

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

Standard of Competence

Each candidate for an endorsement as Electro-Technical Rating (ETR) on Vessels 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/7 of the STCW Code (46 CFR 12.611(a)(3)). The table in this enclosure is adopted from Table A-III/7 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, due to the unique requirements of different equipment 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 manufacturer's 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 demonstration 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 Officer in Charge of an Engineering Watch (OICEW) or an Electro-Technical Officer on seagoing 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).

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.A	Safe use of electrical equipment	<p>Safe use and operation of electrical equipment, including:</p> <p>Safety precautions before commencing work or repair</p> <p>Isolation procedures</p> <p>Different voltages on board</p>	On board a vessel, or on a simulator, or in a laboratory or workshop,	the candidate describes and observes safety procedures for the operation of electrical equipment and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Observes safety procedures prior to work commencing on shipboard electrical systems, machinery and equipment, including the use of work permits and appropriate personal protective equipment; 2. Isolates electrical systems machinery and equipment from a power source using Lock Out/Tag Out procedures and proper communications; 3. Describes the procedures performed during an emergency situation, including: <ol style="list-style-type: none"> a. Recognition and reporting of electrical hazards and unsafe equipment; and b. Procedures in the event of electrical shock; and 4. Describes the procedures and considerations associated with the various voltage sources found on board a ship, including: <ol style="list-style-type: none"> a. Safe voltages for hand-held equipment; and b. Risks associated with high voltages.

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1.1.B	Safe use of electrical equipment	Safe use and operation of electrical equipment, including emergency procedures Knowledge of the causes of electric shock and precautions to be observed to prevent shock	On board a vessel, or in a laboratory or workshop,	the candidate describes procedures for recognizing and avoiding electrical shock hazards and first aid procedures for electrical shock.	The candidate's description includes: 1. Identification of hazards regarding and precautions taken to avoid electrical shock; 2. Recognizing and reporting electrical hazards and unsafe equipment; and 3. Safe voltages for hand-held equipment; 4. Risks associated with high voltage equipment and onboard work; and 5. First aid procedures to be followed in the event of an electrical shock.
2.1.A	Contribute to monitoring the operation of electrical systems and machinery	Basic knowledge of the operation of mechanical engineering systems including: prime movers, including main propulsion plant	On board a vessel, or in a laboratory or workshop,	the candidate describes the operation and monitoring of electrical, electronic, and control systems operations, related to diesel, steam, gas turbine (direct or geared) or electric main propulsion systems and machinery.	The candidate: 1. Identifies the operational parameters of electrical systems and equipment associated with the propulsion plant; and 2. Describes the performance levels of all parameters monitored on the propulsion plant in accordance with the manufacturer's operating manuals.

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2.2.A	Contribute to monitoring the operation of electrical systems and machinery	<p>Basic knowledge of the operation of mechanical engineering systems including engine room auxiliary machinery</p> <p><i>Basic knowledge of:</i></p> <ul style="list-style-type: none"> .1 Electro technology and electrical machine theory .2 Electrical power distribution and electrical equipment .3 Fundamentals of automation, automatic control systems and control technology .4 Instrumentation, alarm, and monitoring systems .5 Electrical drives .6 Electro-hydraulic and electro-pneumatic control systems .7 Coupling/Load sharing and changes in electrical configuration. 	On board a vessel, or in a laboratory or workshop,	the candidate describes the monitoring and operation of electrical systems and equipment associated with auxiliary equipment and systems.	<p>The candidate:</p> <ul style="list-style-type: none"> 1. Identifies the operational parameters of auxiliary machinery and equipment associated with a propulsion plant that must be monitored; and 2. Describes the performance levels of all parameters monitored on auxiliary and ancillary machinery and equipment in accordance with the manufacturer's operating manuals.

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2.2.B	Contribute to monitoring the operation of electrical systems and machinery	<p>Basic knowledge of the operation of mechanical engineering systems including: steering systems and equipment</p> <p><i>Basic knowledge of:</i></p> <ol style="list-style-type: none"> .1 Electro technology and electrical machine theory .2 Electrical power distribution and electrical equipment .3 Fundamentals of automation, automatic control systems and control technology .4 Instrumentation, alarm, and monitoring systems .5 Electrical drives .6 Electro-hydraulic and electro-pneumatic control systems .7 Coupling/Load sharing and changes in electrical configuration. 	On board a vessel, or in a laboratory or workshop,	the candidate describes monitoring and operation of electrical systems and equipment associated with steering gear equipment and systems.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Identifies the operational parameters of vessel steering machinery and equipment and machinery that must be monitored; and 2. Describes the performance levels of all parameters monitored on a vessel steering machinery and equipment in accordance with the manufacturer's operating manuals. <p>The description should include the following steering types:</p> <ul style="list-style-type: none"> • Ram Type; • Rotary Vane; • Azipod Drive; and • Directional Water-Jet.

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2.2.C	Contribute to monitoring the operation of electrical systems and machinery	<p>Basic knowledge of the operation of mechanical engineering systems including cargo handling systems and equipment</p> <p><i>Basic knowledge of:</i></p> <ol style="list-style-type: none"> .1 Electro technology and electrical machine theory .2 Electrical power distribution and electrical equipment .3 Fundamentals of automation, automatic control systems and control technology .4 Instrumentation, alarm, and monitoring systems .5 Electrical drives .6 Electro-hydraulic and electro-pneumatic control systems .7 Coupling/Load sharing and changes in electrical configuration. 	On board a vessel, or in a laboratory or workshop,	The candidate describes monitoring and operation of electrical systems and equipment associated with the operation of vessel cargo handling systems.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Identifies the operational parameters of vessel cargo handling machinery and equipment that must be monitored; and 2. Describes the performance levels of all parameters monitored on a vessel cargo handling machinery and equipment in accordance with the manufacturer's operating manuals. <p>The description should include the following equipment:</p> <ul style="list-style-type: none"> • Winches or derricks; • Cranes; • Variable and constant speed motors; and • Variable and constant pumps.

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2.2.D	Contribute to monitoring the operation of electrical systems and machinery	<p>Basic knowledge of the operation of mechanical engineering systems including deck systems and equipment</p> <p><i>Basic knowledge of:</i></p> <ol style="list-style-type: none"> .1 Electro technology and electrical machine theory .2 Electrical power distribution and electrical equipment .3 Fundamentals of automation, automatic control systems and control technology .4 Instrumentation, alarm, and monitoring systems .5 Electrical drives .6 Electro-hydraulic and electro-pneumatic control systems .7 Coupling/Load sharing and changes in electrical configuration. 	On board a vessel, or in a laboratory or workshop,	the candidate describes the operation and monitoring of electrical systems and equipment associated with deck systems and equipment.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Identifies the operational parameters of vessel deck machinery and equipment that must be monitored; and 2. Describes the performance levels of all parameters monitored on a vessel deck machinery and equipment in accordance with the manufacturer's operating manuals. <p>The description should include the following equipment:</p> <ul style="list-style-type: none"> • Tension winches; • Windlass; • Capstans; • Hatch covers; • Ramp controls; and • Segregation doors.

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2.2.E	Contribute to monitoring the operation of electrical systems and machinery	<p>Basic knowledge of the operation of mechanical engineering systems including hotel systems and equipment</p> <p><i>Basic knowledge of:</i></p> <ol style="list-style-type: none"> .1 Electro technology and electrical machine theory .2 Electrical power distribution and electrical equipment .3 Fundamentals of automation, automatic control systems and control technology .4 Instrumentation, alarm, and monitoring systems .5 Electrical drives .6 Electro-hydraulic and electro-pneumatic control systems .7 Coupling/Load sharing and changes in electrical configuration. 	On board a vessel, or in a laboratory or workshop,	the candidate describes the operation and monitoring of electrical systems and equipment associated with vessel hotel systems.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Identifies the operational parameters of vessel hotel machinery and equipment that must be monitored; and 2. Describes the performance levels of all parameters monitored on a vessel hotel machinery and equipment in accordance with the manufacturer's operating manuals. <p>The description should include the following equipment:</p> <ul style="list-style-type: none"> • Vent dampers; • Accommodation heating; • Air conditioning and ventilation; • Sanitary systems and equipment; • Potable systems and equipment; • Sewage systems and equipment; • Galley equipment and laundry equipment; • Communication devices; and • Entertainment systems.

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2.2.F	Contribute to monitoring the operation of electrical systems and machinery	<p>Basic knowledge of the operation of mechanical engineering systems, including bridge and navigation systems and equipment</p> <p><i>Basic knowledge of:</i></p> <ol style="list-style-type: none"> .1 Electro technology and electrical machine theory .2 Electrical power distribution and electrical equipment .3 Fundamentals of automation, automatic control systems and control technology .4 Instrumentation, alarm, and monitoring systems .5 Electrical drives .6 Electro-hydraulic and electro-pneumatic control systems .7 Coupling/Load sharing and changes in electrical configuration. 	On board a vessel, in a laboratory or workshop,	the candidate describes the operation and monitoring of electrical systems and equipment associated with bridge navigation systems and equipment.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Identifies the operational parameters of vessel bridge and navigation machinery and equipment that must be monitored; and 2. Describes the performance levels of all parameters monitored on a vessel bridge and navigation machinery and equipment in accordance with the manufacturer's operating manuals. <p>The description should include the following equipment:</p> <ul style="list-style-type: none"> • Remote propulsion controls; • Steering controls and feedback systems; • Communications systems, including GMDSS; • Recorders; • Radars; • Fire detection and suppression; and • Remote system controls.

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3.1.A	Use hand tools, electrical and electronic measurement equipment for fault finding, maintenance and repair operation	<p>Safety requirements for working on shipboard electrical systems</p> <p>Application of safe working practices</p> <p><i>Basic knowledge of:</i></p> <p>.1 Construction and operational characteristics of shipboard AC and DC systems and equipment</p> <p>.2 Use of measuring instruments, machine tools, and hand and power tools</p>	On board a vessel, or in a laboratory or workshop,	the candidate selects and uses hand tools and electronic measurement equipment.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Selects hand tools, measuring instruments and testing equipment and inspects and repairs electrical equipment and machinery in the most efficient and safe manner; 2. Uses hand tools correctly and inspects, maintains and repairs electrical equipment and machinery in the safest and most efficient and manner in accordance with the manufacturer's guidelines; and 3. Uses measuring instruments and testing equipment correctly, and results are accurate and electrical equipment functions properly after maintenance and repair tasks are completed.
4.1.A	Contribute to shipboard maintenance and repair	<p>Ability to use lubrication and cleaning materials and equipment</p> <p>Knowledge of safe disposal of waste materials</p> <p>Ability to understand and execute routine maintenance and repair procedures</p> <p>Understanding manufacturer's safety guidelines and shipboard instructions</p>	On board a vessel, or in a laboratory or workshop,	the candidate carries out maintenance activities in accordance with technical, safety and procedural specifications.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Uses lubrication and cleaning materials in accordance with the manufacturer's safety and technical specifications and accepted industry practices; 2. Disposes of waste materials in a safe manner in accordance with the manufacturer's safety and technical specifications, national and international laws, and accepted industry practices. 3. Understands and follows maintenance and repair directions and procedures, and performs them in a safe and acceptable manner; and 4. Observes the manufacturer's and shipboard safety protocols and directions.

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5.1.A	Contribute to the maintenance and repair of electrical systems and machinery on board	<p>Basic knowledge of electro-technical drawings and safe isolation of equipment and associated systems required before personnel are permitted to work on such plant or equipment</p> <p>Test, detect faults and maintain and restore electrical control equipment and machinery to operating condition</p> <p>Electrical and electronic equipment operating in flammable areas</p> <p>Basics of ship's fire detection system</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>Maintenance and repair of lighting fixtures and supply systems</p>	On board a vessel, or in a laboratory or workshop,	the candidate identifies the effect of malfunctions on associated plant and systems, ship's technical drawings and uses measuring and calibrating instruments to maintain and repair electrical systems and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Compares system and machinery performance data to the manufacturer's technical specifications and identifies system and machinery malfunctions; 2. Uses ship's technical drawings and schematics to correctly interpret out of range parameters or faults; and 3. Selects and correctly uses appropriate measuring, calibrating, and test instruments.

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5.1.B	Contribute to the maintenance and repair of electrical systems and machinery on board	<p>Basic knowledge of electro-technical drawings and safe isolation of equipment and associated systems required before personnel are permitted to work on such plant or equipment</p> <p>Test, detect faults and maintain and restore electrical control equipment and machinery to operating condition</p> <p>Electrical and electronic equipment operating in flammable areas</p> <p>Basics of ship's fire detection system</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>Maintenance and repair of lighting fixtures and supply systems</p>	On board a vessel, or on an approved simulator, or in a laboratory or workshop,	the candidate assists in the isolation, dismantling, reassembly, and testing electrical equipment.	<p>The candidate assists with the:</p> <ol style="list-style-type: none"> 1. Isolation of plant machinery and equipment in accordance with shipboard safety procedures and technical specifications; 2. Disassembly of plant machinery and equipment in accordance with shipboard maintenance requirements and technical manuals; 3. Assembly of plant machinery and equipment in accordance with shipboard maintenance requirements and technical manuals; and 4. Testing the performance of electrical equipment and machinery after a maintenance procedure has been completed.

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6.1.A	Contribute to the handling of stores	Knowledge of procedures for safe handling, stowage and securing of stores	On board a vessel, or in a laboratory or workshop,	the candidate stows and secures stores and equipment in accordance with good engineering principles.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Separates flammable and non flammable materials; 2. Separates food items from sources of contamination; 3. Properly stacks materials, including: <ol style="list-style-type: none"> a. Stacking heavy materials on the bottom and lighter materials on top; b. Following labeled height limits; and c. Following the orientation arrows on the packaging; 4. Separates incompatible materials; 5. Brackets or ties off all goods capable of moving and causing injury; 6. Stores items by “first in/first out”; and 7. Secures heavy items with proper types of fiber and wire rope. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 8.1.A for Able Seafarer-Engine.</i></p>

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7.1.A	Apply precautions and contribute to the prevention of pollution of the marine environment	Knowledge of the precautions to be taken to prevent pollution of the marine environment	On board a vessel, or in a laboratory or workshop,	the candidate describes sources of operational pollution.	<p>The candidate's description includes:</p> <ol style="list-style-type: none"> 1. Oil; 2. Noxious liquid substances; 3. Packaged goods and non-liquid substances; 4. Sewage; 5. Garbage; 6. Marine debris; and 7. Air pollution. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 9.1.A for Able Seafarer-Engine.</i></p>
7.1.B	Apply precautions and contribute to the prevention of pollution of the marine environment	Knowledge of the precautions to be taken to prevent pollution of the marine environment	On board a vessel, or in a laboratory or workshop,	the candidate describes precautions to be taken to prevent pollution of the marine environment.	<p>The candidate's description includes:</p> <ol style="list-style-type: none"> 1. Collection, sorting, storage, and estimating the amount of garbage on board; 2. Preparations for preventing or controlling pollutants due to the transfer of cargo, fuel, or passengers; 3. Transferring garbage ashore for disposal; and 4. Awareness of the function of the following: <ol style="list-style-type: none"> a. Marine Sanitation Device (MSD); b. Oily-water separator and bilge cleanliness; c. Ballast water management; d. Incinerator; e. Emission controls; and f. Vessel General Permit (VGP). <p><i>This assessment is also satisfied if the candidate has completed assessment no. 9.1.B for Able Seafarer-Engine.</i></p>

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7.2.A	Apply precautions and contribute to the prevention of pollution of the marine environment	Knowledge of use and operation of anti-pollution equipment/agents	On board a vessel, or in a laboratory or workshop,	the candidate describes the location and use of anti-pollution equipment aboard ship.	<p>The candidate's description includes:</p> <ol style="list-style-type: none"> 1. Sorbents aboard the ship and the types of spills that the sorbents are effective on; 2. Booms aboard the ship and the types of spills that the booms are effective on; 3. Plugs, caps, flanges, and other equipment that can be used to stop leaks in the cargo, ballast, bunker, etc. systems. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 9.2.A for Able Seafarer-Engine.</i></p>
7.3.A	Apply precautions and contribute to the prevention of pollution of the marine environment	Knowledge of approved methods for disposal of marine pollutants	On board a vessel, or in a laboratory or workshop,	the candidate identifies and describes the expected types of waste generated by a pollution incident and describes the proper way to dispose of the waste.	<p>The candidate's description includes:</p> <ol style="list-style-type: none"> 1. Contaminated rags; 2. Contaminated booms; 3. Garbage; 4. Damaged drums; 5. Contaminated sorbents; and 6. Other contaminated material specific to the type of vessel the assessment is performed on. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 9.3.A for Able Seafarer-Engine.</i></p>

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8.1.A	Apply occupational health and safety procedures	Working knowledge of safe working practices and personal shipboard safety including electrical safety	On board a vessel, or as part of a practical demonstration in a laboratory or workshop,	the candidate describes and applies electrical safety procedures to safeguard personnel and the vessel.	<p>The candidate's description includes:</p> <ol style="list-style-type: none"> 1. Observing all pertinent instructions and electric warning signs aboard ship; 2. Observing all safety precautions regarding portable electric lights and tools; 3. Not touching or operating any device that has a tag attached; 4. Not touching bare electric wires or connections and assuming all circuits to be live; 5. Not removing explosion proofing globes from lighting fixtures; 6. Not using electric cable runs to hoist or support any weight; 7. Not using the wire ways for storage; 8. Not permitting water to get into electrical equipment; 9. Avoiding severe burns and damage to equipment and clothing caused by electrolyte from storage batteries; 10. Having an electrician disconnect the circuit and tag it as out of commission when working on electrical motors or other equipment; 11. Not starting or operating electrical equipment when flammable vapors are present; and 12. Reporting damaged electrical equipment or wiring to your superior. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 10.1.A for Able Seafarer-Engine.</i></p>

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8.2.A	Apply occupational health and safety procedures	Working knowledge of safe working practices and personal shipboard safety including lockout/tagout procedures	On a vessel or as part of a practical demonstration in a laboratory or workshop, given the indicated equipment,	the candidate performs lockout/tagout procedures in accordance with good engineering principles.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Identifies the equipment to be locked out; 2. Locks and tags out equipment using approved methods, including logging; 3. Informs the first assistant or watch engineer that equipment is locked and tagged; and 4. Gives appropriate notice of removal of lock/tag when work is completed. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 10.2.A for Able Seafarer-Engine.</i></p>
8.3.A	Apply occupational health and safety procedures	Working knowledge of safe working practices and personal shipboard safety including mechanical safety	On a vessel or as part of a practical demonstration in a in a laboratory or workshop, given the indicated equipment,	the candidate describes and applies mechanical safety.	<p>The candidate describes mechanical hazards and safe working practices and safely uses the following:</p> <ol style="list-style-type: none"> 1. Portable tools; 2. Hand tools; 3. Rotating machinery; 4. Galley equipment; and 5. Cargo securing gear. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 10.3.A for Able Seafarer-Engine.</i></p>

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8.4.A	Apply occupational health and safety procedures	Working knowledge of safe working practices and personal shipboard safety including permit to work systems	On a vessel or as part of a practical demonstration in a laboratory or workshop,	the candidate describes and applies safe working practices and personal shipboard safety including permit to work systems.	<p>The candidate describes procedures for and spaces that require a permit to work, including:</p> <ol style="list-style-type: none"> 1. Hot work; 2. Confined spaces; and 3. Other policies that require a permit to work, such as working aloft and working over the side. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 10.4.A for Able Seafarer-Engine.</i></p>
8.5.A	Apply occupational health and safety procedures	Working knowledge of safe working practices and personal shipboard safety including working aloft	On a vessel or as part of a practical demonstration in a laboratory or workshop, given the indicated equipment,	the candidate describes and applies safe working practices and personal shipboard safety when working aloft.	<p>The candidate describes the proper preparations for going aloft, including:</p> <ol style="list-style-type: none"> 1. Notifying the appropriate officer in accordance with company procedures; 2. Confirming that equipment that may create a hazard has been turned off and tagged accordingly; 3. Confirming that the ship's motion and weather conditions will remain within safe limits; 4. Using safety equipment and checking it for operational integrity; 5. Cordoning off and placarding the area below; 6. Attaching lanyards to tools, if practical; 7. Reading safety placards in the area and taking appropriate actions; 8. Completing any required permits; and 9. Notifying appropriate personnel. <p><i>This assessment is also satisfied if the candidate has completed assessment no. 10.5.A for Able Seafarer-Engine.</i></p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence in Section A-III/7 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 12.601(b)(1)(i), alternative Assessment Guidelines must be approved by the National Maritime Center before use.