprets electrical schematics, and electronic controls and logic diagrams.	The candidate correctly interprets and uses shipboard electrical schematics, shipboard electronic controls diagrams, and shipboard controls logic diagrams.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
9.1.A	Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery	Appropriate electrical and mechanical knowledge and skills <i>Safety and emergency procedures</i> Safe isolation of equipment and associated systems required before personnel are permitted to work on such plant equipment	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate demonstrates the safe procedures for maintenance and repair of automation and control systems of main propulsion and auxiliary equipment.	The candidate: <ol style="list-style-type: none">1. Isolates machinery prior to the performance of maintenance tasks in accordance with the manufacturer's guidelines and vessel operational requirements; and2. Performs test and verification procedures to ensure acceptable machinery operations and integrity after maintenance tasks are completed. Procedures in this assessment should include: <ul style="list-style-type: none">• Lock Out/Tag Out;• Obtaining and filling out work permits;• Proper communications; and• Use of personal protective equipment.
9.2.A	Maintenance and repair of automation and control systems of main propulsion and auxiliary machinery	Practical knowledge for the testing, maintenance, fault finding and repair Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate troubleshoots and repairs automation and control systems for main propulsion and auxiliary machinery equipment.	The candidate demonstrates: <ol style="list-style-type: none">1. Tests and detects faults to determine the correct repair procedures to initiate under the existing circumstances and conditions;2. Performs maintenance required by existing circumstances and conditions necessary to restore electrical and electronic control equipment to normal operating condition; and3. Eliminates faults through the application of correct and accepted repair procedure and protocols.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
10.1.A	Maintenance and repair of bridge navigation equipment and ship communication systems	<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>	On board a vessel, or in a laboratory or workshop,	the candidate describes the operation and maintenance of bridge communication and navigational equipment.	<p>The candidate's description includes:</p> <ol style="list-style-type: none"> 1. Operation of shipboard navigational equipment and systems in accordance with the manufacturer's technical specifications and guidance; 2. Maintenance and repair of shipboard navigational equipment and systems in accordance with the manufacturer's technical specifications and guidance; 3. Operation of shipboard communication equipment and systems in accordance with the manufacturer's technical specifications and guidance; 4. Maintenance and repair of shipboard communication equipment and systems in accordance with the manufacturer's technical specifications and guidance; and 5. Requirements for intrinsically safe operations of electrical and electronic equipment operating in flammable areas.
10.2.A	Maintenance and repair of bridge navigation equipment and ship communication systems	<p>Knowledge of the principles and maintenance procedures of navigation equipment, internal and external communication systems</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>	On board a vessel, or in a laboratory or workshop,	the candidate detects faults and isolates, dismantles, and reassembles navigation and communication systems equipment.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Safely maintains and repairs shipboard navigational systems and equipment; shipboard internal and external communications systems and equipment in accordance with the manufacturer's guidelines and industry standards; and 2. Detects faults and identifies causes of malfunction of shipboard navigational systems and equipment; and internal and external communications systems and equipment.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
11.1.A	Maintenance and repair of electrical, electronic and control systems of deck machinery and cargo handling equipment	<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>Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition</p>	On board a vessel, or in a laboratory or workshop,	the candidate safely isolates, maintains, and repairs automation and control systems of deck and cargo handling machinery in accordance with manufacturer's guidelines and industry standards.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Restores shipboard deck machinery and cargo handling equipment to normal functionality; 2. Isolates electrical, electronic, and control systems of deck machinery and cargo handling equipment prior to the commencement of maintenance procedures; 3. Identifies and uses appropriate test and fault detection procedures to determine the correct repair procedures on deck machinery and cargo handling equipment; and 4. Maintains and restores electrical and electronic control equipment of deck machinery and cargo handling equipment to normal operating condition.
12.1.A	Maintenance and repair of control and safety systems of hotel equipment.	<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>	On board a vessel, or in a laboratory or workshop,	the candidate safely isolates, maintains, and repairs control and safety systems of hotel equipment.	<p>The candidate performs the following in accordance with the manufacturer's guidelines and industry standards:</p> <ol style="list-style-type: none"> 1. Restores shipboard hotel equipment to normal functionality; 2. Identifies and uses appropriate test and fault detection procedures to determine the correct repair procedures on shipboard hotel equipment; and 3. Maintains and restores electrical and electronic control equipment of shipboard hotel equipment to normal operating condition.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
13.1.A	Ensure compliance with pollution prevention requirements	<i>Prevention of pollution of the marine environment and anti-pollution procedures</i> Knowledge of the precautions to be taken to prevent pollution of the marine environment	On board a vessel, or in a laboratory or workshop, when asked to describe pollution prevention procedures,	the candidate describes appropriate pollution prevention procedures.	The candidate's description includes procedures for monitoring shipboard operations and ensuring compliance with MARPOL requirements are fully observed;
13.1.B	Ensure compliance with pollution prevention requirements.	<i>Prevention of pollution of the marine environment and anti-pollution procedures</i> Anti-pollution procedures and all associated equipment	On board a vessel, or in a laboratory or workshop,	the candidate describes appropriate pollution prevention procedures and equipment.	The candidate's description includes procedures for monitoring shipboard operations and ensuring compliance with MARPOL requirements, including those applicable to: 1. Sewage waste treatment plant; 2. Oily water separator; and 3. Oil-content monitor.
13.1.C	Ensure compliance with pollution prevention requirements	<i>Prevention of pollution of the marine environment and anti-pollution procedures</i> Importance of proactive measures to protect the marine environment	When asked by a qualified assessor to describe compliance with pollution prevention procedures,	the candidate describes appropriate pollution prevention procedures.	The candidate's description includes the importance of proactive measures to protect the marine environment.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
14.1.A	Prevent, control and fight fire on board.	<p>Fire prevention and fire fighting appliances.</p> <p>Ability to organize fire drills</p> <p>Knowledge of classes and chemistry of fire</p> <p>Knowledge of fire fighting systems</p> <p>Actions to be taken in the event of a fire, including fires involving oil systems</p>			<p>This competence and associated KUPs are demonstrated by successful completion of approved or accepted training in Basic and Advanced Firefighting, or if the candidate holds an STCW endorsement as Officer in Charge of an Engineering Watch, Chief Engineer Officer, or Second Engineer Officer.</p>
15.1.A	Operate life-saving appliances	<p><i>Life-saving</i></p> <p>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</p>			<p>This KUP is demonstrated by successful completion of approved or accepted training for Proficiency in Survival Craft and Rescue Boats, other than Fast Rescue Boats (PSC) or Proficiency in Survival Craft and Rescue Boats, other than Lifeboats and Fast Rescue Boats (PSC-Limited) or by holding an endorsement for PSC or PSC-Limited.</p>
16.1.A	Apply medical first aid on board ship	<p><i>Medical aid</i></p> <p>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 occur on board ship</p>			<p>This KUP is demonstrated by successful completion of an approved or accepted Medical First Aid Provider or Medical Care Provider course.</p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
17.1.A	Application of leadership and team working skills	Working knowledge of shipboard personnel management and training	On board a vessel, or in a laboratory or workshop,	the candidate describes the basic duties and responsibilities of vessel personnel.	<p>The candidate describes the duties and responsibilities of:</p> <ol style="list-style-type: none"> 1. The Master; 2. Deck department including: <ol style="list-style-type: none"> a. Chief Mate; b. Second Mate; c. Third Mate; d. Bosun; e. Able Seamen; and f. Entry Level Deck; 3. Engine department including: <ol style="list-style-type: none"> a. Chief Engineer; b. First Assistant Engineer; c. Second Assistant Engineer; d. Third Assistant Engineer; e. QMEDs; and f. Entry Level Engine; and 4. Steward's department including: <ol style="list-style-type: none"> a. Chief Steward; b. Chief Cook; and c. Entry Level Steward's Department.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
17.1.B	Application of leadership and team working skills	Ability to apply task and workload management	On board a vessel, or in a laboratory or workshop,	the candidate generates a work plan for the electrical and electronic maintenance aboard ship.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Obtains: <ol style="list-style-type: none"> a. Preventative maintenance plan for the ship's electrical and electronic equipment; b. Work list of any needed repairs of electrical or electronic equipment; and c. Manual for each piece of electrical or electronics equipment onboard; 2. Determines: <ol style="list-style-type: none"> a. Personnel availability; b. Material available; c. Equipment available; d. What repairs and maintenance can be done concurrently; e. Current voyage planning, such as anticipated port calls, drills, weather, etc.; and f. Projected shipboard needs for individual pieces of electrical and/or electronics equipment; and 3. Develops a work plan for shipboard electrical and electronic equipment that complies with national, international, and classification society requirements, and includes: <ol style="list-style-type: none"> a. Work list with personnel assignments; b. Material and equipment list including a breakdown by equipment repair and a summary; c. Daily work list with personnel assignments and estimated work times; d. Material and equipment list for each task; e. Requisition to replace material and equipment consumed; and f. Lock-out / tag out procedures.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
17.1.C	Application of leadership and team working skills	Knowledge and ability to apply effective resource management	On board a vessel or in approved training,	the candidate executes a work plan for the electrical and electronic maintenance aboard ship.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Assigns personnel and equipment to individual tasks based upon the following: <ol style="list-style-type: none"> a. Team members' skill level; b. Team members' abilities; c. Equipment needed; and d. Material needed; 2. Lays out the equipment, as needed; 3. Communicates the tasks to be completed to those individuals who are to perform the tasks, including the: <ol style="list-style-type: none"> a. Task to be performed; b. Expected time to complete the task; c. Equipment and material to be used; d. Safety and hazard information; e. Standards used to determine if the task was performed satisfactorily; 4. Motivates team members; and 5. Checks on work status on a regular basis, including: <ol style="list-style-type: none"> a. The use of safety equipment; b. Work completion; c. Timeliness of repairs and maintenance; d. Satisfactory completion or progress of task; and e. Adaptations as needed to accomplish unplanned repairs.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
17.1.D	Application of leadership and team working skills	Knowledge and ability to apply decision making techniques	On board a vessel or in approved training, during a fire or emergency simulation,	the candidate supervises an emergency team.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Briefs the team on the situation, the approach to remedying the simulated emergency, and the procedures to be executed; 2. Delegates tasks to each of the assigned crewmembers, briefing them about any special procedures or events that may concern them; 3. Checks the assigned crewmembers to ensure that they are using personal protective equipment (PPE) correctly and appropriately; 4. Checks the assigned crewmembers to ensure that they have made available any equipment that will be needed to accomplish the assigned tasks, both team and individual; 5. Executes the generated plan to handle the emergency simulation; and 6. Participates in the post-simulation critique and presents the positive results of the simulation, the negative findings of the simulation, and makes recommendations to improve procedures, equipment availability, and personnel training.
18.1.A	Contribute to the safety of personnel and ship	<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>	This competence and its associated KUPs are satisfied by successful completion of approved or accepted Basic Training or presents evidence of maintaining the standards of competence in Basic Training.		

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