

4. BACKGROUND.

- a. The STCW Convention and STCW Code set forth standards for training and certification for merchant mariners, including mariners serving as OICEW.
- b. In order to implement the 1995 amendments to STCW, the Coast Guard published NVIC 09-04 providing guidance on how mariners may qualify for endorsements as OICEW.
- c. The International Maritime Organization (IMO) amended the STCW Convention and STCW Code on June 25, 2010. These amendments entered into force for all ratifying countries, including the United States, on January 1, 2012.
- d. The Convention is not self-implementing; therefore, the U.S., as a signatory to the STCW Convention, initiated regulatory changes to ensure full implementation of the amendments to the STCW Convention and STCW Code. The U.S. implements these provisions under the Convention and under the authority of United States Code, Titles 33 and 46. The Coast Guard published a final rule in the Federal Register on December 24, 2013 (78 FR 77796) that implements the STCW Convention and STCW Code, including the 2010 amendments. This rule became effective on March 24, 2014. The Coast Guard is publishing this NVIC to provide guidance on complying with the new regulations and is cancelling previous policy. Accordingly, this NVIC supersedes NVIC 09-04.

5. DISCUSSION.

- a. Policy regarding the endorsement as OICEW is located in this NVIC. Enclosure (1) discusses specific requirements for this endorsement. Enclosure (2) contains the national assessment guidelines for OICEW. Enclosure (3) may be used to record completion of assessments. Enclosure (4) provides relevant excerpts from the STCW Convention and STCW Code.
- b. STCW Regulation III/1, paragraph 2.3, states that candidates for an OICEW endorsement must have performed duties associated with engine-room watchkeeping. Many U.S.-flag vessels are fitted with automated engine rooms where engine department personnel work as day-workers. Service, training, and experience gained by engine department day-workers on vessels with automated engine rooms will be acceptable towards meeting the minimum service required for an endorsement as OICEW.
- c. When assessing demonstrations of skills, Qualified Assessors (QAs) are encouraged to use the guidelines in Enclosure (2) or an approved alternative. Shipboard QAs may make minor changes to the assessments in Enclosure (2) to reflect differences in shipboard equipment and operating procedures. QAs may not make other changes unless prior approval is given by the National Maritime Center (NMC) (46 CFR 11.301(a)(1)(i)).

- d. Training institutions applying for approval of a course or program that leads to an endorsement as OICEW should state that the guidelines in Enclosure (2) will apply, or provide the guidelines it proposes to use. However, under 46 CFR 10.402(e), training institutions must submit any deviations from these guidelines to the Coast Guard for approval before use.
 - e. When applying for an endorsement as OICEW, mariners need only submit the completed Enclosure (3), Record of Assessment or equivalent evidence of demonstration of competency, to the Coast Guard. The Coast Guard recommends that the applicant retain a copy of Enclosure (3), or equivalent evidence of demonstration of competency, for his or her records.
 - f. NVIC 09-04 was never put into practice as was other guidance promulgated to assist mariners in qualifying for similar STCW endorsements. NVIC 09-04 was never utilized by the public or the Coast Guard. Actual practice has not required assessments for those qualifying for OICEW. As such, we do not expect there to be any grandfathering issues directly related to superseding NVIC 09-04.
6. DISCLAIMER. This guidance is not a substitute for applicable legal requirements, nor is it itself a regulation. It is not intended to nor does it impose legally-binding requirements on any party. It represents the Coast Guard's current thinking on this topic and is issued for guidance purposes to outline methods of best practice for compliance to the applicable law. You can use an alternative approach if the approach satisfies the requirements of the applicable statutes and regulations.
7. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS.
- a. The development of this NVIC and the general policies contained within it have been thoroughly reviewed by the originating office, and are categorically excluded (CE) under current USCG CE # 33 from further environmental analysis, in accordance with Section 2.B.2. and Figure 2-1 of the National Environmental Policy Act Implementing Procedures and Policy for Considering Environmental Impacts, COMDTINST M16475.1 D. Because this NVIC implements, without substantive change, the applicable Commandant Instruction or other federal agency regulations, procedures, manuals, and other guidance documents, Coast Guard categorical exclusion #33 is appropriate.
 - b. This NVIC will not have any of the following: significant cumulative impacts on the human environment; substantial controversy or substantial change to existing environmental conditions; or inconsistencies with any Federal, State, or local laws or administrative determinations relating to the environment.
8. RECORDS MANAGEMENT CONSIDERATIONS. This NVIC has been thoroughly reviewed during the directives clearance process, and it has been determined there are no further records scheduling requirements, in accordance with Federal Records Act, 44 U.S.C. 3101 et seq., National Archives and Record Administration requirements, and Information and Life Cycle Management Manual, COMDTINST M5212.12 (series). This

policy does not create a significant or substantial change to existing records management requirements.

9. **QUESTIONS.** All questions regarding implementation of this Circular should be directed to the Mariner Credentialing Program Policy Division (CG-CVC-4), at (202) 372-2357 or MMCPolicy@uscg.mil. To obtain approval for an alternative to the assessments described in Enclosure (2), contact the NMC at (888) 427-5662 or IAskNMC@uscg.mil.



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- Encl: (1) Discussion of Qualification Requirements for Officer in Charge of an Engineering Watch in a Manned Engineeroom or Designated Duty Engineer in a Periodically Unmanned Engineeroom on Vessels Powered by Main Propulsion Machinery of 750 kW/1,000 HP Propulsion Power or More
- (2) Assessment Guidelines for Officer in Charge of an Engineering Watch in a Manned Engineeroom or Designated Duty Engineer in a Periodically Unmanned Engineeroom on Vessels Powered by Main Propulsion Machinery of 750 kW/1,000 HP Propulsion Power or More
- (3) Record of Assessment for an Officer in Charge of an Engineering Watch in a Manned Engineeroom or Designated Duty Engineer in a Periodically Unmanned Engineeroom on Vessels Powered by Main Propulsion Machinery of 750 kW/1,000 HP Propulsion Power or More
- (4) Excerpts from STCW Convention and STCW Code

DISCUSSION OF QUALIFICATION FOR STCW ENDORSEMENT AS OFFICER IN CHARGE OF AN ENGINEERING WATCH IN A MANNED ENGINE ROOM OR DESIGNATED DUTY ENGINEER IN A PERIODICALLY UNMANNED ENGINE ROOM ON VESSELS POWERED BY MAIN PROPULSION MACHINERY OF 750 KW/1,000 HP PROPULSION POWER OR MORE (OPERATIONAL LEVEL)

1. GENERAL. This enclosure provides guidance to qualify for an International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978, as amended (STCW) as Officer in Charge of an Engineering Watch in a Manned Engine room or Designated Duty Engineer in a Periodically Unmanned Engine room on Vessels Powered by Main Propulsion Machinery Of 750 kW/1,000 HP Propulsion Power or More (OICEW) in accordance with Section A-III/1 of the STCW Code and 46 Code of Federal Regulations (CFR) 11.329.
2. SEA SERVICE, TRAINING, AND DEMONSTRATIONS.
 - a. In accordance with 46 CFR 11.329(a) and paragraph 2.2 through 2.5 of STCW Regulation III/1, an applicant for an STCW endorsement as OICEW shall be not less than 18 years of age and must provide satisfactory evidence of the following:
 - 1) Service as follows:
 - i) Thirty-six months of seagoing service in the engine department; or
 - ii) Successful completion of an approved training program that includes a combination of workshop skills training and seagoing service of not less than 12 months, and that meets the requirements of Section A-III/1 of the STCW Code;
 - 2) Having performed during the required seagoing service, engine room watchkeeping duties, under the supervision of an officer holding the STCW endorsement as Chief Engineer Officer or as a qualified engineer officer, for a period of not less than 6 months. Since many vessels do not have manned engine rooms, performance of duties associated with engine room maintenance may be substituted for performance of engine room watchkeeping duties;
 - 3) Meeting the standard of competence specified in Section A-III/1 of the STCW Code. This may be done by completing the assessments in Enclosure (s) or an approved alternative; and
 - 4) Having satisfactorily completed approved training in the following subject areas:
 - i) Medical First-Aid Provider;
 - ii) Basic and Advanced Firefighting;
 - iii) Proficiency in Survival Craft and Rescue Boats Other Than Fast Rescue Boats;

- iv) Engine-Room Resource Management (ERM);
 - v) Engineering Terminology and Shipboard Operations;
 - vi) Auxiliary Machinery;
 - vii) Gas Turbine Plants, to be valid for gas turbine propulsion;
 - viii) Motor Plants, to be valid for motor propulsion;
 - ix) Steam Plants, to be valid for steam propulsion;
 - x) Electrical Machinery and Basic Electronics; and
 - xi) Control Systems.
- b. An applicant for an OICEW endorsement without limitation should complete every assessment in Enclosure (2). This will allow service as an OICEW on any steam, motor, or gas turbine vessel. An applicant for an endorsement as OICEW limited to service on vessels of a specific propulsion mode or vessels without certain equipment systems need not complete assessments that are not applicable to the propulsion modes or systems for which the endorsement will be valid. Applicability of individual assessments to propulsion modes and systems is noted in Enclosure (2). Not performing certain assessments will limit the endorsement to service on vessels of specific propulsion modes and/or vessels that are not equipped with certain equipment or auxiliary systems.
- c. To qualify for an STCW endorsement as OICEW, mariners must provide evidence of meeting the standard of competence for Basic Training (BT) (46 CFR 11.302) and Advanced Firefighting (46 CFR 11.303).
- d. Experience gained in the deck department may be creditable for up to 3 months of the service requirements in paragraph (2)(a)(1)(i) of this enclosure (46 CFR 11.329(b)).
- e. The total days of workshop skills training in an approved training program credited towards the 12-month service requirement, in paragraph (2)(a)(1)(ii) of this enclosure, should not exceed 180 days. Proof of completion of workshop skills training may be provided with documentation of successful completion of assessments or certificate of completion from an approved training program, school, or facility (46 CFR 11.301(a)). Workshop skills training may include, but is not limited to, shore-based laboratories, in-port watchkeeping and/or maintenance, engine room simulator and/or internships in an appropriate field of study (shipyards, power generating station, or facilities where mechanical and electrical systems have to be operated, maintained, and managed).
- f. The assessments in Enclosure (2) should be performed on a vessel of at least 1,000 HP/750 kW with a walk-in engine room (manned or periodically unmanned), generators independent of the main engine, and other independent auxiliaries.
- g. At least one-third of the required seagoing service should have been performed on vessels with each propulsion mode (steam, motor, or gas turbine) the endorsement will be valid for. If at least one-third of the service is not obtained on a given propulsion mode, the OICEW endorsement will not be valid for that mode of propulsion (46 CFR 11.502).

- h. Since many vessels do not have manned engine rooms, experience with engine room maintenance which includes duties under the direct supervision of the Chief Engineer, Second Engineer Officer/First Assistant Engineer, and/or the officer in charge of the watch may be substituted for watch keeping experience.

3. GRANDFATHERING AND TRANSITION PROVISIONS.

- a. Mariners who began training or service for an endorsement as OICEW before March 24, 2014, will not be required to provide assessments until January 1, 2017. Mariners who began the service or training for their endorsement after March 24, 2014, must provide evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code by completion of the assessments in Enclosure (2), or an approved equivalent alternative.
- b. Until December 31, 2016, training specified in 46 CFR 11.329(a)(3) is not required for mariners who began their service or training for the OICEW endorsement before March 24, 2014. A mariner will be considered to have started service on the first day of their service that meets the requirements for the OICEW endorsement. Training is considered to have started on the first day of training that results in the issuance of an OICEW endorsement.
- c. For the endorsement to be valid on or after January 1, 2017, mariners must satisfactorily complete ERM training and meet the standard of competence in Leadership and Teamwork Skills (46 CFR 11.329(c)).

4. RENEWAL OF ENDORSEMENT.

- a. To be valid on or after January 1, 2017, in addition to the general qualification requirements found in 46 CFR 10.227 to renew a Merchant Mariner Credential, each candidate for a renewal of an STCW endorsement as OICEW must provide evidence of the following:
 - 1) Having satisfactorily completed ERM training and meeting the standard of competence in Leadership and Teamworking Skills as specified in 46 CFR 11.329(c) (if not previously met); and
 - 2) Maintaining the standard of competence in the following areas:
 - i) Basic Training as specified in 46 CFR 11.302(b); and
 - ii) Advanced Firefighting as specified in 46 CFR 11.303(b).
- b. Assessments are not required for renewal of this endorsement.
- c. Should a mariner renew an STCW endorsement as OICEW before January 1, 2017 and not provide evidence of completing training in ERM and meeting the standard of competence in Leadership and Team-Working Skills specified in 46 CFR 11.329(c), the credential will receive a limitation indicating that it is not valid after December 31, 2016.

Assessment Guidelines for Officer in Charge of an Engineering Watch in a Manned Engine-Room or Designated Duty Engineer in a Periodically Unmanned Engine-Room on Vessels Powered by Main Propulsion Machinery of 750 kW/1,000 HP Propulsion Power or More

Standard of Competence

Mariners who began training or service for endorsements as Officer in Charge of an Engineering Watch in a Manned Engine-Room or Designated Duty Engineer in a Periodically Unmanned Engine-Room on Vessels Powered by Main Propulsion Machinery of 750 kW/1,000 HP Propulsion Power or More (OICEW) before March 24, 2014, will not be required to provide assessments until January 1, 2017. Mariners who began the service or training for their endorsement after March 24, 2014, must provide evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code by completion of the assessments in this enclosure, or an approved equivalent alternative. After December 31, 2016, all mariners must provide evidence of having achieved the required standard of competence specified in Section A-III/1 of the STCW Code (46 CFR 11.329(a)(3)). The table below is adopted from Table A-III/1 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 shipboard installations did 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 qualified assessor 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/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 National Maritime Center to conduct the assessment (46 CFR 10.405).

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Notes

The following notes are used in the “Task No.” column of the assessment table that follows:

- All* The assessment is required for all OICEW endorsements regardless of any limitations for propulsion mode and/or vessel equipment.
- Note 1* A candidate who does not perform this task will receive an endorsement that is not valid for steam vessels.
- Note 2* A candidate who does not perform this task will receive an endorsement that is limited to motor and/or gas-turbine propelled vessels without distilling plants.
- Note 3* A candidate who does not perform this task will receive an endorsement that is limited to motor and/or gas-turbine propelled vessels without waste-heat or auxiliary boilers.
- Note 4* A candidate who does not perform this task will receive an endorsement that is not valid for gas-turbine propelled vessels.
- Note 5* A candidate who does not perform this task will receive an endorsement that is not valid for motor vessels.
- Note 6* A candidate who does not perform this task will receive an endorsement that is not valid for motor or gas-turbine propelled vessels.
- Course* The candidate demonstrates the KUP by successfully completing approved or accepted course.
- Exam* The candidate demonstrates the KUP by completing the written examination for the associated national officer endorsement.

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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 Officer in Charge of an Engineering Watch in a Manned Engine-Room or Designated Duty Engineers in a Periodically Unmanned Engine-Room on Vessels Powered by Main Propulsion Machinery of 750 kW/1,000 HP Propulsion Power or More

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.A <i>All</i>	Maintain a safe engineering watch	Thorough knowledge of principles to be observed in keeping an engineering watch, including: .1 Duties associated with taking over and accepting a watch	On a vessel of at least 1,000 HP at sea, on a simulator, or in a laboratory,	the candidate conducts an inspection of machinery spaces before taking over the engine room watch.	The candidate: 1. Correctly determines, describes, and reports the status or condition of the main and auxiliary machinery (including fuel, feed water, and exhaust systems), control systems, indicating panels, and communication systems; 2. Correctly determines, describes, and reports the status and condition of the steering system and all associated gear; 3. Correctly determines, describes, and reports the condition of the bilges with respect to water level and contamination; and 4. Takes proper action to prevent safety and pollution violations.

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.B <i>Note 5</i>	Maintain a safe engineering watch	Thorough knowledge of principles to be observed in keeping an engineering watch, including: Routine duties undertaken during a watch	On a motor vessel of at least 1,000 HP at sea, on a simulator, or in a laboratory,	the candidate assumes and keeps the engineering watch in accordance with STCW Code (A-VIII/2 part 3-2), describing each step as executed and makes all necessary inspections and site visits required to understand and verify the status of the watch and machinery.	The candidate: <ol style="list-style-type: none"> 1. Reads and understands all standing orders and special instructions; 2. Identifies work being performed, and identifies and describes personnel involved and potential hazards in the engine room; 3. Conducts a complete round of the plant, inspecting all lubricating-oil levels and adding lube-oil as necessary; 4. Records pertinent system, equipment and machinery pressures and temperatures; 5. Ensures that: <ol style="list-style-type: none"> a. The water level in the freshwater expansion tank for main and auxiliary engine is half-full; b. The level or capacity in the settler and day tank; c. The level or capacity in main engine lube-oil, auxiliary engine lube-oil, and lube-oil storage tank; d. The auxiliary boiler steam pressure and temperature, forced draft fan pressure, uptake pressure and temperature, fuel-oil and feed booster pump discharge pressures, waste heat boiler steam pressure and temperature; e. The level or capacity in the potable and distilled-water tanks; f. Refrigeration compressor suction and discharge pressures and temperatures and thaw, meat, freeze, vegetable, and dairy box temperatures are recorded; g. Air conditioning compressor suction and discharge pressures and temperatures, chill water cooler circulating pump discharge pressure, and outlet and return temperatures are recorded; h. Potable water and sanitary systems hydro-pneumatic tank water level is at half-full and the air charge is at recommended levels; <p style="text-align: right;"><i>Continued on next page</i></p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.B <i>Continued</i> <i>Note 5</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ul style="list-style-type: none"> i. Potable water and sanitary systems hydro-pneumatic tank water level is at half-full and the air charge is at recommended levels; j. Ship service air compressor lube-oil level is within the normal range, recording the ship service system air compressor air discharge temperature and cooling water inlet/outlet temperatures and air flask pressure; k. The moisture from the ship service system air compressor intercooler, air moisture separating device, and air flasks/receiver are drained; l. The generator amps, kVA, and frequency are inspected; m. Lube-oil centrifuge oil is at the recommended input temperature and output pressure; n. Waste-oil tank level is inspected and that he/she has used the lube-oil centrifuge to transfer contents; o. Freshwater generator, saltwater cooling and air conditioning /refrigeration system saltwater supply pump discharge pressures are inspected; p. Sea temperature; is recorded; q. Bilge-water holding tank soundings are recorded; r. Stern-tube supply pump discharge pressure and temperature are at recommended levels; s. He/she has provided "air on deck", posting a notice on the engine room status board; t. He or she has de-watered the engine-room and cargo-hold bilge wells according to level, draft, and heel of the vessel; u. When directed, he/she has provided "water on deck" by preparing and starting the main fire pump; and v. All required entries have been appropriately made in the engine room log book; <p>6. Answers maneuvering orders in engine-room control; and</p> <p>7. Takes proper action to prevent safety and pollution violations.</p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.C <i>Note 1</i>	Maintain a safe engineering watch	Thorough knowledge of principles to be observed in keeping an engineering watch, including: .2 Routine duties undertaken during a watch	On a steam vessel of at least 1,000 HP at sea, on a simulator, or in a laboratory,	the candidate assumes and keeps the engineering watch in accordance with STCW Code Section A-VIII/2 part 3-2, describing each step as executed and making all necessary inspections and site visits required to understand and verify the status of the watch and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Reads and understands all standing orders and special instructions; 2. Identifies all work being performed and identifies and describes personnel involved and potential hazards in the engine room; 3. Conducts a complete periodic round of the plant, inspecting all equipment, machinery lubricating-oil levels and adding lube-oil as necessary; 4. Records all pertinent system, equipment and machinery pressures and temperatures during the watch; 5. Inspects and records: <ol style="list-style-type: none"> a. The level in the fuel oil settling tank; b. The level in main engine lube-oil sump, ship's service turbo generator sump, and lube-oil storage tank; c. The main boiler steam pressures and temperatures, forced draft fan pressures, uptake pressure and temperature, fuel-oil and feed pump discharge pressures, de-aerating feed tank pressure and temperature; condensate temperature, bleed steam pressures, etc; d. The available potable, make-up feed, and reserved feedwater tanks; e. Refrigeration compressor suction and discharge pressures and temperatures; and thaw, meat, freeze, vegetable, and dairy box temperatures; f. Air conditioning compressor suction and discharge pressures and temperatures, chill water cooler circulating pump discharge pressure, and outlet and return temperatures; <p style="text-align: right;"><i>Continued on next page</i></p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.C <i>Continued</i> <i>Note 1</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ul style="list-style-type: none"> g. That the potable water and sanitary systems hydro-pneumatic tanks water level are at half-full and the air charge is at the recommended pressure with the pump cycled off; h. That the ship service system and control air compressor lube-oil levels are within the normal range on the dipstick, recording the each compressed air system pressure; i. That the moisture from the compressed air systems moisture separating device and air receivers are drained; j. Generator amps, kVA, and frequency; k. Lube-oil centrifuge oil input pressure and temperature; l. Waste-oil tank level; m. Saltwater evaporator feed, saltwater cooling and air conditioning/refrigeration system saltwater supply pump discharge pressures, if so equipped; n. Sea temperature; o. Bilge-water holding tank has been sounded and recorded; p. Stern-tube supply pump discharge pressure and temperature; q. That the engine-room and cargo-hold bilge wells have been de-watered according to level, draft, and heel of the vessel; and r. That all required entries have been appropriately made in the engine room log book; <p>6. Answers maneuvering orders while in engine-room control mode; and</p> <p>7. Takes proper action to prevent safety and pollution violations.</p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.D <i>Note 4</i>	Maintain a safe engineering watch	Thorough knowledge of principles to be observed in keeping an engineering watch, including: .2 Routine duties undertaken during a watch	On a gas-turbine vessel of at least 1,000 HP at sea, on a simulator, or in a laboratory,	the candidate assumes and keeps the engineering watch in accordance with STCW Code (A-VIII/2 part 3-2), describing each step as executed and making all necessary inspections and site visits required to understand and verify the status of the watch and machinery.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Reads and understands all standing orders and special instructions and descriptions to the assessor are correct, complete, and indicate a clear understanding of the duties involved; 2. Identifies all work being performed on machinery and systems, and identifies and describes personnel involved and potential hazards in the engine room to the assessor completely and correctly with watch implications clearly explained; and 3. Conducts a complete round of the plant, inspecting all equipment, machinery lubricating-oil levels, adding lube-oil as necessary, and recording all pertinent system, equipment and machinery pressures and temperatures, during the watch, including: <ol style="list-style-type: none"> a. Checking plant's operational status; b. Checking gas-generator RPM; c. Checking gas generator vibration; d. Checking gas generator inlet temperature and pressure; e. Checking power turbine rpm; f. Checking power turbine inlet temperature and Checking ; g. Checking power turbine vibration; h. Checking power turbine exhaust temperature; i. Checking gas turbine bearings' temperature and oil flow; j. Checking governor, turbine/reduction gear lube-oil sump levels; k. Checking the physical condition of pipes, tubing, and hoses for wear or leaks; l. Observing gas turbine lube-oil supply and scavenging temperatures; <p style="text-align: right;"><i>Continued on next page</i></p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.D <i>Continued</i> <i>Note 4</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ul style="list-style-type: none"> m. Observing gas turbine air intake and exhaust temperatures and pressures, including air-intake filter pressure drop, as appropriate; n. Checking start air pressure; o. Reading and recording fuel-oil meter and day-tank levels; p. Observing and recording the sea temperature; q. Sounding and recording the bilge-water holding tank; r. Observing the stern-tube supply pump discharge pressure and temperature; s. Checking or any unusual conditions or noises; t. Notifying the watch engineer of any unusual or unsafe conditions; u. Taking proper action to prevent safety and pollution violations; v. Ensuring that the engine-room and cargo-hold bilge wells have been de-watered according to level, draft, and heel of the vessel; w. Ensuring that all required entries have been appropriately made in the engine room log book; and <p>4. Answers maneuvering orders while in engine-room control mode.</p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.1.E <i>All</i>	Maintain a safe engineering watch	Thorough knowledge of principles to be observed in keeping an engineering watch, including: Maintenance of the machinery space logs and the significance of the readings taken	On a vessel of at least 1,000 HP at sea or on a simulator,	the candidate maintains engine room logs and demonstrates understanding of the significance of the readings.	The candidate: 1. Makes a round of the engine room and notes pressure and temperature readings; 2. Enters this data in respective fields in engine room logs; 3. Notes the acceptable range of all of the readings; and 4. Explains the reasoning behind the range.
1.1.F <i>All</i>	Maintain a safe engineering watch	Thorough knowledge of Principles to be observed in keeping an engineering watch, including: Duties associated with handing over a watch	On a vessel of at least 1,000 HP at sea, on a simulator, or in a laboratory,	the candidate demonstrates duties associated with handing over a watch.	The candidate provides the following information to the relieving watch officer prior to going off his/her watch: 1. Operational status of the plant; 2. Unusual alarms or conditions occurring during the previous watch; 3. Standing orders; 4. Maintenance performed during the previous watch; and 5. On-going repairs affecting plant operations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.2.A <i>All</i>	Maintain a safe engineering watch	Safety and emergency procedures; change-over of remote/automatic to local control of all systems	On a vessel of at least 1,000 HP, on a simulator, or in a laboratory or workshop, or in an approved or accepted course,	the candidate properly and safely changes systems from remote/automatic to local control.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Checks the operational status of all operating machinery, 2. Checks pressures, temperatures, speed, and flow of the equipment being changed; 3. Follows the manufacturers recommendations, changes control from remote to local; 4. Re-checks all pressures, temperatures, speed, flows for changes; and 5. Re-checks operational status of all operating machinery. <p><u>Main Propulsion Throttle Control</u></p> <ol style="list-style-type: none"> 1. Changes-over the main propulsion throttle control from bridge control to engine room control and verifies proper operation of the throttle; and 2. Changes-over the main propulsion throttle control from engine room control to the emergency maneuvering station and verifies proper operation of the throttle. <p><u>Combustion Control System</u></p> <ol style="list-style-type: none"> 1. Initiates a "bumpless" transfer of the boiler master steam pressure control from auto to manual; and 2. Maintains operating steam pressure through manual operation of the fuel oil regulating valve and forced draft fan controls. <p><u>Feedwater Regulating System</u></p> <ol style="list-style-type: none"> 1. Initiates a "bumpless" transfer of the feedwater regulating system control from auto to manual; and 2. Maintains correct operating water level through manual operation of the feedwater valve. <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.2.A <i>All</i>	Maintain a safe engineering watch	Safety and emergency procedures; change-over of remote/automatic to local control of all systems	On a vessel of at least 750 kW / 1,000 HP, on a simulator, or in a laboratory or workshop, or in an approved or accepted course,	the candidate properly and safely changes systems from remote/automatic to local control.	<p><i>Continued from previous page</i></p> <p><u>Cooling Water Systems</u></p> <ol style="list-style-type: none"> 1. Transfers plant cooling systems from remote/automatic to local manual control; and 2. Maintains correct operating temperatures through manual regulation of the respective cooling water system. <p><u>Bilge, Ballast, and Firemain System</u></p> <ol style="list-style-type: none"> 1. Demonstrates the procedure to transfer bilge, ballast, & FM System from remote/automatic to local manual control; 2. Operates fire pump locally to verify proper operation; 3. Operates bilge pump locally to verify proper operation; and 4. Operates ballast pump locally to verify proper operation.
1.3.A <i>All</i>	Maintain a safe engineering watch	Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil system	On a vessel of at least 1,000 HP, on a simulator, or in a laboratory or workshop,	the candidate demonstrates the ability to identify and respond to each of the following alarms: <ol style="list-style-type: none"> a. Low lube-oil pressure; b. Boiler low-water; c. High lube-oil temperature; d. General Alarm; e. Steering gear. 	For each alarm, the candidate: <ol style="list-style-type: none"> 1. Correctly identifies the alarm; 2. Correctly acknowledges the alarm; 3. Correctly confirms the alarm condition; 4. Ensures that timely action is taken to correct the indicated alarm condition; 5. Clears the alarm when corrective actions have been taken; and 6. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.3.B <i>All</i>	Maintain a safe engineering watch	Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil system	On a vessel of at least 1,000 HP, on a simulator, or in a laboratory or workshop, or in an approved or accepted course,	the candidate demonstrates the immediate actions to be taken in the event of fire.	The candidate: <ol style="list-style-type: none"> 1. Determines that a fire has occurred and identifies the type of fire; 2. Activates the fire/general alarm; 3. Notifies the bridge of the particulars of the fire; 4. Takes action to contain the fire; and 5. Takes proper action to extinguish the fire.
1.3.C <i>All</i>	Maintain a safe engineering watch	Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil system	On a vessel of at least 1,000 HP, on a simulator, or in a laboratory or workshop, or in an approved or accepted course,	the candidate demonstrates the immediate actions to be taken in the event of an accident.	The candidate: <ol style="list-style-type: none"> 1. Determines that an accident has occurred and identifies the type of accident; 2. Activates the general alarm; 3. Notifies the bridge of the particulars of the accident; 4. Takes action to administer first aid, if necessary; 5. Attempts to isolate the affected system, if safe to do so; and 6. Remains on the scene until help arrives.
1.3.D <i>All</i>	Maintain a safe engineering watch	Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil system	On a vessel of at least 1,000 HP, on a simulator, or in a laboratory or workshop, or in an approved or accepted course,	the candidate demonstrates the immediate actions to be taken in the event of an oil system fire or accident.	The candidate: <ol style="list-style-type: none"> 1. Determines that an oil system fire has occurred; 2. Attempts to isolate the affected system, if it is safe to do so; 3. Activates the fire/general alarm; 4. Notifies the bridge of the particulars of the fire; 5. Takes action to contain the fire; and 6. Takes proper action to extinguish the fire.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
1.4.A <i>All Course</i>	Maintain a safe engineering watch	Engine-room resource management Knowledge of engine-room resource management principles	In an approved or accepted course,	the candidate demonstrates knowledge of engine-room resource management principles.	The candidate: 1. Identifies the various crew member resources available in the engine room; 2. Explains how to communicate with engine crew members normally as well as in case of emergency; 3. Explains engine room activities on a routine basis; 4. Demonstrates reactions under varying emergency scenarios such as flooding of bilges, pipes bursting etc.; 5. Appropriately responds and challenges questionable decisions and/or actions; 6. Demonstrates effective leadership behavior; and 7. Shares, as a team member, accurate understanding of current and predicted engine room and associated systems state, and of external environment.
2.1.A <i>All Exam</i>	Use English in written and oral form	Adequate knowledge of the English language to enable the officer to use engineering publications and to perform engineering duties	This competency is demonstrated by successful completion of the written examination for a corresponding national officer endorsement.		

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
3.1.A <i>All</i>	Use internal communication systems	Operation of all internal communication systems on board	On a vessel of at least 1,000 HP, on a simulator, or in a laboratory,	the candidate demonstrates the ability to test internal communications, (e.g., sound powered phone, portable radio), engine order telegraph, alarm systems, and ship's whistle.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Within the required time prior to Standby, coordinates with the officer in charge of the navigation watch the time at which the steering gear will be tested; 2. Uses the engine-room phone to notify the bridge that the engine department is ready to test the gear; 3. Responds to movement of the engine room telegraph, notifies bridge of any discrepancies, and logs them in the engine room log book; 4. Responds to notification from the bridge of any failures encountered during testing of the ship's sound signals; 5. Asks the bridge to sound the ship's whistle; 6. Telephones the senior engineer in the steering-gear room when the bridge makes notification that it is ready to test the steering gear; 7. Assists the senior engineer in contacting the navigation bridge when ready to test the steering gear; 8. During testing of the steering gear, observes the "run" indicator lights and power failure alarms and makes note that they are functional; 9. Receives the report from the bridge that the testing of the ship's internal communications, whistle, engine order telegraph, and steering gear have been completed; 10. Makes an entry in the engine room log book noting the time all gear was tested; and 11. Prepares the engine-room bell log, if applicable, noting the time that all gear was tested.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.1.A <i>All</i>	Operate main and auxiliary machinery and associated control systems	Basic construction and operation principles of machinery systems,	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate demonstrates understanding of basic construction and operating principles of engine room and deck equipment.	The candidate reads drawings and instructions and describes the construction and operating mechanisms of all engine room and deck equipment, including control systems.
4.1.B <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Basic construction and operation principles of machinery systems,	On a steam vessel of at least 1,000 HP, on a simulator, or in a laboratory,	the candidate prepares and lights off a main propulsion boiler (assuming other boiler is in operation.).	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Visually inspects the boiler to ensure that boiler firesides and watersides are properly closed up and that all manholes, hand holes, and access plates are properly secured; 2. Wipes up any oil accumulations in the furnace or air casing; 3. Checks closed bottom and surface blow valves; waterwall and economizer header drain valves; chemical feed and main and auxiliary feed stop check valves; main and auxiliary and soot blower steam stop valves, and the gauge glass drain valve; 4. Checks open the steam drum vent valve; superheater drain and vent valves; gauge glass cutoff valves; instrument and gauge root valves; and the feedwater stop valves; 5. Vents the economizer; close valve when water evident at vent; 6. Brings the boiler water level to 1 inch from the bottom of the gauge glass, filling or draining the boiler as necessary and makes sure to verify the ability to feed the boiler; 7. Blows down the boiler water level gauge glass to insure accuracy, leaving several inches of water in the glass; <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.1.B <i>Continued</i> <i>Note 1</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 8. Visually inspects the boiler and checks for water leaks; 9. Eases off on all steam stop valves and re-closes them hand tight; 10. Inspects and cleans all fuel oil strainers and ensures atomizers are made up with clean tips; 11. Ensures the air register doors operate freely; 12. Inserts a burner with small size tip into burner tube; 13. Starts forced draft fan, adjust damper, open register(s), and purges the furnace; 14. Ensures burner fuel oil root valves are closed; opens recirculating valve; 15. When fuel oil reaches proper temperature, reduces purging air volume and uses a torch or electric igniter to light burner; 16. Watches rise in steam drum water level and feeds as necessary; 17. When drum pressure reaches the recommended pressure, closes superheater drain and drum vent; 18. Continues slow fire and feeding until drum pressure is nearly line pressure; 19. Opens auxiliary steam stop to “float” the boiler online; 20. Closes superheater vent; puts feedwater and firing on “auto;” 21. Ensures that all operations are in accordance with manufacturer’s recommended procedures; and 22. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.1.C <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Basic construction and operation principles of machinery systems,	On a steam vessel of at least 1,000 HP, on a simulator, or in a laboratory,	the candidate secures a main propulsion boiler.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Cracks open superheater vent; 2. Secures fires, leaving register open slightly to keep dripping oil from burner tip, being careful not to cool furnace too rapidly; 3. Closes auxiliary steam stop and main & auxiliary feed stops; 4. Closes fuel oil burner root valves; 5. As steam pressure and water level drop, maintains several inches of water in the gauge glass using the chemical feed line; 6. When drum pressure reaches recommended pressure, opens drum vent; 7. When all pressure is off the drum, opens superheater drain, closes the drum feed stop; 8. Ensures that all operations are in accordance with manufacturer's recommended procedures; and 9. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.2.A <i>All</i>	Operate main and auxiliary machinery and associated control systems	Safety and emergency procedures for operation of propulsion plant machinery, including control systems	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate identifies and describes safe working practices and safety equipment and identifies and describes actions to be carried out during steering gear failure and scavenge fires	<p>The candidate:</p> <p><u>Safety</u></p> <ol style="list-style-type: none"> 1. Identifies types and use of appropriate safety equipment; and 2. Describes safe working practices both within the engine room as well as elsewhere on the ship, including: <ol style="list-style-type: none"> a. Lockout/tagout procedures; b. Emergency operating procedures for critical equipment; and c. Use of standby crewmembers as backup. <p><u>Emergency</u></p> <ol style="list-style-type: none"> 1. Describes steering gear emergency operations, including: <ol style="list-style-type: none"> a. Failure of steering gear control from bridge; and b. Failure of electrical power to all systems; and 2. Describes how to manage scavenge fires, including: <ol style="list-style-type: none"> a. Stopping the engine; b. Shutting the fuel and air supply to the engine; c. Tightly closing the scavenge drains; d. After waiting the period of time specified by the engine manufacturer, thoroughly inspecting the engine's crankcase, trunking, cylinders, and pistons; e. Providing proper fire extinguishing elements such as carbon dioxide, dry powder, etc. to fight possible re-flash as a result of hot spots; and f. Making no attempt to immediately open the scavenge trunk or it might lead to a severe explosion – consults manufacturer's instructions.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.2.B <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Safety and emergency procedures for operation of propulsion plant machinery, including control systems	On a steam vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate describes actions to be carried out in the event of propulsion boiler carry-over.	<p>The candidate's description includes:</p> <ol style="list-style-type: none"> 1. Identifying the operating symptoms associated with boiler carryover (fluctuating superheat temperature, excessive turbine vibration, and/or reduction gear rumbling). 2. Cracking open the superheater header and main steam line manual drain valves. 3. Identifying and correcting the cause of the carry-over: <ol style="list-style-type: none"> a. Closing the throttle sufficiently to eliminate the carryover if the carryover is the result of opening the throttle too fast; b. Reducing the boiler load by closing in on the throttle to reduce the firing rate if the carryover is the result of too high a steaming rate; c. Adjusting the feed water regulator to maintain the correct operating water level if the carryover is the result of high water level; d. Reducing the solid content of the boiler water through continuous and/or surface blow if the carryover is the result of excessively high dissolved solid content of the boiler water; 4. Closing the manual drain valves once the situation has been rectified.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.A <i>Note 5</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems: .1 Main engine and associated auxiliaries .2 Steam boiler and associated auxiliaries and steam systems .3 Auxiliary prime movers and associated systems .4 Other auxiliaries including refrigeration, air-conditioning and ventilation systems	On a motor vessel of at least 1,000 HP, on a simulator, or in a laboratory,	the candidate assists in starting a main propulsion diesel engine, describing the actions as they are being performed.	The candidate: 1. Checks on the cooling water and associated equipment: <ol style="list-style-type: none"> Checks all valves to ensure system is lined up for operation; Starts motor-driven cooling-water pump, if necessary; Ensures systems have adequate pressure and flow; Vents cooling-water heat exchangers, using the vent cocks or vent valves on the heat-exchanger shells; Re-checks water level in freshwater expansion tanks for adequacy; and Verifies above actions are indicated on the control panel. 2. Checks on lube-oil system: <ol style="list-style-type: none"> Checks that all valves and pumps are lined up for proper operation; Ensures cooling-water system is on line and operational; Checks sump level for adequate supply; Checks all necessary temperatures and pressures for normal operating conditions; and Verifies above actions are indicated on control panel. 3. After obtaining permission from the bridge, checks for open indicator cocks and rotates engine on engine-turning gear; 4. Checks indicator cocks for water and disengages jacking gear; 5. Checks on the air system: <ol style="list-style-type: none"> Ensures all tanks are charged; Checks valves to ensure system is properly lined up; Ensures compressors are properly lined up and ready; Checks associated systems (reducers and dryers) for proper operation and flow; and Verifies above actions are indicated on control panel. <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.A <i>Continued</i> <i>Note 5</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 6. Performs blowdown; 7. Takes appropriate action to eliminate moisture; 8. Restores valves and indicator cocks to their operating positions; 9. Verifies all system indicators and alarm systems for proper operation and starts mist detector(s); 10. Completes all necessary checks on fuel-oil system: <ol style="list-style-type: none"> a. Lines up and primes fuel system; b. Checks to ensure sufficient clean fuel for anticipated engine operation is available; c. Starts fuel-oil purifier systems and transfer system; d. Checks heaters, filters, and pumps for acceptable operation; e. Vent heaters; f. Checks temperatures and pressure for normal operating conditions; and g. Verifies that the above actions are indicated on control panels. 11. Starts engine, following all proper procedures for the type of starting system in use and in accordance with the manufacturer's recommendations, ship's procedures, and standing orders; 12. Verifies voice communication, correct time, and Engine Order Telegraph setting with bridge; 13. Correctly describes actions as they are being performed; and 14. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.A <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a steam vessel of at least 1,000 HP, on simulator, or in a laboratory,	the candidate assists in starting a main propulsion turbine engine, describing the actions as they are being performed.	The candidate: <ol style="list-style-type: none"> 1. Starts the main lube-oil pump; 2. Verifies that there is flow through the gravity tank overflow line using the sight-glass; 3. Verifies that there is lube-oil flow to all main-engine bearings; 4. Engages the jacking gear to the main engine; 5. Makes notification of jacking gear status; 6. Turns on jacking-gear motor; 7. Establishes steam flow to the gland-seal regulator and adjusts it to recommended levels; 8. Starts the gland exhaust condenser fan; 9. Verifies that the main circulator high-suction and overboard-discharge valves are open; 10. Starts the main circulator pump; 11. Opens the main-condenser saltwater header vents until flow is observed; 12. Verifies that main condensate pump suction and discharge stop valves are open; 13. Verifies that main condensate pump vent line valve is open 14. Starts the main condensate pump; 15. Opens the inlet/outlet valves to both the first and second stage air-ejector elements; 16. Lines up steam to the air-ejector pressure reducing station; 17. Opens the steam root valve to the second stage main air-ejector element; 18. Observes progressive increase in vacuum; 19. Inspects the entire system for proper operation; 20. Correctly describes actions as they are being performed; and 21. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.B <i>Note 4</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a gas turbine vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate assists in starting a main propulsion gas turbine engine, describing the actions as they are being performed.	The candidate: <ol style="list-style-type: none"> 1. Ensures the enclosure is secure; 2. Ensures that the starting medium is available and at recommended pressures; 3. Ensures all permissive obligations are met, including: <ol style="list-style-type: none"> a. Reduction gear oil at pressure; b. Jacking gear disengaged; c. Clutch disengaged (if so fitted); d. Gas generator speed below alarm point; e. Uptake and supply stacks are clear; f. Command throttles are in the IDLE position; g. Command and Control logic is reset; 4. Initiates starting sequence from command platform; 5. Monitors all speeds, temperatures and pressures vital to engine start; 6. Ensures start medium and ignition system are secured upon reaching gas generator idle speed; and 7. Records start initiation and at idle times.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.C <i>Note 5</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a motor vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and monitors an operating main diesel engine, describing actions as they are being performed.	The candidate: 1. Checks all main-engine and reduction-gear bearing thermometers to detect signs of overheating; 2. Checks oil sight-flow indicators for proper oil flow; 3. Checks the clearance indicators for proper rotor position; 4. Checks all thermometers, pressure gauges, and vacuum gauges for readings within operating ranges; 5. Checks the oil level in the engine/reduction gear sumps; 6. Maintains the proper water level in the engine cooling tanks; 7. Constantly monitors the salinity indicators; 8. Checks the lube-oil temperature from the lube-oil cooler, and maintains the oil temperature at proper temperature; 9. Checks the pressure of the cooling-water main; 10. Properly responds to and logs all speed change orders; 11. Is constantly alert for unusual sounds and/or vibrations, and reports them to the OICEW; 12. Correctly describes actions as they are performed; and 13. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.D <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a steam vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and monitors an operating main steam turbine engine, describing actions as they are being performed.	The candidate: <ol style="list-style-type: none"> 1. Checks all main-engine and reduction-gear bearing thermometers to detect signs of overheating; 2. Checks oil sight-flow indicators for proper oil flow 3. Checks the clearance indicators for proper rotor position; 4. Checks all thermometers, pressure gauges, and vacuum gauges 5. For readings within operating ranges; 6. Checks the oil level in the main sump; 7. Maintains the proper water level in the de-aerating feed tank; 8. Constantly monitors the salinity indicators; 9. Checks the lube-oil temperature from the lube-oil cooler, and 10. Maintains at proper temperature; 11. Checks the pressure of the cooling-water main; 12. Properly responds to and logs all speed change orders; 13. Is constantly alert for unusual sounds and/or vibrations and reports them to the OICEW; 14. Correctly describes actions as they are performed; and 15. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.E <i>Note 4</i>	Operate main and auxiliary machinery and associated control systems.	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a gas turbine vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and monitors an operating main gas turbine engine, describing actions as they are being performed.	The candidate: 1. Checks enclosure for fire, lighting, vibration; 2. Monitors necessary operational parameters, including: a. Reduction gear oil supply pressure and bearing temperatures; b. Power turbine and gas generator speeds and vibration levels; c. Compressor inlet and discharge temperatures and pressures; d. Power turbine inlet temperature and pressure; e. Gas turbine bearing lube oil temperatures; and f. Exhaust gas temperature and pressure; 3. Performs performance calculations and compares results with ideal mapping data; and 4. Determines necessary changes to operational procedures or status.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.F <i>Note 5</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a motor vessel of at least 1,000 HP or a simulator, or in a laboratory,	the candidate assists in securing a main propulsion diesel engine, describing actions as they are being performed.	The candidate: 1. At “Finished With Engines,” coordinates with bridge to shift main engine from bridge control to engine-room control; 2. Changes over and verifies that change in control has occurred; 3. Secures fuel-oil supply and booster pumps, (if fitted) and acknowledges low-pressure alarm; 4. Closes air start blocking valve; 5. Closes air receiver outlet valves to air start system; 6. Secures auxiliary blower, acknowledges low-pressure alarm; 7. Opens each cylinder indicating cock; 8. Engages engine-turning gear; 9. Starts engine-turning gear and cycles through one revolution; 10. Secures main lube-oil system supply pumps and acknowledges low-pressure alarm; 11. Secures jacket fresh cooling water supply pump and acknowledges low-pressure alarm; 12. Secures power to mist detector; 13. Secures cooling medium supply valves to intercooler; 14. Opens scavenging air receiver drain valve; 15. Opens freshwater jacket cooling water flow crossover valve to diesel generators; and 16. Enters the time that all systems were secured in logbook.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.G <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a steam vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate assists in securing a main steam turbine.	The candidate: <ol style="list-style-type: none"> 1. Secures the main steam stops at Finished With Engines; 2. Alternately uses ahead and astern throttles to bleed off steam trapped in main steam lines; 3. Secures bulkhead stops; 4. Secures astern guarding valve; 5. Verifies that main shaft is no longer rotating; 6. Engages jacking gear once main shaft is confirmed is no longer rotating; 7. Posts notice that main-engine “Jacking Gear Engaged”; 8. Verifies that lube-oil system continues to operate; 9. Verifies that lube-oil flow continues through turbine bearing sight glasses; 10. Verifies that lube-oil temperatures at each bearing are below 160°F; 11. Verifies that lube-oil cooler outlet temperature is maintained at recommended levels; and 12. Verifies that each main shaft steady-bearing oil ring rotates freely.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.H <i>Note 4</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control system Main engine and associated auxiliaries	On a gas turbine vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate assists in securing a main gas turbine.	The candidate performs the following for a normal stop sequence: <ol style="list-style-type: none"> 1. Ensures that the throttle at the Command Platform is in the “idle” position; 2. Initiates “Normal Shutdown” sequence from the Command Platform; 3. After the recommended Cool Down period, ensures the following: <ol style="list-style-type: none"> a. Main fuel stop valves are closed; b. Clutch (if equipped) is disengaged; c. Upon shaft rotation stop, engage jacking gear; and d. Module cooling system operative; and e. Inspects gas turbine and enclosure for damage and/or fire.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.I <i>Note 4</i> <i>Note 5</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Steam boiler and associated auxiliaries and steam systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate monitors the oil-fired or waste heat auxiliary boiler.	The candidate performs <i>either</i> (A) or (B): (A) OIL-FIRED AUXILIARY BOILER <ol style="list-style-type: none"> 1. Monitors the steam drum pressure and water level; 2. Monitors the feed water pressure; 3. Monitors the fuel oil service pump suction and discharge pressures and fuel-oil supply pressure and temperature to the supply header and applicable fuel oil strainer pressure drops; 4. Monitors the fuel oil settling/service tank levels and temperatures; 5. Strips fuel oil settling tanks of moisture as appropriate; 6. Monitors the stack temperature; 7. Monitors the atomizing steam pressure as applicable; 8. Observes condition of flame through peephole; 9. Visually inspects boiler casing, hand holes, manholes, and piping for leaks; 10. Promptly wipes up any oil accumulations presenting a fire hazard 11. Notifies the watch engineer of any unusual or unsafe conditions, unusual sounds, or vibrations; and 12. Takes proper action to prevent safety and pollution violations. <p>NOTE: Recorded readings from analog gauges should be $\pm 5\%$ of actual, except boiler water level should be $\pm 1''$ of actual.</p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.I <i>(Cont'd)</i> <i>Note 4</i> <i>Note 5</i>					<p>The candidate performs <i>either</i> (A) or (B):</p> <p>(B) WASTE HEAT AUXILIARY BOILER</p> <ol style="list-style-type: none"> 1. Monitors the steam drum pressure and water level; 2. Monitors the feed water pressure; 3. Monitors the feed pump suction and discharge pressures; 4. Monitors the feed tank level and temperature; 5. Monitors the boiler water circulating pump suction and discharge pressures, as applicable; 6. Monitors the exhaust gas inlet temperature 7. Monitors the stack temperature; 8. Visually inspects boiler casing, hand holes, manholes, and piping for leaks; 9. Notifies the watch engineer of any unusual or unsafe conditions, unusual sounds, or vibrations; and 10. Takes proper action to prevent safety and pollution violations. <p>NOTE: Recorded readings from analog gauges should be $\pm 5\%$ of actual, except boiler water level should be $\pm 1''$ of actual.</p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.J <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems.	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Steam boiler and associated auxiliaries and steam systems	On a steam vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate tests the boiler water for the following: <ul style="list-style-type: none"> • P-alkalinity; • Total alkalinity; • Chlorides; • Phosphates; • Dissolved oxygen; and • Total dissolved solids. 	On a daily basis, for no less than a 2-week period, the candidate: <ol style="list-style-type: none"> 1. Properly lines up the sample cooler system and obtains required samples of water from each boiler; 2. Correctly performs each required test procedure according to the directions provided by the vessel's boiler-water treatment vendor; and 3. Records the results daily.
4.3.K <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Steam boiler and associated auxiliaries and steam systems	On a steam vessel of at least 750 kW / 1,000 HP or simulator, or in a laboratory,	the candidate doses and seeks to control the boiler water quality by: <ul style="list-style-type: none"> • Continuous blow; • Bottom blow; and • Chemical dosing following recommendations of the vessel's boiler-water treatment vendor. 	On a daily basis, for no less than a 2-week period, the candidate: <ol style="list-style-type: none"> 1. Identifies which corrective actions associated with the results of chemical testing are applicable; 2. Correctly identifies the type and quantity of chemicals to be used to treat the boiler; 3. Adds appropriate chemicals to the boiler water while underway; and 4. Performs dosing and controls, observing all safety and environmental practices and procedures.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.L <i>Note 1</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Steam boiler and associated auxiliaries and steam systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory, under the supervision of the Chief Engineer, and when directed,	the candidate performs a bottom blow of a boiler.	The candidate: <ol style="list-style-type: none"> 1. Performs bottom blow when directed, slowing main engine to prevent carry-over or other adverse affects on steaming boiler; 2. Secures fires in boiler and opens superheater vent to boiler; 3. Secures main-steam stops to boiler to be given bottom blow; 4. Using auxiliary feed stop-check, raises level of water in steam drum of boiler to 1 inch from the top of gauge glass; 5. Opens bottom blow overboard skin valve; 6. Opens water wall bottom blow valve; 7. Observes drop in water level, securing bottom blow valve when level is no less than 1 inch from bottom of gauge glass; 8. Repeats steps 4 and 5; 9. Opens mud drum bottom blow valve and secures when gauge glass water level drops to no less than 1 inch from the bottom; 10. Prepares to re-light boiler; 11. Starts boiler forced draft fan and pre-purges furnace for 5 minutes; 12. Raises water level to 2 inches below normal level; 13. Re-lights burner and adjusts combustion air as necessary; 14. Opens main steam stops to “float” boiler back on line, cracks open superheater and main steam line drains; 15. Begins to return main engine to sea speed when boiler pressures are observed to be equal and slight drop in burner manifold fuel oil pressure is noted; 16. Closes off superheater and main steam drains, and superheater vent; 17. Continues to slowly re-establish engine speed; and 18. Conducts round of engine room to verify that all steam systems and equipment are operating at normal levels.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.M <i>All</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Auxiliary prime movers and associated systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory or workshop,	the candidate plans for and changes over from the on-line low pressure service air compressor to the stand-by unit, describing actions as they are being performed.	The candidate: 1. Checks the oil reservoirs and (if necessary) fills them to the proper level with the correct grade of oil; 2. Ensures that the power is off, checks the belts for excessive sagging and ensures that they are in the proper position in the pulley wheels, and jacks the compressor over by hand, if applicable; 3. Starts up the air compressor; 4. Places air compressor in service and properly shuts down replaced air compressor; 5. Drains and removes all accumulations of moisture or oil from the separators and air receivers; 6. Tests pressure-relief devices; and 7. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.N <i>Note 5</i> <i>Task No. 4.3.W may be used as a substitute</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Auxiliary prime movers and associated systems	On a motor vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and starts up the freshwater generator, describing actions as they are being performed.	The candidate: <ol style="list-style-type: none"> 1. Opens the brine pump/eductor overboard skin valve; 2. Opens the brine pump eductor saltwater supply valve; 3. Opens the vacuum pump/eductor saltwater supply valve; 4. Opens the saltwater feed pump discharge and suction valves; 5. Starts the saltwater feed pump to supply both the evaporator eductors; 6. Closes the vacuum breaker valve atop the evaporator shell; 7. Adjusts the brine overboard discharge valve to maintain water level to just cover submerged tube nest in bottom of distiller; 8. Delays continuing with operation until 75% of operational vacuum is attained; 9. Opens the main heat source valve to distiller heating section; 10. Adjusts the main-engine jacket water distiller heating section outlet valve to maintain proper jacket-water temperature differential between inlet and outlet; 11. Adjusts the saltwater feed to distiller to maintain proper inlet temperature; 12. Continues to regulate the brine overboard pump discharge to maintain seal and brine level; 13. Starts the distillate pump; 14. Energizes the salinity indicating panel and verifies the three-way valve is de-energized and distillate is re-circulated to the evaporator; <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.N <i>Continued</i> <i>Note 5</i> <i>Task No. 4.3.W may be used as a substitute</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> 15. Energizes the salinity indicating panel and verifies the three-way valve is de-energized and distillate is re-circulated to the evaporator; 16. Continues to adjust the saltwater supply valve, controlling saltwater feed temperature, and brine overboard flow rate; 17. Monitors the distillate pump salinity level output; 18. Verifies the tank to be replenished is lined up; 19. Energizes the three-way valve when the distillate salinity level is below alarm level; 20. Verifies the salinity meter reading by comparing to chemical test of a 50 ml sample; 21. Records the meter reading once discharge to tank has been established; and 22. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.O <i>Note 5</i> <i>Task No. 4.3.W may be used as a substitute</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Auxiliary prime movers and associated systems	On a motor vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and shuts down the freshwater generator, describing actions as they are being performed.	The candidate: <ol style="list-style-type: none"> 1. Trips three-way solenoid valve when all tanks have been topped off; 2. Closes main heat source valve to and from distiller heating section; 3. Allows feed water flow until the distiller has cooled to ambient temperature; 4. Secures saltwater feed pump and saltwater supply to both eductors; 5. Closes saltwater feed pump discharge and suction valves; 6. Opens vacuum breaker valve atop evaporator shell; 7. Secures distillate pump motor and close distillate pump discharge valve; 8. Logs the time that the unit is secured and the final water meter reading; and 9. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.P <i>Note 2</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Auxiliary prime movers and associated systems	On a steam vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and starts up the freshwater distiller, describing actions as they are being performed.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Opens the brine pump overboard discharge valve; 2. Verifies that the brine pump overboard skin valve is open; 3. Verifies that the sea suction valve to the distiller saltwater feed pump is open; 4. Opens the saltwater feed pump suction and discharge valves; 5. Starts the saltwater feed pump to freshwater distilling unit; 6. Starts the brine overboard pump; 7. Adjusts the brine overboard discharge valve to maintain brine level to just cover the slosh plates in bottom of the flash chambers; 8. Opens the steam root valve to the distiller unit steam air ejectors; 9. Opens the steam supply valve to the saltwater feed heater (not if the saltwater feed water heater shell vacuum is less than 75% of normal operational vacuum); 10. Lines up and opens the L.P. bleed steam to saltwater feed water heater (or applies and regulates de-superheater condensate flow if live steam supply provided to salt water heater); 11. Lines up and regulates saltwater feed heater L.P. drain to maintain half of a gauge glass in saltwater feed heater hot well; 12. Adjusts the saltwater flow from the saltwater feed heater to maintain proper temperature of feed water to first stage; 13. Observes spray pattern of the feed water and level of water at bottom of the flash chamber; <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.P <i>Continued</i> <i>Note 2</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 14. Energizes the salinity indicating panel and verifies the three-way dump valve is tripped and will discharge to the bilge; 15. Monitors each salinity in the distillate path for indications of abnormal conditions; 16. Starts the distillate pump when the static suction line gauge glass is at least half-full; 17. Adjusts as necessary the saltwater feed temperature, brine overboard flow rate, and monitors the distillate pump output salinity level; 18. Verifies the tank to be replenished is lined up; 19. Engages the three-way dump valve when the distillate salinity level is indicated to be at or below alarm level; 20. Verifies the salinity meter reading by chemical test comparison of the distillate sample; 21. Records the water meter reading once discharge to the tanks has been established; and 22. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.Q <i>Note 2</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Auxiliary prime movers and associated systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and shuts down the freshwater distiller, describing actions as they are being performed.	The candidate: <ol style="list-style-type: none"> 1. Trips the three-way dump valve; 2. Verifies the distillate distribution valves to the tanks have been closed; 3. Records the water meter reading; 4. Closes the steam root valve to the distiller unit steam air ejectors; 5. Secures the L.P. bleed steam or live steam and desuperheater condensate flow to the saltwater feed water heater; 6. Secures the saltwater feed heater L.P. drain to maintain main or auxiliary condenser vacuum; 7. Stops the distillate pump when the static suction line gauge glass is empty; 8. Monitors the unit for drop in temperature and decrease in vacuum; 9. Secures the saltwater feed pump to the freshwater distilling unit as temperatures and vacuum have decreased and closes the saltwater feed pump suction and discharge valves; 10. Stops the brine overboard pump and secures the overboard skin valve when the level in the flash chamber no longer visible; and 11. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.R <i>All</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Auxiliary prime movers and associated systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and starts the lube oil or fuel oil purifier, describing actions as they are being performed.	The candidate: <ol style="list-style-type: none"> 1. Verifies that brake has been released; 2. Checks centrifuge sump oil level and adds oil as necessary; 3. Checks discharge valve is open to correct sump or tank; 4. Depresses start button to re-start centrifuge motor ; 5. Verifies that centrifuge is up to proper operating speed; 6. Lines up automatic “shoot” panel and adds sealing/priming water until overflow is detected at heavy phase discharge; 7. Opens oil supply valve from main sump or tank; 8. Lines up steam or power to centrifuge pre-heater, if used; 9. Observes cessation of seal/priming water displacement from centrifuge & sets automatic “shoot” panel; 10. Monitors increase of oil temperature input to proper temperature; and 11. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.S <i>All</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Auxiliary prime movers and associated systems	On a vessel of at least 1,000 HP or in a laboratory,	the candidate plans for and secures a lube oil or fuel oil purifier, describing actions as they are being performed.	The candidate: 1. “Shoots” the purifier from the control panel several times to discharge loose sludge; 2. Secures steam or power to oil centrifuge pre-heater, if used; 3. Closes oil supply to centrifuge; 4. Depresses centrifuge motor controller stop button; 5. Verifies centrifuge has come to a complete stop and closes clean oil discharge valve; and 6. Secures power and valves to the automatic “shoot” panel.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.T <i>All</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Other auxiliaries including refrigeration, air-conditioning and ventilation systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate starts an air-conditioning or refrigeration system.	The candidate: 1. Checks the crankcase oil level - the level should be visible in the sight glass; 2. Lines up the condensing water circulating system by opening the condensing water isolation valves and venting the waterboxes to ensure condenser watersides are full; 3. For chillers, lines up the chilled water system by opening the chilled water isolation valves and venting the waterboxes to ensure chiller watersides are filled; 4. Opens the compressor discharge and main liquid line (king) valves; 5. Opens the compressor suction valve approximately one full turn; 6. Depresses the start button and starts the compressor in the auto mode; 7. When compressor starts, slowly opens the compressor suction valve to help prevent excessive oil foaming (due to rapid crankcase pump-down) until the suction valve is fully open; and 8. By monitoring the suction temperature and listening for any evidence of compressor knocking (due to liquid floodback), throttles down on the suction valve until liquid in the suction line has successfully flashed off, then slowly opens the suction valve until fully open.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.U <i>All</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Other auxiliaries including refrigeration, air-conditioning and ventilation systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate monitors an air-conditioning or refrigeration system.	The candidate: <ol style="list-style-type: none"> 1. Checks the compressor suction and discharge pressures and temperatures; 2. Checks compressor crankcase oil level; 3. Checks compressor oil pressure and control oil pressure if applicable; 4. Checks condition of crankcase and compressor noise; 5. Checks receiver level and liquid line sight glass condition; 6. Checks liquid line temperature; 7. Checks condition of suction accumulator if applicable; 8. Checks oil separator oil return sight glass condition if applicable; 9. Checks condensing cooling water pressure and inlet and outlet temperatures; 10. For chillers, checks chilled water pump suction and discharge pressures and chiller inlet and outlet temperatures, as well as the chilled water expansion tank level; 11. Checks refrigerated space temperatures as applicable; 12. Checks supply air, return air, and air conditioned space temperatures as applicable; and 13. Checks the compressor drive motor temperature.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.V <i>All</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Other auxiliaries including refrigeration, air-conditioning and ventilation systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate secures an air-conditioning or refrigeration system.	The candidate: 1. While the compressor is running, closes the main liquid line (king) stop valve; 2. Allows the compressor to cycle off in automatic by the action of the low pressure cut-out switch; 3. While observing the refrigerant receiver level, ensures that the compressor does not restart by the action of the low pressure cut-out switch and insures that the system is completely pumped down to the receiver; 4. With compressor shutdown and not short-cycling, depresses the motor controller stop button; 5. Keeps power available to the compressor motor for the purpose of maintaining the crankcase oil warm via the heater circuit; 6. Isolates the compressor by closing the suction and discharge stop valves; 7. Isolates the water-cooled condenser by closing the condensing water isolation valves (drains the condenser watersides if required); and 8. For chillers, isolates the chiller by closing the chilled water isolation valves.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
4.3.W <i>May be used as substitute for Task Nos. 4.3N and 4.3O</i>	Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems Other auxiliaries including refrigeration, air-conditioning and ventilation systems	On a vessel of at least 1,000 HP at sea or at anchor in clean water, on a simulator, or in a laboratory,	the candidate monitors a reverse osmosis plant.	The candidate: 1. Checks plant's operational status; 2. Checks sea water feed and high pressure pump suction and discharge pressures as appropriate; 3. Checks pre-filter pressure drops; 4. Checks membrane bank pressure drops; 5. Verifies and checks distillate flow to proper tank; 6. Observes the position of the -way valve to ensure it is not tripped, unless in the case of high salinity; 7. Takes water-meter reading; 8. Checks distillate salinity; and 9. Notifies the watch engineer of any unusual or unsafe conditions.
5.1.A <i>All</i>	Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operational characteristics of pumps and piping systems including control systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate describes the operating characteristics of pumps and piping systems including control systems.	The candidate reads drawings and instructions and describes the operating characteristics of pumps and piping systems including control systems.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
5.2.A <i>All</i>	Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operation of pumping systems: routine pumping operations	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and conducts an onboard fuel transfer.	<p>The candidate performs the following actions, and describes them as they are performed:</p> <ol style="list-style-type: none"> 1. Applies steam to tank heating coils, if required; 2. Monitors contaminated return tank as necessary; 3. Lines up the fuel-oil transfer pump and fuel-oil manifold to take a suction on the desired fuel-oil tank as directed; 4. Lines up the fuel-oil transfer pump to discharge to the desired tank as directed; 5. Determines the fuel-oil tank levels in both tanks; 6. Starts the fuel-oil transfer pump; 7. Checks the fuel-oil transfer pump suction and discharge pressures to determine that the pump picks up suction; 8. Monitors the fuel-oil tank level on the tank being filled; 9. Stops the fuel-oil transfer pump when the tank approaches full or the level directed; 10. Restores the fuel transfer system piping to normal; and 11. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
5.2.B <i>All</i>	Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operation of pumping systems: Operation of bilge, ballast and cargo pumping systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and conducts a ballasting of double-bottom or wing tanks.	The candidate performs the following actions, and describes them as they are performed: <ol style="list-style-type: none"> 1. Lines up the ballast pump suction manifold and/or suction piping to take a suction on an appropriate sea chest; 2. Lines up the ballast pump discharge manifold and/or piping to direct flow to the ballast tank fill and drain manifold; 3. Lines up the ballast tank fill and drain manifold to those ballast tanks as directed; 4. Starts the ballast pump; 5. Stops the ballast pump when the vessel is brought down to the desired draft marks; 6. Restores the ballast system piping to normal; and 7. Takes proper action to prevent safety and pollution violations.
5.2.C <i>All</i>	Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operation of pumping systems: operation of bilge, ballast and cargo pumping systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and conducts a deballasting of double-bottom or wing tanks.	The candidate performs the following actions, and describes them as they are performed: <ol style="list-style-type: none"> 1. Lines up the ballast pump suction manifold and/or suction piping to take a suction on the ballast-tank fill and drain manifold; 2. Lines up the ballast-pump discharge manifold to direct flow of sea water overboard; 3. Lines up the ballast-tank fill and drain manifold to drain those ballast tanks as directed; 4. Starts the ballast pump; 5. Stops the ballast pump when tanks are emptied; 6. Restores the ballast system piping to normal; and 7. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
5.2.D <i>All</i>	Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operation of pumping systems: Operation of bilge, ballast and cargo pumping	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and pumps out the engine-room bilge wells.	The candidate performs the following actions, and describes them as they are performed: <ol style="list-style-type: none"> 1. Sounds the bilge-water collecting tank to ensure it is capable of accommodating bilge water without overflowing; 2. Lines up the bilge system to take a suction from the desired bilge well, and discharges to the bilge-water collecting tank; 3. Primes the bilge pump as necessary; 4. Starts the bilge pump; 5. Monitors the bilge-pump suction and discharge pressure gauges to ensure the bilge pump has picked up suction; 6. Monitors the bilge pocket level; 7. Stops the bilge pump when the bilge pocket has been pumped dry; 8. Restores the bilge system valve line up to normal; 9. Properly fills in information in the Oil Record Book; and 10. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
5.2.E <i>All</i>	Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operation of pumping systems: Operation of bilge, ballast and cargo pumping systems	On a vessel of at least 1,000 HP or a simulator, or in a laboratory,	the candidate plans for and pumps out a cargo-hold or the shaft-alley bilge wells.	The candidate performs the following actions, and describes them as they are performed: <ol style="list-style-type: none"> 1. Sounds the bilge-water collecting tank to ensure it is capable of accommodating bilge water without overflowing; 2. Lines up the bilge system to take a suction from the desired bilge well, and discharges to the bilge-water collecting tank; 3. Primes the bilge pump if necessary; 4. Starts the bilge pump; 5. Monitors the bilge-pump suction and discharge pressure gauges to ensure the bilge pump has picked up suction; 6. Monitors the bilge pocket level; 7. Stops the bilge pump when the bilge pocket has been pumped dry; 8. Restores the bilge system valve line back to normal; 9. Properly fills in information in the Oil Record Book; and 10. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
5.3.A <i>All</i>	Operate fuel, lubrication, ballast and other pumping systems and associated control systems.	Oily-water separators (or similar equipment) requirements and operation	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate monitors the oily-water separator system.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Checks plant's operational status; 2. Checks bilge-water tank level; 3. Checks oily-water-separator chamber pressure or vacuum; 4. Checks filling related pressure/vacuum; 5. Checks overboard-discharge water-pump pressure; 6. Monitors oil-content monitor and ensures that: 7. Equipment is not bypassed, sampling line is open, and flushing water is not being supplied to sensor; 8. Automatic valves are not operated in manual mode or disconnected from controlling devices; and 9. No temporary hoses are used during operation and when possible, checks cleanliness of sensors; 10. Checks for any unusual conditions or noises; 11. Notifies watch engineer of any unusual or unsafe conditions; and 12. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.1.A <i>All</i>	Operate electrical, electronic and control systems	Basic configuration and operation principles of the following electrical, electronic and control equipment, Generator and distribution systems	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate describes operating characteristics of the electrical generating and distribution systems.	The candidate reads drawings and instructions and describes the operating characteristics of the electrical generating and distribution systems.
6.1.B <i>Note 5</i>	Operate electrical, electronic and control systems	Basic configuration and operation principles of the following electrical, electronic and control equipment, Preparing, starting, paralleling and changing over generators	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and conducts a pre-start-up inspection, and start a diesel generator engine, describing actions as they are being performed.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Inspects the generator for loose cable connections, brush rigging as fitted, and foreign or loose items that may damage the unit during start-up; 2. Inspects the couplings between the reduction gear and alternator for readiness; 3. Inspects the governor linkage reduction-gear casing, and bearing housings for indications of lubrication leaks; 4. Manually trips the over-speed to prevent fuel rack operation; 5. Checks the lube-oil level in the sumps and adds lube oil as necessary; 6. Starts the pre-lube pump; checks for pressure leaks and proper flow; 7. Opens the indicator cocks, lines up start air, and rolls the engine over; 8. Closes indicator cocks and checks fuel oil lineup; <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.1.B <i>Continued</i> <i>Note 5</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 9. Resets the trip and determines if the mechanism operates without binding; 10. Starts the engine and checks temperatures and pressures; 11. Correctly describes actions as they are being performed; and 12. Takes proper action to prevent safety and pollution violations.
6.1.C <i>Note 1</i>	Operate electrical, electronic and control systems	<p>Basic configuration and operation principles of the following electrical, electronic and control equipment</p> <p>Preparing, starting, paralleling and changing over generators</p>	On a steam vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and conducts a pre-start-up inspection and starts a steam turbo-generator.	<p>The candidate takes the following actions, describing them as they are performed:</p> <ol style="list-style-type: none"> 1. Inspects alternator for loose cable connections, brush rigging, and loose items that may damage unit during start-up; 2. Inspects coupling between turbine/reduction gear and alternator for readiness; 3. Inspects governor unit, reduction gear casing, and bearing housings for indications of lubrication leaks; 4. Inspects manual over-speed trip for excessive wear; 5. Determines level of lube-oil in sump and adds lube-oil as necessary; 6. Manually trips and resets over-speed trip to determine operation without binding; 7. Inspects auxiliary circulator pump and its piping for leaks and cracks; 8. Verifies that sea suction and discharge valves are open to auxiliary circulator; 9. Inspects auxiliary condensate pump and its piping for leaks and cracks; 10. Verifies that hot well condensate level is visible; <p style="text-align: center;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.1.C <i>Continued</i> <i>Note 1</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 11. ;Verifies that suction, discharge, and vent line valves to auxiliary condensate pump are open; 12. Inspects auxiliary circulator and condensate pump motor controllers for readiness; 13. Starts auxiliary circulator; 14. Vents-off condenser heads and observes stabilizing of circulated water pressure; 15. Starts auxiliary condensate pump; 16. Adjusts opening of re-circulating valve to maintain visible level of condensate in hot well; 17. Returns to operating level and applies gland seal steam to turbine rotor; 18. Admits operating steam to air ejectors, adjusting supply pressure as necessary; 19. Determines visible level in hot well, adjusting re-circulating valve as necessary; 20. Starts lube-oil supply to unit when vacuum reaches 18-22 inches (obtain assistance if pump is hand-operated); 21. Sets throttle valve; 22. Slowly opens throttle valve, gradually increasing turbine rotating speed; 23. Allows unit to rotate without load for even warming; 24. Applies lube-oil and alternator cooler water supply as necessary; and 25. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.1.D <i>All</i>	Operate electrical, electronic and control systems	Basic configuration and operation principles of the following electrical, electronic and control equipment Preparing, starting, paralleling and changing over generators	On a vessel of at least 1,000 HP or simulator, or in a laboratory,	the candidate plans for and connects the ship's service generator to the main switchboard, and takes original on-line unit off the board.	The candidate takes the following actions, describing them as they are performed: 1. Ensures the plan reflects proper sequence of actions, is complete, and conforms to the requirements of manufacturer's instructions and ship's procedures; 2. Pre-inspects and starts the generator prime mover; 3. Verifies that automatic voltage regulator is at recommended voltage-and manually adjusts as necessary; 4. Turns on synchroscope and observes direction and speed of rotation; 5. Manually adjusts generator speed so that the scope rotation is moving slowly in the "fast" direction; 6. Manually closes the in-coming unit's circuit breaker to stop the synchroscope at the 12 o'clock position; turns off scope; 7. Divides load simultaneously and evenly between on-line and in-coming units by observing available switchboard meters; 8. Continues to shift load between unit to remain on-line and off-going unit, observing available switchboard meters; 9. Continues to manually reduce the off-going unit load until off-going unit circuit breaker trips, or trips breaker manually as the kW load of off-going unit approaches 0; and 10. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.1.E <i>All</i>	Operate electrical, electronic and control systems	<p>Basic configuration and operation principles of the following electrical, electronic and control equipment</p> <p>Electrical motors including starting methodologies</p> <p>High-voltage installations</p> <p>Sequential control circuits and associated system devices</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop, or in an approved course,	the candidate demonstrates knowledge of motor controllers, other sequential control systems, and High Voltage properties and precautions.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Explains the sequence of events that lead to the starting of at least two motor controllers; one reversing and one non-reversing; 2. Describes the basic operation of an electro-pneumatic or electro-hydraulic sequence system as chosen by the assessor; and 3. Lists the inherent dangers of High Voltage systems and enumerates special safety precautions to take when operating and troubleshooting such system.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.2.A <i>All</i>	Operate electrical, electronic and control systems	<p>Basic configuration and operation principles of the following electrical, electronic and control equipment</p> <p>Characteristics of basic electronic circuit elements</p> <p>Flowchart for automatic and control systems</p> <p>Functions, characteristics and features of control systems for machinery items, including main propulsion plant operation control and steam boiler automatic controls</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop, or in an approved course,	the candidate demonstrates knowledge of basic electronic elements and diagrams.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Identifies and explains the characteristics and uses of: <ol style="list-style-type: none"> a. Resistors; b. Potentiometer; c. Capacitors; d. Transistors; e. Thyristors; f. Inductors; g. Semi-conductors; h. Diodes; i. Integrated circuits; j. Light dependent resistors (LDRs)/thermistors; k. Parallel circuits; l. Series circuits; m. Ohm's law; n. Frequency modulation; and o. Amplitude modulation; <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.2.A <i>Continued</i> <i>All</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 2. Identifies the following, using a drawing of an electronics circuit: <ol style="list-style-type: none"> a. Ammeter; b. Amplifier; c. “And” and “Or” gates and inverters; d. Antenna; e. Battery; f. Capacitor; g. Circuit breaker; h. Diode; i. LED; j. Schottky diode; k. Hull ground; l. Integrated circuit; m. Rectifier; n. Relay; o. Rheostat; p. Transformer; q. Voltmeter; and r. Wattmeter; and 3. Identifies the use of an electronic circuit based upon a provided drawing.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
6.3.A <i>All</i>	Operate electrical, electronic and control systems	Basic configuration and operation principles of the following electrical, electronic and control equipment Various automatic control methodologies and characteristics Proportional-Integral-Derivative (PID) control characteristics and associated system devices for process control	On a vessel of at least 1,000 HP, or in a laboratory or workshop, or in an approved course,	the candidate describes the fundamentals of automation and control system technology.	The candidate: 1. Identifies and describes the function of components in a motor controller, combustion control system, or feedback control circuit; 2. Explains the terms: a. <i>Zero</i> ; b. <i>Live zero</i> ; c. <i>Gain</i> and; d. <i>Span</i> ; 3. Identifies the uses and problems of the following controls: a. On/off; b. Proportional; c. Integral; d. Derivative; e. Split range; and f. Cascade.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.1.A <i>All</i>	Maintenance and repair of electrical and electronic equipment	<p>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</p> <p>Maintenance and repair of electrical system equipment, switchboards, electric motors, generator 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 equipment and their configuration:</p> <p>interpretation of electrical and simple electronic diagrams</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate plans to lock and tag out an electric motor and uses the Megger to measure and record the dielectric strength of the insulation of the motor through connections in the controller, describing actions as they are being performed.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. De-energizes the motor circuit; 3. Employs available mechanical means (e.g., fuse removal, circuit breaker box lock, etc.) to prevent unintentional energizing of the circuit; 4. Employs a sturdy tag device stating which circuit is de-energized, reason, date and time, and the person's name who will be working on the motor; 5. Confirms that the system is de-energized and uses the Megger correctly in accordance with manufacturer's instructions; 6. Corrects the reported resistance value for temperature and it is within +/- 5% of the assessor's solution; 7. Correctly describes the actions as they are being performed; and 8. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.2.A <i>All</i>	Maintenance and repair of electrical and electronic equipment	<p>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</p> <p>Maintenance and repair of electrical system equipment, switchboards, electric motors, generator 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 equipment and their configuration:</p> <p>interpretation of electrical and simple electronic diagrams</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate troubleshoots a malfunctioning motor controller.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Obtains the necessary schematics and wiring diagrams; 2. Verifies that any necessary circuit breakers and disconnects switches supplying power to the motor and associated control equipment are closed as appropriate; 3. Using a voltmeter, checks for power available at the service entrance of the controller and verifies that all supply voltages are within accepted parameters; 4. Tests power and control fuses using on-line testing techniques with a voltmeter - to verify the results, tests the fuses off-line with an ohmmeter; 5. If fuses are blown, visually checks for obvious signs of electrical shorts and grounds; 6. Visually checks the interior of the controller enclosure for any signs of overheating, burning of contacts, weak contactor springs, corroded magnetic contactor armature faces, discoloration of terminals and conductors, broken conductors, loose fuses, and loose terminal connections; also uses sense of smell to check for burned insulation; 7. Restores power and attempts to restart the motor while observing the motor controller to determine what relays and contactors are pulling in, if any; 8. If the motor contactor is pulling in: <ol style="list-style-type: none"> a. Listens for any buzzing or chattering noises; b. Using a voltmeter, checks for voltage drops and imbalances; and c. Using a clamp-on ammeter, checks for current draws and imbalances in the power circuit lines; verifies normal current by checking the motor nameplate data; <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.2.A <i>Continued</i> <i>All</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 9. If the motor contactor is not pulling in: <ol style="list-style-type: none"> a. Determines what actions in terms of motor controller load energization (such as relays, timers, contactors, indicator lights, etc., if any, do take place; and b. Using the control schematic, determines what specific operating contacts are necessary for energizing specific operating contactor and relay coils for normal motor startup; 10. After closing any required operating contacts, checks to see if normal voltage is applied to the operating coil. If: <ol style="list-style-type: none"> a. Normal voltage is being applied to the operating coil, tests the coil resistance with an ohmmeter, ensuring first that power is secured to the controller and coil is properly isolated; b. No voltage at all is being applied to the operating coil, determines the location of the open in the control circuit; c. An unacceptably low voltage is being applied to the operating coil, determines the location of the partial open in the control circuit.; and 11. Verifies the on-line results for low or no voltage by testing operating contacts for continuity using off-line testing techniques with an ohmmeter. Ensures that power is secured to the controller and operating contacts are properly isolated before testing.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.2.B <i>All</i>	Maintenance and repair of electrical and electronic equipment	<p>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</p> <p>Maintenance and repair of electrical system equipment, switchboards, electric motors, generator 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 equipment and their configuration:</p> <p>interpretation of electrical and simple electronic diagrams</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate repairs a malfunctioning motor controller.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. If blown fuses are replaced, the replacement fuses should be of the correct type and be properly rated, and fuse holders should grip tightly the fuses; 2. If contacts are to be refurbished, techniques should be in accordance with instruction manuals; 3. If controller parts are to be replaced, only manufacturer recommended spares are to be used; 4. When replacing controller components, leads should be marked and connection scheme sketches drawn to insure correct wiring; 5. Lugs and terminals shall be properly tightened; 6. Cleaning of motor controllers should be accomplished in accordance with manufacturer instructions, avoiding the use of compressed air; 7. Lubrication of controller linkages and pivots should be accomplished in accordance with manufacturer instructions; and 8. Prior to placing equipment back into normal service, the controller function shall be thoroughly tested and that all system voltages and current draws are within manufacturer specifications.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.3.A <i>All</i>	Maintenance and repair of electrical and electronic equipment	Detection of electric malfunction, location of faults and measures to prevent damage	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate plans and carries out a logical procedure to detect the location of ground(s) indicated on the main switchboard.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. Ensures that the logic path followed progressively eliminates or reduces possible grounding sources by: <ol style="list-style-type: none"> a. Isolating the circuit breaker panel by sequentially opening each circuit feeder; b. Isolating each circuit by opening each breaker in the panel until the circuit is found; and c. If necessary, isolating each outlet/piece of equipment; 3. Correctly identifies grounding source(s); 4. Correctly describes the actions as they are performed; and 5. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.4.A <i>All</i>	Maintenance and repair of electrical and electronic equipment	Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment Detection of electric malfunction, location of faults and measures to prevent damage Construction and operation of electrical testing and measuring equipment	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate disassembles and reassembles an electric motor.	The candidate: 1. Disassembles an AC or DC electric motor; 1. Thoroughly cleans internal components; 2. Makes continuity and ground tests of stator/rotor coils; 3. Turns/grinds commutator and undercut mica if necessary in a DC motor; 4. Checks, replaces, and fits brushes if applicable; 5. Fits new bearings if necessary; 6. Reassembles the motor; 7. Sets brush tension if applicable; 8. Tests run if possible; and 10. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.5.A <i>All</i>	Maintenance and repair of electrical and electronic equipment	Function and performance tests of the following equipment: .1 Monitoring systems .2 Automatic control devices .3 Protective devices	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	The candidate responds to and clears at least two alarms from the engine control monitoring system.	The candidate: 1. Fills bilge well to test high bilge water alarm and pumps out well to clear alarm; 2. Uses smoke test gear to test two fire alarm sensors and clears out smoke and reset alarm. 3. Takes proper action to prevent safety and pollution violations.
7.5.B <i>All</i>	Maintenance and repair of electrical and electronic equipment	Function and performance tests of the following equipment: .2 Automatic control devices	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	The candidate performs a steering gear test.	The candidate: 1. Using first one, then the other steering gear pump, alternately operates steering gear from maximum port to maximum starboard rudder from the ships wheel, non-follow up switches and local manual control devices; 2. On a running generator, not connected to the bus, shuts off valve to low LO shut down sensor; 3. With one steering gear motor running, interrupts power via circuit breaker on main switchboard to test if other unit starts automatically; and 4. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
7.5.C <i>All</i>	Maintenance and repair of electrical and electronic equipment	Function and performance tests of the following equipment and their configuration: .3 Protective devices	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	The candidate tests a low lube oil (LO) shutdown protective device.	The candidate: 1. On a running generator, not connected to the bus, shuts off valve to low LO shut down sensor; 2. Drains LO from line between valve and sensor; 3. Ensures that engine shuts down; 4. Closes drain valve; open sensor valve; and 5. Restarts engine to confirm proper operation; and 6. Takes proper action to prevent safety and pollution violations.
8.1.A <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	Materials used in construction and repair of ships and equipment Fabrication and repair Fabrication and repair of systems and components Safe working practices Safety measures to ensure a safe working environment and for using hand tools, machine tools and measuring instruments Use of hand tools, machine tools and measuring instruments	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate uses hand and machine tools to fabricate two useful items from the following list, to the satisfaction of, and with tolerances specified by, the assessor.	The candidate plans and fabricates: 1. One of the following: a. Plumb bob; b. Bolt – either SAE or metric – with hex head; c. Threaded pipe nipples and “bell” reducer; d. Parallel clamp; or e. Similar item that may be required on board as directed by the assessor; and 2. One of the following: a. Screw jack; b. Coupling, pipe thread-to-flare tubing – any size; c. Pump shaft; d. Valve stem; or e. Similar item that may be required on board as directed by the assessor.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.1.B <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	<p>Materials used in construction and repair of ships and equipment</p> <p>Fabrication and repair</p> <p>Fabrication and repair of systems and components</p> <p>Safe working practices</p> <p>Safety measures to ensure a safe working environment and for using hand tools, machine tools and measuring instruments</p> <p>Use of hand tools, machine tools and measuring instruments</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate performs several electric arc welding processes.	<p>The candidate, for each weld listed below:</p> <ol style="list-style-type: none"> 1. Prepares required pieces of metal prior to welding; 2. Selects the proper machine settings and electrode for the size and material to be joined; and 3. Performs a post-weld examination and/or test. <p><u>Fillet welds</u></p> <ul style="list-style-type: none"> • Flat plates; • Vertical plates (at right angles); and • Horizontal [flat] pipe (end-to-end). <p><u>Groove welds</u></p> <ul style="list-style-type: none"> • Flat plates; • Vertical plates (at right angles); and • Horizontal [flat] pipe (end-to-end).

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.1.C <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	Materials used in construction and repair of ships and equipment Fabrication and repair Fabrication and repair of systems and components Safe working practices Safety measures to ensure a safe working environment and for using hand tools, machine tools and measuring instruments Use of hand tools, machine tools and measuring instruments	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate uses oxy-acetylene equipment to fabricate a flange to the satisfaction of, and with tolerances specified by, the assessor.	The candidate: 1. Prepares required piece of metal prior to burning; 2. Selects the proper gas pressure settings and cutting tip; and 3. Performs a post-cut examination.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.2.A <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	Methods for carrying out safe emergency and temporary repairs	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate demonstrates the ability to understand the urgency of a problem and carries out safe emergency and temporary repairs.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Isolates the item to be repaired; 2. Wears suitable protective equipment; 3. Selects the proper tools and materials for repair; 4. Uses lockout/tagout principles to keep shipmates informed of his activity; 5. Does not exacerbate the problem; and 6. Takes proper action to prevent safety and pollution violations; and 7. Performs one of the following: <u>Fabricates and installs a “jubilee” pipe patch:</u> <ol style="list-style-type: none"> 1. Isolates the line to be repaired; <ol style="list-style-type: none"> a. Relieves the line of residual pressure. b. Confirms that the pressure has been relieved. c. Drains the line. 2. Rolls a piece of sheet metal into a cylinder; 3. Bends a tab on each edge to form a flange; 4. Drills three to five holes through both flanges for the securing bolts; 5. Puts a piece of rubber or gasket material over the hole that is large enough to cover and overlap the damage at least 2 inches on all sides; 6. Slips the jubilee pipe patch over the rubber or gasket material and Inserts the bolts into the holes and secures them in place; and 7. Slowly applies pressure and check for leaks. <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.2.A <i>Continued</i> <i>All</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <p><u>Fabricates and installs a “soft” patch:</u></p> <ol style="list-style-type: none"> 1. Isolates the line to be repaired; <ol style="list-style-type: none"> a. Relieves the line of residual pressure; b. Confirms that the pressure has been relieved; c. Drains the unit; 2. Reduces the area of the hole first by driving in softwood plugs and wedges as necessary; 3. Once the plugs and wedges are in place, trims them off flush with the outside surface of the pipe; 4. Covers the damaged area with a piece of rubber that will completely cover and extend about 2 inches past the damaged area on all sides; 5. Uses two tightly wound layers of marlin or wire to hold the rubber in place; and 6. Slowly applies pressure and checks for leaks.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.2.B <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	Use of various types of sealants and packings	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate replaces a mechanical seal or repack gland on a centrifugal pump.	The candidate performs the operations as follows: <ol style="list-style-type: none"> 1. Isolates the component to be worked on; 2. Uses lockout/tagout procedures; 3. Selects the correct type of sealant or packing; 4. Prepares sealant/packing to proper size; 5. Cleans/prepares surfaces to receive new seal or packing; 6. In case of mechanical seals, follows manufacturer's instructions; 7. Uses proper tension while tightening bolts; 8. Opens isolation valves slowly to check for leaks; 9. Fully tests new packing before putting unit back in service and 10. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.2.C <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	Use of various types of sealants and packings	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate repacks a valve.	The candidate performs the operations as follows: <ol style="list-style-type: none"> 1. Isolates the component to be worked on; 2. Uses lockout/tagout procedures; 3. Selects the correct type of sealant or packing; 4. Prepares sealant/packing to proper size; 5. Cleans/prepares surfaces to receive new seal or packing; 6. In case of mechanical seals, follows manufacturer's instructions; 7. Uses proper tension while tightening bolts; 8. Opens isolation valves slowly to check for leaks; 9. Fully tests new packing before putting unit back in service and 10. Takes proper action to prevent safety and pollution violations.
8.2.D <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	Use of various types of sealants and packings	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate replaces a flange gasket.	The candidate: <ol style="list-style-type: none"> 1. Isolates the component to be worked on; 2. Uses lockout/tagout procedures; 3. Selects the correct type of sealant or packing; 4. Prepares sealant/packing to proper size; 5. Cleans/prepares surfaces to receive new seal or packing; 6. In case of mechanical seals, follows manufacturer's instructions; 7. Uses proper tension while tightening bolts; 8. Opens isolation valves slowly to check for leaks; 9. Fully tests new packing before putting unit back in service and 10. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.3.A <i>All</i>	Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	<p>Application of Safe working practices in the workshop environment</p> <p>Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments</p> <p>Use of hand tools, machine tools and measuring instruments.</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate opens, cleans, inspects, and closes a lube oil or fuel oil purifier.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Performs a lockout/tagout procedure and informs the engine crew; 2. Closes and secures all liquid inlet and outlet valves; 3. Releases clamp from atop oil input/supply tube; 4. Raises and withdraws input/supply tube to fully extracted position; 5. Releases both frame clamps; 6. Lifts up front end of bowl hood and pivots back to locked position; 7. Carefully and slowly screws in locking bolt while rotating bowl slowly to line up and locate recess provided; 8. Repeats for second locking bolt; 9. Locates and removes bowl cover ring wrench from tool board; 10. Places bowl ring wrench level on bowl ring and gently drives wrench in clock-wise direction to loosen and un-screw ring; 11. Lifts bowl ring and gently sets aside on soft surface; 12. Locates and removes bowl cover-lifting tool from tool board; 13. Places bowl cover-lifting tool around ring dam locking ring, lifts cover and places along-side bowl ring; 14. Removes top disk and gently sets in cleaning fluid (diesel-oil). 15. Firmly grasps distribution tube/disk stack, gently rocking and lifting to dislodge from bowl bottom; 16. Removes distribution tube/disk stack and places on wood stand placed in bottom of cleaning solution receptacle; 17. Removes accumulated sludge from top disk surfaces and wipes down to remove all traces of cleaning solution; <p style="text-align: right;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.3.A <i>Continued</i> <i>All</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 18. Either singularly or as a stack lifts all disks from distribution tube and inverts in cleaning solution; 19. Wipes out bowl with lint-free rag; 20. Cleans sludge deposits from distribution tube and wipes cleaning solution residue from all surfaces; 21. Firmly replaces distribution tube in center of bowl bottom and locks onto locating pin; 22. Uses stiff-bristled brush to remove accumulated sludge from each disk, beginning with “bottom” disk, then wiping off disk surfaces to remove cleaning solution; 23. Places “bottom disk” over distribution tube; 24. Consecutively cleans and places each numbered intermediate disk until all disks have been cleaned and installed; 25. With all intermediate disks in place, positions cleaned top disk onto disk stack; 26. Checks bowl cover gasket for resilience, chipping, or fraying replacing as necessary; 27. Wipes off underside of bowl cover; 28. Places bowl cover in place noting to line up tang on cover to bowl notch; 29. Sets bowl ring in place and rotates counterclockwise by hand until tight; <p style="text-align: center;"><i>Continued on next page</i></p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
8.3.A <i>Continued</i> <i>All</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <p>30. Uses bowl ring wrench to drive bowl ring around until tight (make sure mark on top of bowl ring surface lines up within 1/8-inch of corresponding mark on bowl cover);</p> <p>31. Unscrews side-jacking bolts until bowl can be rotated freely by hand, and without binding;</p> <p>32. Releases bowl frame cover and gently lowers into place;</p> <p>33. Pushes supply tube/arm down and into position, securing with clamp;</p> <p>34. Secures opposite cover clamp; and returns all tools to centrifuge tool board, stows brushes, rags, and cleaning solutions; and</p> <p>35. Takes proper action to prevent safety and pollution violations.</p>

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
9.1.A <i>All</i>	Maintenance and repair of shipboard machinery and equipment	<p>Safety measures for repair and maintenance, including the safe isolation of shipboard machinery and equipment</p> <p>Basic mechanical knowledge and skills</p> <p>Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment</p> <p>Use of specialized tools and measuring instruments</p> <p>Materials in construction of equipment</p> <p>Machinery drawings and handbooks</p> <p>Piping, hydraulic and pneumatic diagrams</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate overhauls a centrifugal pump.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Isolates the item to be repaired; 2. Selects the proper tools and materials for repair; 3. Ensures hoist or other lifting device necessary to support pump body is of correct specification and hooked up properly; 4. Uses lockout/tagout procedures to isolate motor from panel; 5. Marks alignment markings on the two halves of the coupling flanges and then removes the coupling bolts; 6. Shuts suction and discharge valves; 7. Cracks open flanges to drain water out; 8. Removes pump cover, jacking up if necessary; 9. Lifts out pump shaft and impeller; 10. Dismantles the impeller, liner and removes the wearing rings; 11. Removes the gland packing or seal; 12. Inspects pump shaft and casing for erosion, pitting and wear; 13. Rectifies defects with brass putty or other method if required; 14. Replaces excess worn out parts; 15. Checks wear ring clearance, general practice being to replace with new rings; 16. Checks shaft trueness, removes sleeve from shaft, replaces sleeve with 'O' ring (if fitted); 17. Checks key, key slots, nuts and threads for good order; 18. Assembles all pump parts and tests for free rotation; 19. Aligns and tightens coupling; 20. Conducts a test run of the pump; and 21. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
9.1.B <i>All</i>	Maintenance and repair of shipboard machinery and equipment	<p>Appropriate basic mechanical knowledge and skills</p> <p>Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment</p> <p>The use of appropriate specialized tools and measuring instruments</p>	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate tightens an excessively leaking rotary pump packing stuffing box while in operation.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Correctly plans for the job, using the proper sequence of actions to examine an operating rotary pump (without a mechanical seal) to tighten an excessively leaking packing stuffing box and determines if further examination of the pump is required; 2. Determines through visual inspection if leakage of pumped fluid is dripping at an acceptable rate; 3. Determines (for saltwater cooling service) if leakage is cool to the touch; 4. Determines by using a set of dividers if packing is evenly distant from casing; 5. Tightens packing gland by turning both packing gland nuts by a ¼-turn before additional tightening to maintain a parallel position of the gland with the casing; 6. Looks for a reduction in leakage and ascertains by touch if the leakage has become warmer; 7. Continues tightening of the packing gland until the leakage is reduced to a continuous dribble and/or the leakage has begun to warm; and 8. Notifies the senior engineer if leakage flow is not stemmed and/or the leakage has warmed excessively.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
9.1.C <i>All</i>	Maintenance and repair of shipboard machinery and equipment	Appropriate basic mechanical knowledge and skills Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment The use of appropriate specialized tools and measuring instruments	On a vessel of at least 1,000 HP, or in a laboratory or workshop,	the candidate adjusts the stroke of an operating reciprocating pump.	The candidate: 1. Correctly plans for the job, using the proper sequence of actions to examine a direct acting reciprocating pump in operation and to determine if the pumping strokes in each direction are equal and not excessive; 2. Checks to ensure that one stroke is not longer than the other (if so, the opposite tappet to the lengthy stroke is to be loosened and moved towards the moving tappet by no more than ¼-inch and re-tightened); 3. Monitors pump operation and, if necessary, loosens and moves the tappet again; 4. Checks if the pump strokes are excessive in both directions, with the pump stopped (if so, both tappets are to be loosened and moved towards the moving tappet by no more than ¼-inch); 5. Re-starts the pump, observes for proper operation; 6. Checks if pump strokes continue to be too long (if so, gradually adjusts the tappets until satisfactory); and 7. Takes proper action to prevent safety and pollution violations.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
10.1.A <i>All</i>	Ensure compliance with pollution prevention requirements.	Prevention of pollution of the marine environment Knowledge of the precautions to be taken to prevent pollution of the marine environment Anti-pollution procedures and all associated equipment Importance of proactive measures to protect the marine environment	On a vessel of at least 1,000 HP; or in a laboratory or workshop;	the candidate puts into service and then secures the sewage waste-treatment plant.	The candidate: 1. Describes the vessel's environmental compliance plan and how it relates to the sewage waste-treatment plant; 2. Ensures that the plan reflects proper sequences of actions are complete, and that it conforms to the directions and requirements of both the manufacturer's instructions and ship's procedures; 3. Successfully puts into service and secures the sewage waste-treatment according to plan; 4. Correctly describes the actions as they are being performed; and 5. Takes proper action to prevent safety and pollution violations.

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
10.1.B <i>All</i>	Ensure compliance with pollution prevention requirements.	Prevention of pollution of the marine environment Knowledge of the precautions to be taken to prevent pollution of the marine environment Anti-pollution procedures and all associated equipment Importance of proactive measures to protect the marine environment	On a vessel of at least 1,000 HP; or in a laboratory or workshop as part of an approved course,	the candidate puts into service and then secures the oily-water separator/oil content monitor system.	The candidate: 1. Describes the vessel's environmental compliance plan and how it relates to oily-water separator/oil content monitor system; 2. Ensures that the plan reflects proper sequences of actions are complete, and conforms to the directions and requirements of both the manufacturer's instructions and ship's procedures; 3. Successfully puts into service and secures the oily-water separator/oil content monitor system according to plan; 4. Correctly describes the actions as they are being performed; and 5. Takes proper action to prevent safety and pollution violations.
11.1.A <i>All</i>	Maintain seaworthiness of the ship <i>Ship stability & construction</i>	Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment	Onboard ship or in a laboratory, when asked by a Qualified Assessor and given stability, trim and stress tables, and diagrams,	the candidate determines stability data for vessel.	The candidate determines stability data for vessel and describes whether the stability conditions comply with the IMO intact stability criteria under all conditions of vessel loading.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
11.2.A <i>All</i>	Maintain seaworthiness of the ship	Understanding of the fundamentals of watertight integrity	Onboard ship or in a laboratory, when asked by a Qualified Assessor,	the candidate describes the actions to ensure and maintain the watertight integrity of the ship.	The candidate 's description includes: 1. Stability conditions comply with the IMO intact stability criteria under all conditions of loading; and 2. Watertight integrity of the ship is in accordance with accepted practice.
11.3.A <i>All</i>	Maintain seaworthiness of the ship	Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy	Onboard ship or in a laboratory, when asked by a Qualified Assessor,	the candidate describes actions to be taken for a partial loss of intact buoyancy.	The candidate describes actions that maintain the watertight integrity of the ship and are in accordance with accepted practice.
11.4.A <i>All</i>	Maintain seaworthiness of the ship	General knowledge of the principal structural members of a ship and the proper names for the various parts	Onboard ship or in a laboratory, when asked by a Qualified Assessor,	the candidate describes principal structure members of a ship and the proper names for the various parts.	The candidate correctly identifies and describes the ship's structural members.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
12.1.A <i>All Course</i>	Prevent, control and fight fires on board	Fire prevention and fire-fighting appliances 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			These KUPs are demonstrated by successfully completing approved or accepted training in <i>Basic and Advanced Fire Fighting</i> .

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
13.1.A <i>All Course</i>	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			This KUP is demonstrated by successfully completing approved or accepted training for either <i>Proficiency in Survival Craft and Rescue Boats, other than Fast Rescue Boats</i> or <i>Proficiency in Survival Craft and Rescue Boats, other than Lifeboats and Fast Rescue Boats</i> or by holding an endorsement for PSC or PSC-Limited.
14.1.A <i>All Course</i>	Apply medical first aid on board ship	Medical aid Practical application of medical guides and advice by radio, including ability to take effective action in the case of accidents or illnesses that are likely to occur			This KUP is demonstrated by successfully completing an approved or accepted <i>Medical First Aid Provider</i> or <i>Medical Care Provider</i> course.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
15.1.A <i>All</i>	Monitor compliance with legislative requirements	Basic working knowledge of the relevant IMO conventions concerning safety of life at sea and protection of the marine environment	Onboard ship or in a laboratory, when asked by a Qualified Assessor,	the candidate describes legislative requirements relating to safety of life at sea, security and protection of the environment.	The candidate describes appropriate legislative requirements.
16.1.A <i>All</i>	Application of leadership and teamworking skills	Working knowledge of shipboard personnel management and training	Aboard ship or in an approved training program, when asked by a Qualified Assessor,	the candidate describes the basic duties and responsibilities of vessel personnel.	The candidate describes the duties and responsibilities of: <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; 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; f. Entry Level Engine; 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
16.2.A <i>All</i>	Application of leadership and team working skills	A knowledge of related international maritime conventions and recommendations, and national legislation	Aboard ship or in an approved training program, when asked by a Qualified Assessor,	the candidate describes the basic international maritime conventions and national regulations.	<p>The candidate describes the basic international conventions and location of information concerning these programs aboard ship related to:</p> <ol style="list-style-type: none"> 1. International Convention for the Safety of Life at Sea (SOLAS); 2. International Ship and Port Facility Security Code (ISPS); 3. International Safety Management Code (ISM); 4. International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978, as amended (STCW); 5. MARPOL 73/78 and its Annexes; 6. Oil Pollution Act of 1990 (OPA 90); 7. United States laws and regulations on inspection and manning of vessels; 8. United States laws and regulations on shipment and discharge of seamen; 9. U. S. Coast Guard chemical testing requirements (46 CFR Part 16); 10. Department of Transportation Hazardous Materials training requirements; and 11. Onboard contracts, including labor contracts.

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
16.3.A <i>All</i>	Application of leadership and team working skills	<p>Ability to apply task and workload management, and effective resource management including:</p> <ul style="list-style-type: none"> .1 Planning and co-ordination .2 Personnel assignment .3 Time and resource constraints .4 Prioritization .5 Allocation, assignment, and prioritization of resources .6 Effective communication onboard and ashore .7 Decisions reflect consideration of team experiences .8 Assertiveness and leadership, including motivation .9 Obtaining and maintaining situational awareness 	On a vessel or on a simulator,	the candidate plans for and assists in taking on bunkers.	<p>The candidate:</p> <ol style="list-style-type: none"> 1. Meets with the Chief and Second Assistant Engineers to plan and schedule the order of events in anticipation of the shore-side bunker hose connection or bunker barge arrival; 2. Follows anti-pollution procedures (e.g., plug scuppers, provide vent drip buckets and absorbent medium, etc.); 3. Transfers oil internally (under supervision) if required; 4. Sound tanks and records levels that are planned to receive bunkers; 5. Helps identify and train subordinate personnel who will be assigned to help sound filling tanks and/or communicate with pumping personnel; 6. Supervises/assists in the connection of the bunker hose to the vessel taking particular note of type and condition of flange gasket(s); 7. Reads and discusses the Declaration of Inspection; 8. Checks hose connections for tightness and proper valve line-up; 9. Tests methods of communication with barge/shore side, deck and engine room, and sounding personnel; 10. Notifies both the mate and engineer on watch before commencing operations; 11. Starts process slowly; checking for leaks in hoses and connections; <p style="text-align: right;"><i>Continued on next page</i></p>

Successful completion of these Assessment Guidelines will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and alternative means of having achieved the standards of 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.

Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
16.3.A <i>Continued</i> <i>All</i>					<p style="text-align: center;"><i>Continued from previous page</i></p> <ol style="list-style-type: none"> 12. Takes required samples directly from barge tanks or sample valve on hose/flange; 13. Tests sample of incoming oil with respect to specific gravity, viscosity, sediment, water content, etc., if such testing equipment is on board; 14. Assists in monitoring progress, flow rates, sounding of tanks, topping off, and changing over tanks according to plan; 15. Periodically checks bilges for oil content if oil is flowing through piping in the engine room (filling double-bottom tanks); 16. Slows bunkering rate as last tank is being filled and secures operations as level approaches predetermined value; 17. Assists in securing from the evolution; and 18. Assists in making proper entries into Engine Log and Oil Record Books

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
16.4.A <i>All</i>	Application of leadership and team working skills	<p>Knowledge and ability to apply decision-making techniques:</p> <p>.1 Situation and risk assessment</p> <p>.2 Identify and consider generated options</p> <p>.3 Selecting course of action</p> <p>.4 Evaluation of outcome effectiveness</p>	On board a vessel or in an approved training program, during a fire or emergency simulation,	the candidate supervises a fire or emergency team under the supervision of the normally assigned supervisor.	<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.

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Task No.	STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
17.1.A <i>All Course</i>	Contribute to the safety of personnel and ship	Knowledge of personal survival techniques Knowledge of fire prevention and ability to fight and extinguish fires Knowledge of elementary first aid Knowledge of personal safety and social responsibilities			These KUPs are demonstrated by successful completion of approved or accepted <i>Basic Training</i> or presents evidence of maintaining the standards of competence in <i>Basic Training</i> .

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Record of Assessment
for
**OFFICER IN CHARGE OF AN
ENGINEERING WATCH**

Candidate's Name

Candidate's Signature

Candidate's Mariner Reference No.

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

NOTE TO QUALIFIED ASSESSOR(S): In performing your function as a Qualified Assessor, you may use your initials only to indicate you have personally witnessed the demonstration of skill or ability by the person being assessed. The Assessment Guidelines in Enclosure (2) will provide satisfactory evidence of meeting the standard of competence specified in Section A-III/1 of the STCW Code. The use of these Assessment Guidelines is not mandatory and an alternative means of having achieved the standards of 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.

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Maintain a safe engineering watch	Thorough knowledge of principles to be observed in keeping an engineering watch	1.1.A	Inspect machinery space; take over watch		
		1.1.B <i>Note 5</i>	Keep watch (Motor)		
		1.1.C <i>Note 1</i>	Keep watch (Steam)		
		1.1.D <i>Note 4</i>	Keep watch (Gas Turbine)		
		1.1.E	Maintain log book		
		1.1.F	Hand over watch		

Notes:

- Note 1* A candidate who does not perform this task will receive an endorsement that is not valid for steam vessels.
- Note 2* A candidate who does not perform this task will receive an endorsement that is limited to motor and/or gas-turbine propelled vessels without distilling plants.
- Note 3* A candidate who does not perform this task will receive an endorsement that is limited to motor and/or gas-turbine propelled vessels without waste-heat or auxiliary boilers.
- Note 4* A candidate who does not perform this task will receive an endorsement that is not valid for gas-turbine propelled vessels.
- Note 5* A candidate who does not perform this task will receive an endorsement that is not valid for motor vessels.
- Note 6* A candidate who does not perform this task will receive an endorsement that is not valid for motor or gas-turbine propelled vessels.
- Course* The assessment is satisfied by completion of an appropriate approved or accepted course.

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Maintain a safe engineering watch	Safety and emergency procedures; change-over of remote/automatic to local control of all systems	1.2.A	Change-over procedures from remote/automatic to local control systems		
	Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil systems	1.3.A	Observe safety precautions during watch		
		1.3.B	Take immediate action in the event of fire		
		1.3.C	Take immediate action in the event of accident		
		1.3.D	Take immediate action in the event of oil system fire or accident		
	Engine room resource management	1.4.A	Demonstrate knowledge of Engine Room Resource Management (ERM) principles	COURSE	
Use English in written and oral form	Adequate knowledge of the English language to enable the officer to use engineering publications and to perform engineering duties	2.1.A	Complete written examination for a corresponding National Officer Endorsement	COURSE	
Use internal communication systems	Operation of all internal communication systems on board	3.1.A	Demonstrate the ability to assist in testing internal communications, (e.g., sound powered phone, portable radio), engine order telegraph, alarm systems, and ship's whistle		
Operate main and auxiliary machinery and associated control systems	Basic construction and operation principles of machinery systems	4.1.A	Demonstrate understanding of basic construction and operating principles of engine room and deck equipment		
		4.1.B <i>Note 1</i>	Light off a main propulsion boiler		
		4.1.C <i>Note 1</i>	Secure a main propulsion boiler		

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Operate main and auxiliary machinery and associated control systems	Safety and emergency procedures for operation of propulsion plant machinery, including control systems	4.2.A	Understand safety and emergency procedures for operation of propulsion plant machinery including control systems		
		4.2.B <i>Note 1</i>	Identify action to be taken in event of a propulsion boiler carry-over		
		4.3.A <i>Note 5</i>	Assist in preparing main propulsion diesel engine for operation		
	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems	4.3.A <i>Note 1</i>	Assist in preparing main steam turbine for operation		
		4.3.B <i>Note 4</i>	Assist in preparing main gas turbine for operation		
		4.3.C <i>Note 5</i>	Monitor main diesel engine operation		
		4.3.D <i>Note 1</i>	Monitor main steam turbine operation		
		4.3.E <i>Note 4</i>	Monitor main gas turbine operation		
		4.3.F <i>Note 5</i>	Assist in securing main propulsion diesel		
		4.3.G <i>Note 1</i>	Assist in securing main steam turbine operation		
		4.3.H <i>Note 4</i>	Assist in securing main gas turbine operation		
		4.3.I <i>Notes 4, 5</i>	Monitor the oil-fired or waste heat auxiliary boiler		
		4.3.J <i>Note 1</i>	Test boiler water		
		4.3.K <i>Note 1</i>	Control boiler water quality		
		4.3.L <i>Note 1</i>	Bottom blow boiler		
		4.3.M	Secure on line low pressure air compressor and start up and place on line standby unit		
		4.3.N <i>Note 5</i>	Start fresh water generator <i>No. 4.3.U may be used as a substitute</i>		

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Operate main and auxiliary machinery and associated control systems	Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems	4.3.O <i>Note 5</i>	Shut down fresh water generator <i>No. 4.3.U may be used as a substitute</i>		
		4.3.P <i>Note 2</i>	Start fresh water distiller		
		4.3.Q <i>Note 2</i>	Shut down fresh water distiller		
		4.3.R	Start automated/ non-automated purification plant		
		4.3.S	Shut down fuel oil or lube oil purifier		
		4.3.T	Start ,an A/C or refrigeration system		
		4.3.U	Monitor an A/C or refrigeration system		
		4.3.V	Secure an A/C or refrigeration system		
		4.3.W	Monitor a reverse osmosis plant <i>Nos. 4.3.N & O may be used as a substitute</i>		
Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operational characteristics of pumps and piping systems including control systems	5.1.A	Demonstrate understanding of operating characteristics of pumps and piping systems including control systems		
	Operation of pumping systems	5.2.A	Plan for and conduct an onboard fuel transfer		
		5.2.B	Plan for and conduct a ballasting of a double-bottom or wing tank		
		5.2.C	Plan for and conduct a de-ballasting of a double-bottom or wing tank		
		5.2.D	Plan for and pump out the engine room bilge wells		
		5.2.E	Plan for and pump out a cargo-hold or the shaft alley bilge wells		
Oily-water separators (or similar equipment) requirements and operation	5.3.A	Monitor the oily-water separator system			

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Operate electrical, electronic, and control systems	Basic configuration and operation principles of electrical, electronic and control equipment	6.1.A	Operating characteristics of the electrical generating and distribution systems		
		6.1.B <i>Note 5</i>	Conduct pre-start inspection and start a diesel generator		
		6.1.C <i>Note 1</i>	Conduct pre-start inspection and start a steam turbo-generator		
		6.1.D	Connect ship service generator to main switchboard and remove one from the line		
		6.1.E	Demonstrate knowledge of motor controllers, other sequential control system, and high voltage circuits		
	Electronic equipment	6.2.A	Demonstrate knowledge of basic electronic elements and diagrams		
	Control systems	6.3.A	Describe the fundamentals of automation and control system technology		
Maintenance and repair of electrical and electronic equipment	Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required The interpretation of electrical and simple electronic diagrams	7.1.A	Plan for and use test equipment		
		Maintenance and repair of electrical system equipment, switchboards, electric motors, generator, and DC electrical systems and equipment	7.2.A	Troubleshoot a malfunctioning motor controller	
		7.2.B	Repair a malfunctioning motor controller		
	Detection of electric malfunction, location of faults and measures to prevent damage	7.3.A	Detect location of grounds		
	Construction and operation of electrical testing and measuring equipment	7.4.A	Disassemble and reassemble an electric motor		
	Function and performance tests of the equipment and their configuration:	7.5.A	Respond to and clear at least 2 alarms from the engine control monitoring system		
		7.5.B	Steering gear test		
		7.5.C	Test low lube oil (LO) shutdown protective device		

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Appropriate use of hand tools, machine tools, and measuring instruments for fabrication and repair on board	Materials used in construction and repair ships and equipment.	8.1.A	Hand and machine tool projects		
	Processes used for fabrication and repair Fabrication and repair of systems and components.	8.1.B	Welding projects		
	Safe working practices in the workshop. Safety measures to ensure a safe working environment	8.1.C	Oxy-acetylene cutting project		
	Use of hand tools, machine tools and measuring instruments	8.2.A	Demonstrate ability to understand urgency of problem and carry out safe emergency/temporary repairs		
	Methods for carrying out safe emergency and temporary repairs	8.2.B	Replace or repack a mechanical seal or gland on a centrifugal pump		
	Use of various types of sealants and packings	8.2.C	Repack a valve		
		8.2.D	Replace a flange gasket		
	Application of safe working practices Safety measures to be taken Use of hand tools	8.3.A	Open, clean, inspect and close a lube oil or fuel oil purifier		

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Maintenance and repair of shipboard machinery and equipment	Safety measures for repair and maintenance, including the safe isolation of shipboard machinery and equipment Basic mechanical knowledge and skills Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment Use of specialized tools and measuring instruments Design characteristics and selection of materials in construction of equipment Machinery drawings and handbooks Piping, hydraulic and pneumatic diagrams	9.1.A	Overhaul a centrifugal pump or reciprocating pump		
		9.1.B	Tighten an excessively leaking rotary pump packing stuffing box while in operation		
		9.1.C	Adjust an operating reciprocating pump stroke rate		
Ensure compliance with pollution prevention requirements	Prevention of pollution of the marine environment Knowledge of precautions to prevent pollution of the marine environment Anti-pollution procedures and all associated equipment Importance of proactive measures to protect the marine environment	10.1.A	Put into service and then secure the sewage waste-treatment plant		
		10.1.B	Put into service and then secure the oily-water separator/oil content monitor system		
Maintain seaworthiness of the ship	Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment	11.1.A	Determine stability data for vessel		
	Understanding of the fundamentals of watertight integrity	11.2.A	Actions to ensure and maintain the watertight integrity of the ship		
	Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy	11.3.A	Describe actions to be taken for a partial loss of intact buoyancy		
	General knowledge of the principal structural members of a ship and the proper names for the various parts	11.4.A	Describe principal structure members of a ship and the proper names for various parts		
Prevent, control and fight fires on board	Fire prevention and fire-fighting appliances	12.1.A	Successfully complete approved or accepted <i>Basic and Advanced Fire-Fighting</i> courses	COURSE	

**RECORD OF ASSESSMENT
OFFICER IN CHARGE OF AN ENGINEERING WATCH**

STCW Competence	Knowledge, Understanding, and Proficiency	Task No.	Task Description	Assessor's Initials	Date
Operate life-saving appliances	Life-saving 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	13.1.A	Successfully complete an approved or accepted <i>Proficiency in Survival Craft</i> course	COURSE	
Apply medical first aid on board ship	Medical aid Practical application of medical guides and advice by radio, including ability to take effective action based on such knowledge in the case of accidents or illnesses likely to occur on board ship	14.1.A	Successfully complete an approved or accepted <i>Medical First Aid Provider</i> course	COURSE	
Monitor compliance with legislative requirements	Basic working knowledge of the relevant IMO conventions concerning safety of life at sea and protection of the marine environment	15.1.A	Demonstrate the ability to use and understand the SOLAS, MARPOL and STCW Conventions.		
Application of leadership and team-working skills	Working knowledge of shipboard personnel management and training	16.1.A	Describe the basic duties and responsibilities of vessel personnel		
	A knowledge of related international maritime conventions and recommendations, and national legislation	16.2.A	Describe the basic international maritime conventions and national regulations		
	Ability to apply task and workload management, and effective resource management	16.3.A	Plan for and assist in taking on bunkers		
	Knowledge and ability to apply decision-making techniques	16.4.A	Supervise a fire or emergency team		
Contribute to the safety of personnel and ship	Knowledge of personal survival techniques Knowledge of fire prevention and ability to fight and extinguish fires Knowledge of elementary first aid Knowledge of personal safety and social responsibilities	17.1.A	Successfully complete approved <i>Basic Training</i> or present evidence of maintaining the standards of competence in <i>Basic Training</i>		

Excerpts from the International Convention on Standards of Training,
Certification and Watchkeeping for Seafarers, 1978, as amended

and

Seafarers' Training, Certification and Watchkeeping Code, as amended

Notice: These excerpts are provided for background information. By themselves, they do not constitute Coast Guard policy.

The Manila Amendments to the annex to the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978

Chapter I
General provisions

Regulation I/6

Training and assessment

Each party shall ensure that:

- .1 the training and assessment of seafarers, as required under the Convention, are administered, supervised and monitored in accordance with the provisions of section A-I/6 of the STCW Code; and
- .2 those responsible for the training and assessment of competence of seafarers, as required under the Convention, are appropriately qualified in accordance with the provisions of section A-I/6 of the STCW Code for the type and level of training and assessment involved.

Regulation I/12

Use of Simulators

1 The performance standards and other provisions set forth in section A-I/12 and such other requirements as are prescribed in part A of the STCW Code for any certificate concerned shall be complied with in respect of:

- .1 all mandatory simulator-based training;
- .2 any assessment of competency required by part A of the STCW Code which is carried out by means of a simulator; and
- .3 any demonstration, by means of a simulator, of continued proficiency required by part A of the STCW Code.

Chapter III

Standards regarding the engine department

Regulation III/1

Mandatory minimum requirements for certification of officers in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine-room

1 Every officer in charge of an engineering watch in a manned engine-room or designated duty engineer officer in a periodically unmanned engine-room on a seagoing ship powered by main propulsion machinery of 750 kW propulsion power or more shall hold a certificate of competency.

2 Every candidate for certification shall:

- .1 be not less than 18 years of age;
- .2 have completed combined workshop skills training and an approved seagoing service of not less than 12 months as part of an approved training programme which includes onboard training that meets the requirements of section A-III/1 of the STCW Code

and is documented in an approved training record book, or otherwise have completed combined workshop skills training and an approved seagoing service of not less than 36 months of which not less than 30 months shall be seagoing service in the engine department;

- .3 have performed, during the required seagoing service, engine-room watchkeeping duties under the supervision of the chief engineer officer or a qualified engineer officer for a period of not less than six months;
- .4 have completed approved education and training and meet the standard of competence specified in section A-III/1 of the STCW Code; and
- .5 meet the standard of competence specified in section A-VI/1, paragraph 2, section A-VI/2, paragraphs 1 to 4, section A-VI/3, paragraphs 1 to 4 and section A-VI/4, paragraphs 1 to 3 of the STCW Code.

Chapter VIII Watchkeeping

Regulation VIII/2

Watchkeeping arrangements and principles to be observed

1 Administrations shall direct the attention of companies, masters, chief engineer officers and all watchkeeping personnel to the requirements, principles and guidance set out in the STCW Code which shall be observed to ensure that a safe continuous watch or watches appropriate to the prevailing circumstances and conditions are maintained on all seagoing ships at all times.

2 Administrations shall require the master of every ship to ensure that watchkeeping arrangements are adequate for maintaining a safe watch or watches, taking into account the prevailing circumstances and conditions and that, under the master's general direction:

- .1 officers in charge of the navigational watch are responsible for navigating the ship safely during their periods of duty, when they shall be physically present on the navigating bridge or in a directly associated location such as the chartroom or bridge control room at all times;
- .2 radio operators are responsible for maintaining a continuous radio watch on appropriate frequencies during their periods of duty;
- .3 officers in charge of an engineering watch, as defined in the STCW Code, under the direction of the chief engineer officer, shall be immediately available and on call to attend the machinery spaces and, when required, shall be physically present in the machinery space during their periods of responsibility;
- .4 an appropriate and effective watch or watches are maintained for the purpose of safety at all times, while the ship is at anchor or moored and, if the ship is carrying hazardous cargo, the organization of such watch or watches takes full account of the nature, quantity, packing and stowage of the hazardous cargo and of any special conditions prevailing on board, afloat or ashore; and
- .5 as applicable, an appropriate and effective watch or watches are maintained for the purposes of security.

**The Manila Amendments to the Seafarers' Training, Certification and Watchkeeping
(STCW) Code**

Chapter I

Standards regarding general provisions

Section A-I/6

Training and assessment

1 Each Party shall ensure that all training and assessment of seafarers for certification under the Convention is:

- .1** structured in accordance with written programmes, including such methods and media of delivery, procedures, and course material as are necessary to achieve the prescribed standard of competence; and
- .2** conducted, monitored, evaluated and supported by persons qualified in accordance with paragraphs 4, 5 and 6.

2 Persons conducting in-service training or assessment on board ship shall only do so when such training or assessment will not adversely affect the normal operation of the ship and they can dedicate their time and attention to training or assessment.

Qualifications of instructors, supervisors and assessors*

3 Each Party shall ensure that instructors, supervisors and assessors are appropriately qualified for the particular types and levels of training or assessment of competence of seafarers either on board or ashore, as required under the Convention, in accordance with the provisions of this section.

In-service training

4 Any person conducting in-service training of a seafarer, either on board or ashore, which is intended to be used in qualifying for certification under the Convention, shall:

- .1** have an appreciation of the training programme and an understanding of the specific training objectives for the particular type of training being conducted;
- .2** be qualified in the task for which training is being conducted; and
- .3** if conducting training using a simulator:
 - .3.1** have received appropriate guidance in instructional techniques involving the use of simulators; and
 - .3.2** have gained practical operational experience on the particular type of simulator being used.

5 Any person responsible for the supervision of in-service training of a seafarer intended to be used in qualifying for certification under the Convention shall have a full understanding of the training programme and the specific objectives for each type of training being conducted.

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

Assessment of competence

6 Any person conducting in-service assessment of competence of a seafarer, either on board or ashore, which is intended to be used in qualifying for certification under the Convention, shall:

- .1** have an appropriate level of knowledge and understanding of the competence to be assessed;
- .2** be qualified in the task for which the assessment is being made;
- .3** have received appropriate guidance in assessment methods and practice;
- .4** have gained practical assessment experience; and
- .5** if conducting assessment involving the use of simulators, have gained practical assessment experience on the particular type of simulator under the supervision and to the satisfaction of an experienced assessor.

Training and assessment within an institution

7 Each Party which recognizes a course of training, a training institution, or a qualification granted by a training institution, as part of its requirements for the issue of a certificate required under the Convention, shall ensure that the qualifications and experience of instructors and assessors are covered in the application of the quality standard provisions of section A-I/8. Such qualification, experience and application of quality standards shall incorporate appropriate training in instructional techniques, and training and assessment methods and practice, and shall comply with all applicable requirements of paragraphs 4 to 6.

Section A-I/12

Standards governing the use of simulators

Part 1 – Performance standards

General performance standards for simulators used in training

- 1** Each Party shall ensure that any simulator used for mandatory simulator-based training shall:
 - .1** be suitable for the selected objectives and training tasks;
 - .2** be capable of simulating the operating capabilities of shipboard equipment concerned, to a level of physical realism appropriate to training objectives, and include the capabilities, limitations and possible errors of such equipment;
 - .3** have sufficient behavioural realism to allow a trainee to acquire the skills appropriate to the training objectives;
 - .4** provide a controlled operating environment, capable of producing a variety of conditions, which may include emergency, hazardous or unusual situations relevant to the training objectives;
 - .5** provide an interface through which a trainee can interact with the equipment, the simulated environment and, as appropriate, the instructor; and

- .6 permit an instructor to control, monitor and record exercises for the effective debriefing of trainees.

General performance standards for simulators used in assessment of competence

2 Each Party shall ensure that any simulator used for the assessment of competence required under the Convention or for any demonstration of continued proficiency so required shall:

- .1 be capable of satisfying the specified assessment objectives;
- .2 be capable of simulating the operational capabilities of the shipboard equipment concerned to a level of physical realism appropriate to the assessment objectives, and include the capabilities, limitations and possible errors of such equipment;
- .3 have sufficient behavioural realism to allow a candidate to exhibit the skills appropriate to the assessment objectives;
- .4 provide an interface through which a candidate can interact with the equipment and simulated environment;
- .5 provide a controlled operating environment, capable of producing a variety of conditions, which may include emergency, hazardous or unusual situations relevant to assessment objectives; and
- .6 permit an assessor to control, monitor and record exercises for the effective assessment of the performance of candidates.

* * * * *

Part 2 – Other provisions

Simulator training objectives

6 Each Party shall ensure that the aims and objectives of simulator-based training are defined within an overall training programme and that specific training objectives and tasks are selected so as to relate as closely as possible to shipboard tasks and practices.

Training procedures

- 7 In conducting mandatory simulator-based training, instructors shall ensure that:
- .1 trainees are adequately briefed beforehand on the exercise objectives and tasks and are given sufficient planning time before the exercise starts;
 - .2 trainees have adequate familiarization time on the simulator and with its equipment before any training or assessment exercise commences;
 - .3 guidance given and exercise stimuli are appropriate to the selected exercise objectives and tasks and to the level of trainee experience;
 - .4 exercises are effectively monitored, supported as appropriate by audio and visual observation of trainee activity and pre- and post-exercise evaluation reports;

- .5 trainees are effectively debriefed to ensure that training objectives have been met and that operational skills demonstrated are of an acceptable standard;
- .6 the use of peer assessment during debriefing is encouraged; and
- .7 simulator exercises are designed and tested so as to ensure their suitability for the specified training objectives.

Assessment procedures

- 8 Where simulators are used to assess the ability of candidates to demonstrate levels of competency, assessors shall ensure that:
 - .1 performance criteria are identified clearly and explicitly and are valid and available to the candidates;
 - .2 assessment criteria are established clearly and are explicit to ensure reliability and uniformity of assessment and to optimize objective measurement and evaluation, so that subjective judgements are kept to the minimum;
 - .3 candidates are briefed clearly on the tasks and/or skills to be assessed and on the tasks and performance criteria by which their competency will be determined;
 - .4 assessment of performance takes into account normal operating procedures and any behavioural interaction with other candidates on the simulator or with simulator staff;
 - .5 scoring or grading methods to assess performance are used with caution until they have been validated; and
 - .6 the prime criterion is that a candidate demonstrates the ability to carry out a task safely and effectively to the satisfaction of the assessor.

Qualifications of instructors and assessors^{*}

- 9 Each Party shall ensure that instructors and assessors are appropriately qualified and experienced for the particular types and levels of training and corresponding assessment of competence as specified in regulation I/6 and section A-I/6.

Chapter III

Standards regarding the engine department

Section A-III/1

Mandatory minimum requirements for certification of officers in charge of an engineering watch in a manned engine-room or as designated duty engineers in a periodically unmanned engine-room

Training

- 1 The education and training required by paragraph 2.4 of regulation III/1 shall include training in mechanical and electrical workshop skills relevant to the duties of an engineer officer.

^{*} The relevant IMO Model Course(s) and resolution MSC.64(67), *Recommendations on new and amended performance standards*, may be of assistance in the preparation of courses.

Onboard training

2 Every candidate for certification as officer in charge of an engineering watch in a manned engine-room or as designated duty engineer in a periodically unmanned engine-room of ships powered by main propulsion machinery of 750 kW or more whose seagoing service, in accordance with paragraph 2.2 of regulation III/1, forms part of a training programme approved as meeting the requirements of this section shall follow an approved programme of onboard training which:

- .1** ensures that, during the required period of seagoing service, the candidate receives systematic practical training and experience in the tasks, duties and responsibilities of an officer in charge of an engine-room watch, taking into account the guidance given in section B-III/1 of this Code;
- .2** is closely supervised and monitored by a qualified and certificated engineer officer aboard the ships in which the approved seagoing service is performed; and
- .3** is adequately documented in a training record book.

Standard of competence

3 Every candidate for certification as officer in charge of an engineering watch in a manned engine-room or as designated duty engineer in a periodically unmanned engine-room on a seagoing ship powered by main propulsion machinery of 750 kW propulsion power or more shall be required to demonstrate ability to undertake, at the operational level, the tasks, duties and responsibilities listed in column 1 of table A-III/1.

4 The minimum knowledge, understanding and proficiency required for certification is listed in column 2 of table A-III/1.

5 The level of knowledge of the material listed in column 2 of table A-III/1 shall be sufficient for engineer officers to carry out their watchkeeping duties.*

6 Training and experience to achieve the necessary theoretical knowledge, understanding and proficiency shall be based on section A-VIII/2, part 4-2 – Principles to be observed in keeping an engineering watch, and shall take into account the relevant requirements of this part and the guidance given in part B of this Code.

7 Candidates for certification for service in ships in which steam boilers do not form part of their machinery may omit the relevant requirements of table A-III/1. A certificate awarded on such a basis shall not be valid for service on ships in which steam boilers form part of a ship's machinery until the engineer officer meets the standard of competence in the items omitted from table A-III/1. Any such limitation shall be stated on the certificate and in the endorsement.

8 The Administration may omit knowledge requirements for types of propulsion machinery other than those machinery installations for which the certificate to be awarded shall be valid. A certificate awarded on such a basis shall not be valid for any category of machinery installation which has been omitted until the engineer officer proves to be competent in these knowledge requirements. Any such limitation shall be stated on the certificate and in the endorsement.

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

9 Every candidate for certification shall be required to provide evidence of having achieved the required standard of competence in accordance with the methods for demonstrating competence and the criteria for evaluating competence tabulated in columns 3 and 4 of table A-III/1.

Near-coastal voyages

10 The requirements of paragraphs 2.2 to 2.5 of regulation III/1 relating to level of knowledge, understanding and proficiency required under the different sections listed in column 2 of table A-III/1 may be varied for engineer officers of ships powered by main propulsion machinery of less than 3,000 kW propulsion power engaged on near-coastal voyages, as considered necessary, bearing in mind the effect on the safety of all ships which may be operating in the same waters. Any such limitation shall be stated on the certificate and in the endorsement.

Table A-III/1

Specification of minimum standard of competence for officers in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine-room

Function: Marine engineering at the operational level

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Maintain a safe engineering watch	<p>Thorough knowledge of Principles to be observed in keeping an engineering watch, including:</p> <p>.1 duties associated with taking over and accepting a watch</p> <p>.2 routine duties undertaken during a watch</p> <p>.3 maintenance of the machinery space logs and the significance of the readings taken</p> <p>.4 duties associated with handing over a watch</p> <p>Safety and emergency procedures; change-over of remote/automatic to local control of all systems</p> <p>Safety precautions to be observed during a watch and immediate actions to be taken in the event of fire or accident, with particular reference to oil systems</p>	<p>Assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>The conduct, handover and relief of the watch conforms with accepted principles and procedures</p> <p>The frequency and extent of monitoring of engineering equipment and systems conforms to manufacturers' recommendations and accepted principles and procedures, including Principles to be observed in keeping an engineering watch</p> <p>A proper record is maintained of the movements and activities relating to the ship's engineering systems</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Maintain a safe engineering watch (continued)	<p><i>Engine-room resource management</i></p> <p>Knowledge of engine-room resource management principles, including:</p> <ul style="list-style-type: none"> .1 allocation, assignment, and prioritization of resources .2 effective communication .3 assertiveness and leadership .4 obtaining and maintaining situational awareness .5 consideration of team experience 	<p>Assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved training .2 approved in-service experience .3 approved simulator training 	<p>Resources are allocated and assigned as needed in correct priority to perform necessary tasks</p> <p>Communication is clearly and unambiguously given and received</p> <p>Questionable decisions and/or actions result in appropriate challenge and response</p> <p>Effective leadership behaviours are identified</p> <p>Team member(s) share accurate understanding of current and predicted engine-room and associated systems state, and of external environment</p>
Use English in written and oral form	Adequate knowledge of the English language to enable the officer to use engineering publications and to perform engineering duties	Examination and assessment of evidence obtained from practical instruction	<p>English language publications relevant to engineering duties are correctly interpreted</p> <p>Communications are clear and understood</p>
Use internal communication systems	Operation of all internal communication systems on board	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul 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>Transmission and reception of messages are consistently successful</p> <p>Communication records are complete, accurate and comply with statutory requirements</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Operate main and auxiliary machinery and associated control systems	<p>Basic construction and operation principles of machinery systems, including:</p> <ul style="list-style-type: none"> .1 marine diesel engine .2 marine steam turbine .3 marine gas turbine .4 marine boiler .5 shafting installations, including propeller .6 other auxiliaries, including various pumps, air compressor, purifier, fresh water generator, heat exchanger, refrigeration, air-conditioning and ventilation systems .7 steering gear .8 automatic control systems .9 fluid flow and characteristics of lubricating oil, fuel oil and cooling systems .10 deck machinery <p>Safety and emergency procedures for operation of propulsion plant machinery, including control systems</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul style="list-style-type: none"> .1 approved in-service experience .2 approved training ship experience .3 approved laboratory equipment training 	<p>Construction and operating mechanisms can be understood and explained with drawings/instructions</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Operate main and auxiliary machinery and associated control systems (continued)	<p>Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems:</p> <ul style="list-style-type: none"> .1 main engine and associated auxiliaries .2 steam boiler and associated auxiliaries and steam systems .3 auxiliary prime movers and associated systems .4 other auxiliaries, including refrigeration, air-conditioning and ventilation systems 	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul 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 and avoid pollution of the marine environment</p> <p>Deviations from the norm are promptly identified</p> <p>The output of plant and engineering systems consistently meets requirements, including bridge orders relating to changes in speed and direction</p> <p>The causes of machinery malfunctions are promptly identified and actions are designed to ensure the overall safety of the ship and the plant, having regard to the prevailing circumstances and conditions</p>
Operate fuel, lubrication, ballast and other pumping systems and associated control systems	<p>Operational characteristics of pumps and piping systems, including control systems</p> <p>Operation of pumping systems:</p> <ul style="list-style-type: none"> .1 routine pumping operations .2 operation of bilge, ballast and cargo pumping systems <p>Oily-water separators (or similar equipment) requirements and operation.</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <ul 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 and avoid pollution of the marine environment</p> <p>Deviations from the norm are promptly identified and appropriate action is taken</p>

Function: Electrical, electronic and control engineering at the operational level

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Operate electrical, electronic and control systems	<p>Basic configuration and operation principles of the following electrical, electronic and control equipment:</p> <p>.1 electrical equipment:</p> <p>.a generator and distribution systems</p> <p>.b preparing, starting, paralleling and changing over generators</p> <p>.c electrical motors including starting methodologies</p> <p>.d high-voltage installations</p> <p>.e sequential control circuits and associated system devices</p> <p>.2 electronic equipment:</p> <p>.a characteristics of basic electronic circuit elements</p> <p>.b flowchart for automatic and control systems</p> <p>.c functions, characteristics and features of control systems for machinery items, including main propulsion plant operation control and steam boiler automatic controls</p> <p>.3 control systems:</p> <p>.a various automatic control methodologies and characteristics</p> <p>.b Proportional–Integral–Derivative (PID) control characteristics and associated system devices for process control</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>Operations are planned and carried out in accordance with operating manuals, established rules and procedures to ensure safety of operations</p> <p>Electrical, electronic and control systems can be understood and explained with drawings/instructions</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Maintenance and repair of electrical and electronic equipment	<p>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</p> <p>Maintenance and repair of electrical system equipment, switchboards, electric motors, generator 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:</p> <p>.1 monitoring systems</p> <p>.2 automatic control devices</p> <p>.3 protective devices</p> <p>The interpretation of electrical and simple electronic diagrams</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>Safety measures for working are appropriate</p> <p>Selection and use of hand tools, measuring instruments, and testing equipment are appropriate and interpretation of results is accurate</p> <p>Dismantling, inspecting, repairing and reassembling equipment are in accordance with manuals and good practice</p> <p>Reassembling and performance testing is in accordance with manuals and good practice</p>

Function: Maintenance and repair at the operational level

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board	<p>Characteristics and limitations of materials used in construction and repair of ships and equipment</p> <p>Characteristics and limitations of processes used for fabrication and repair</p> <p>Properties and parameters considered in the fabrication and repair of systems and components</p> <p>Methods for carrying out safe emergency/temporary repairs</p> <p>Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments</p> <p>Use of hand tools, machine tools and measuring instruments</p> <p>Use of various types of sealants and packings</p>	<p>Assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>Identification of important parameters for fabrication of typical ship-related components is appropriate</p> <p>Selection of materials is appropriate</p> <p>Fabrication is to designated tolerances</p> <p>Use of equipment and hand tools, machine tools and measuring instruments is appropriate and safe</p>
Maintenance and repair of shipboard machinery and equipment	<p>Safety measures to be taken for repair and maintenance, including the safe isolation of shipboard machinery and equipment required before personnel are permitted to work on such machinery or equipment</p> <p>Appropriate basic mechanical knowledge and skills</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p>	<p>Safety procedures followed are appropriate</p> <p>Selection of tools and spare gear is appropriate</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Maintenance and repair of shipboard machinery and equipment (continued)	<p>Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment</p> <p>The use of appropriate specialized tools and measuring instruments</p> <p>Design characteristics and selection of materials in construction of equipment</p> <p>Interpretation of machinery drawings and handbooks</p> <p>The interpretation of piping, hydraulic and pneumatic diagrams</p>	.4 approved training ship experience	<p>Dismantling, inspecting, repairing and reassembling equipment is in accordance with manuals and good practice</p> <p>Re-commissioning and performance testing is in accordance with manuals and good practice</p> <p>Selection of materials and parts is appropriate</p>

Function: Controlling the operation of the ship and care for persons on board at the operational level

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Ensure compliance with pollution-prevention requirements	<p><i>Prevention of pollution of the marine environment</i></p> <p>Knowledge of the precautions to be taken to prevent pollution of the marine environment</p> <p>Anti-pollution procedures and all associated equipment</p> <p>Importance of proactive measures to protect the marine environment</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved training</p>	<p>Procedures for monitoring shipboard operations and ensuring compliance with MARPOL requirements are fully observed</p> <p>Actions to ensure that a positive environmental reputation is maintained</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Maintain seaworthiness of the ship	<p><i>Ship stability</i></p> <p>Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment</p> <p>Understanding of the fundamentals of watertight integrity</p> <p>Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy</p> <p><i>Ship construction</i></p> <p>General knowledge of the principal structural members of a ship and the proper names for the various parts</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>The stability conditions comply with the IMO intact stability criteria under all conditions of loading</p> <p>Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice</p>
Prevent, control and fight fires on board	<p><i>Fire prevention and fire-fighting appliances</i></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>Action to be taken in the event of fire, including fires involving oil systems</p>	<p>Assessment of evidence obtained from approved fire-fighting training and experience as set out in section A-VI/3, paragraphs 1 to 3</p>	<p>The type and scale of the problem is promptly identified and initial actions conform with the emergency procedure and contingency plans for the ship</p> <p>Evacuation, emergency shutdown and isolation procedures are appropriate to the nature of the emergency and are implemented promptly</p> <p>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</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
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>	Assessment of evidence obtained from approved training and experience as set out in section A-VI/2, paragraphs 1 to 4	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
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>	Assessment of evidence obtained from approved training as set out in section A-VI/4, paragraphs 1 to 3	Identification of probable cause, nature and extent of injuries or conditions is prompt and treatment minimizes immediate threat to life
Monitor compliance with legislative requirements	Basic working knowledge of the relevant IMO conventions concerning safety of life at sea, security and protection of the marine environment	Assessment of evidence obtained from examination or approved training	Legislative requirements relating to safety of life at sea, security and protection of the marine environment are correctly identified
Application of leadership and teamworking skills	<p>Working knowledge of shipboard personnel management and training</p> <p>A knowledge of related international maritime conventions and recommendations, and national legislation</p> <p>Ability to apply task and workload management, including:</p> <p>.1 planning and co-ordination</p> <p>.2 personnel assignment</p> <p>.3 time and resource constraints</p> <p>.4 prioritization</p>	<p>Assessment of evidence obtained from one or more of the following:</p> <p>.1 approved training</p> <p>.2 approved in-service experience</p> <p>.3 practical demonstration</p>	<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 demonstrated to be in accordance with applicable rules</p>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
Application of leadership and teamworking skills <i>(continued)</i>	<p>Knowledge and ability to apply effective resource management:</p> <ul 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> <ul 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>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>

Column 1	Column 2	Column 3	Column 4
Competence	Knowledge, understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
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>	Assessment of evidence obtained from approved training and experience as set out in section A-VI/1, paragraph 2	<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>

Chapter VIII
Standards regarding watchkeeping

Section A-VIII/2

Watchkeeping arrangements and principles to be observed

Part 1 – Certification

1 The officer in charge of the navigational or deck watch shall be duly qualified in accordance with the provisions of chapter II or chapter VII appropriate to the duties related to navigational or deck watchkeeping.

2 The officer in charge of the engineering watch shall be duly qualified in accordance with the provisions of chapter III or chapter VII appropriate to the duties related to engineering watchkeeping.

Part 2 – Voyage Planning

General requirements

3 The intended voyage shall be planned in advance, taking into consideration all pertinent information, and any course laid down shall be checked before the voyage commences.

4 The chief engineer officer shall, in consultation with the master, determine in advance the needs of the intended voyage, taking into consideration the requirements for fuel, water, lubricants, chemicals, expendable and other spare parts, tools, supplies and any other requirements.

Planning prior to each voyage

5 Prior to each voyage, the master of every ship shall ensure that the intended route from the port of departure to the first port of call is planned using adequate and appropriate charts and other nautical publications necessary for the intended voyage, containing accurate, complete and up-to-date information regarding those navigational limitations and hazards which are of a permanent or predictable nature and which are relevant to the safe navigation of the ship.

Verification and display of planned route

6 When the route planning is verified, taking into consideration all pertinent information, the planned route shall be clearly displayed on appropriate charts and shall be continuously available to the officer in charge of the watch, who shall verify each course to be followed prior to using it during the voyage.

Deviation from planned route

7 If a decision is made, during a voyage, to change the next port of call of the planned route, or if it is necessary for the ship to deviate substantially from the planned route for other reasons, then an amended route shall be planned prior to deviating substantially from the route originally planned.

Part 3 – Watchkeeping principles in general

8 Watches shall be carried out based on the following bridge and engine-room resource management principles:

- .1** proper arrangements for watchkeeping personnel shall be ensured in accordance with the situations;
- .2** any limitation in qualifications or fitness of individuals shall be taken into account when deploying watchkeeping personnel;
- .3** understanding of watchkeeping personnel regarding their individual roles, responsibility and team roles shall be established;
- .4** the master, chief engineer officer and officer in charge of watch duties shall maintain a proper watch, making the most effective use of the resources available, such as information, installations/equipment and other personnel;
- .5** watchkeeping personnel shall understand functions and operation of installations/equipment, and be familiar with handling them;
- .6** watchkeeping personnel shall understand information and how to respond to information from each station/installation/equipment;
- .7** information from the stations/installations/equipment shall be appropriately shared by all the watchkeeping personnel;
- .8** watchkeeping personnel shall maintain an exchange of appropriate communication in any situation; and
- .9** watchkeeping personnel shall notify the master/chief engineer officer/officer in charge of watch duties without any hesitation when in any doubt as to what action to take in the interest of safety.

Part 4 – Watchkeeping at sea

Principles applying to watchkeeping generally

9 Parties shall direct the attention of companies, masters, chief engineer officers and watchkeeping personnel to the following principles, which shall be observed to ensure that safe watches are maintained at all times.

10 The master of every ship is bound to ensure that watchkeeping arrangements are adequate for maintaining a safe navigational or cargo watch. Under the master's general direction, the officers of the navigational watch are responsible for navigating the ship safely during their periods of duty, when they will be particularly concerned with avoiding collision and stranding.

11 The chief engineer officer of every ship is bound, in consultation with the master, to ensure that watchkeeping arrangements are adequate to maintain a safe engineering watch.

Protection of marine environment

12 The master, officers and ratings shall be aware of the serious effects of operational or accidental pollution of the marine environment and shall take all possible precautions to prevent such pollution, particularly within the framework of relevant international and port regulations.

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Part 4-2 – Principles to be observed in keeping an engineering watch

52 The term *engineering watch* as used in parts 4-2, 5-2 and 5-4 of this section means either a person or a group of personnel comprising the watch or a period of responsibility for an officer during which the physical presence in machinery spaces of that officer may or may not be required.

53 The *officer in charge of the engineering watch* is the chief engineer officer's representative and is primarily responsible, at all times, for the safe and efficient operation and upkeep of machinery affecting the safety of the ship and is responsible for the inspection, operation and testing, as required, of all machinery and equipment under the responsibility of the engineering watch.

Watch arrangements

54 The composition of the engineering watch shall, at all times, be adequate to ensure the safe operation of all machinery affecting the operation of the ship, in either automated or manual mode, and be appropriate to the prevailing circumstances and conditions.

55 When deciding the composition of the engineering watch, which may include appropriately qualified ratings, the following criteria, *inter alia*, shall be taken into account:

- .1** the type of ship and the type and condition of the machinery;
- .2** the adequate supervision, at all times, of machinery affecting the safe operation of the ship;
- .3** any special modes of operation dictated by conditions such as weather, ice, contaminated water, shallow water, emergency conditions, damage containment or pollution abatement;
- .4** the qualifications and experience of the engineering watch;
- .5** the safety of life, ship, cargo and port, and protection of the environment;
- .6** the observance of international, national and local regulations; and
- .7** maintaining the normal operations of the ship.

Taking over the watch

56 The officer in charge of the engineering watch shall not hand over the watch to the relieving officer if there is reason to believe that the latter is obviously not capable of carrying out the watchkeeping duties effectively, in which case the chief engineer officer shall be notified.

57 The relieving officer of the engineering watch shall ensure that the members of the relieving engineering watch are apparently fully capable of performing their duties effectively.

58 Prior to taking over the engineering watch, relieving officers shall satisfy themselves regarding at least the following:

- .1** the standing orders and special instructions of the chief engineer officer relating to the operation of the ship's systems and machinery;
- .2** the nature of all work being performed on machinery and systems, the personnel involved and potential hazards;
- .3** the level and, where applicable, the condition of water or residues in bilges, ballast tanks, slop tanks, reserve tanks, fresh water tanks, sewage tanks and any special requirements for use or disposal of the contents thereof;
- .4** the condition and level of fuel in the reserve tanks, settling tank, day tank and other fuel storage facilities;
- .5** any special requirements relating to sanitary system disposals;
- .6** condition and mode of operation of the various main and auxiliary systems, including the electrical power distribution system;
- .7** where applicable, the condition of monitoring and control console equipment, and which equipment is being operated manually;
- .8** where applicable, the condition and mode of operation of automatic boiler controls such as flame safeguard control systems, limit control systems, combustion control systems, fuel-supply control systems and other equipment related to the operation of steam boilers;
- .9** any potentially adverse conditions resulting from bad weather, ice, or contaminated or shallow water;
- .10** any special modes of operation dictated by equipment failure or adverse ship conditions;
- .11** the reports of engine-room ratings relating to their assigned duties;
- .12** the availability of fire-fighting appliances; and
- .13** the state of completion of the engine-room log.

Performing the engineering watch

59 The officer in charge of the engineering watch shall ensure that the established watchkeeping arrangements are maintained and that, under direction, engine-room ratings, if forming part of the engineering watch, assist in the safe and efficient operation of the propulsion machinery and auxiliary equipment.

60 The officer in charge of the engineering watch shall continue to be responsible for machinery-space operations, despite the presence of the chief engineer officer in the machinery

spaces, until specifically informed that the chief engineer officer has assumed that responsibility and this is mutually understood.

61 All members of the engineering watch shall be familiar with their assigned watchkeeping duties. In addition, every member shall, with respect to the ship they are serving in, have knowledge of:

- .1** the use of appropriate internal communication systems;
- .2** the escape routes from machinery spaces;
- .3** the engine-room alarm systems and be able to distinguish between the various alarms, with special reference to the fire-extinguishing media alarm; and
- .4** the number, location and types of fire-fighting equipment and damage-control gear in the machinery spaces, together with their use and the various safety precautions to be observed.

62 Any machinery not functioning properly, expected to malfunction or requiring special service shall be noted along with any action already taken. Plans shall be made for any further action if required.

63 When the machinery spaces are in the manned condition, the officer in charge of the engineering watch shall at all times be readily capable of operating the propulsion equipment in response to needs for changes in direction or speed.

64 When the machinery spaces are in the periodic unmanned condition, the designated duty officer in charge of the engineering watch shall be immediately available and on call to attend the machinery spaces.

65 All bridge orders shall be promptly executed. Changes in direction or speed of the main propulsion units shall be recorded, except where an Administration has determined that the size or characteristics of a particular ship make such recording impracticable. The officer in charge of the engineering watch shall ensure that the main propulsion unit controls, when in the manual mode of operation, are continuously attended under stand-by or manoeuvring conditions.

66 Due attention shall be paid to the ongoing maintenance and support of all machinery, including mechanical, electrical, electronic, hydraulic and pneumatic systems, their control apparatus and associated safety equipment, all accommodation service systems equipment and the recording of stores and spare gear usage.

67 The chief engineer officer shall ensure that the officer in charge of the engineering watch is informed of all preventive maintenance, damage control, or repair operations to be performed during the engineering watch. The officer in charge of the engineering watch shall be responsible for the isolation, bypassing and adjustment of all machinery under the responsibility of the engineering watch that is to be worked on, and shall record all work carried out.

68 When the engine-room is put in a stand-by condition, the officer in charge of the engineering watch shall ensure that all machinery and equipment which may be used during manoeuvring is in a state of immediate readiness and that an adequate reserve of power is available for steering gear and other requirements.

69 Officers in charge of an engineering watch shall not be assigned or undertake any duties which would interfere with their supervisory duties in respect of the main propulsion system and

ancillary equipment. They shall keep the main propulsion plant and auxiliary systems under constant supervision until properly relieved, and shall periodically inspect the machinery in their charge. They shall also ensure that adequate rounds of the machinery and steering-gear spaces are made for the purpose of observing and reporting equipment malfunctions or breakdowns, performing or directing routine adjustments, required upkeep and any other necessary tasks.

70 Officers in charge of an engineering watch shall direct any other member of the engineering watch to inform them of potentially hazardous conditions which may adversely affect the machinery or jeopardize the safety of life or of the ship.

71 The officer in charge of the engineering watch shall ensure that the machinery space watch is supervised, and shall arrange for substitute personnel in the event of the incapacity of any engineering watch personnel. The engineering watch shall not leave the machinery spaces unsupervised in a manner that would prevent the manual operation of the engine-room plant or throttles.

72 The officer in charge of the engineering watch shall take the action necessary to contain the effects of damage resulting from equipment breakdown, fire, flooding, rupture, collision, stranding, or other cause.

73 Before going off duty, the officer in charge of the engineering watch shall ensure that all events related to the main and auxiliary machinery which have occurred during the engineering watch are suitably recorded.

74 The officer in charge of the engineering watch shall co-operate with any engineer in charge of maintenance work during all preventive maintenance, damage control or repairs. This shall include, but not necessarily be limited to:

- .1** isolating and bypassing machinery to be worked on;
- .2** adjusting the remaining plant to function adequately and safely during the maintenance period;
- .3** recording, in the engine-room log or other suitable document, the equipment worked on and the personnel involved, and which safety steps have been taken and by whom, for the benefit of relieving officers and for record purposes; and
- .4** testing and putting into service, when necessary, the repaired machinery or equipment.

75 The officer in charge of the engineering watch shall ensure that any engine-room ratings who perform maintenance duties are available to assist in the manual operation of machinery in the event of automatic equipment failure.

76 The officer in charge of the engineering watch shall bear in mind that changes in speed, resulting from machinery malfunction, or any loss of steering may imperil the safety of the ship and life at sea. The bridge shall be immediately notified in the event of fire and of any impending action in machinery spaces that may cause reduction in the ship's speed, imminent steering failure, stoppage of the ship's propulsion system or any alteration in the generation of electric power or similar threat to safety. This notification, where possible, shall be accomplished before changes are made, in order to afford the bridge the maximum available time to take whatever action is possible to avoid a potential marine casualty.

77 The officer in charge of the engineering watch shall notify the chief engineer officer without delay:

- .1 when engine damage or a malfunction occurs which may be such as to endanger the safe operation of the ship;
- .2 when any malfunction occurs which, it is believed, may cause damage or breakdown of propulsion machinery, auxiliary machinery or monitoring and governing systems; and
- .3 in any emergency or if in any doubt as to what decision or measures to take.

78 Despite the requirement to notify the chief engineer officer in the foregoing circumstances, the officer in charge of the engineering watch shall not hesitate to take immediate action for the safety of the ship, its machinery and crew where circumstances require.

79 The officer in charge of the engineering watch shall give the watchkeeping personnel all appropriate instructions and information which will ensure the keeping of a safe engineering watch. Routine machinery upkeep, performed as incidental tasks as a part of keeping a safe watch, shall be set up as an integral part of the watch routine. Detailed repair maintenance involving repairs to electrical, mechanical, hydraulic, pneumatic or applicable electronic equipment throughout the ship shall be performed with the cognizance of the officer in charge of the engineering watch and chief engineer officer. These repairs shall be recorded.

Engineering watchkeeping under different conditions and in different areas

Restricted visibility

80 The officer in charge of the engineering watch shall ensure that permanent air or steam pressure is available for sound signals and that at all times bridge orders relating to changes in speed or direction of operation are immediately implemented and, in addition, that auxiliary machinery used for manoeuvring is readily available.

Coastal and congested waters

81 The officer in charge of the engineering watch shall ensure that all machinery involved with the manoeuvring of the ship can immediately be placed in the manual mode of operation when notified that the ship is in congested waters. The officer in charge of the engineering watch shall also ensure that an adequate reserve of power is available for steering and other manoeuvring requirements. Emergency steering and other auxiliary equipment shall be ready for immediate operation.

Ship at anchor

82 At an unsheltered anchorage the chief engineer officer shall consult with the master whether or not to maintain the same engineering watch as when under way.

83 When a ship is at anchor in an open roadstead or any other virtually “at-sea” condition, the engineer officer in charge of the engineering watch shall ensure that:

- .1 an efficient engineering watch is kept;
- .2 periodic inspection is made of all operating and stand-by machinery;

- .3 main and auxiliary machinery is maintained in a state of readiness in accordance with orders from the bridge;
- .4 measures are taken to protect the environment from pollution by the ship, and that applicable pollution-prevention regulations are complied with; and
- .5 all damage-control and fire-fighting systems are in readiness.

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Part 5 – Watchkeeping in port

Principles applying to all watchkeeping

General

90 On any ship safely moored or safely at anchor under normal circumstances in port, the master shall arrange for an appropriate and effective watch to be maintained for the purpose of safety. Special requirements may be necessary for special types of ships' propulsion systems or ancillary equipment and for ships carrying hazardous, dangerous, toxic or highly flammable materials or other special types of cargo.

Watch arrangements

91 Arrangements for keeping a deck watch when the ship is in port shall at all times be adequate to:

- .1 ensure the safety of life, of the ship, the port and the environment, and the safe operation of all machinery related to cargo operation;
- .2 observe international, national and local rules; and
- .3 maintain order and the normal routine of the ship.

92 The master shall decide the composition and duration of the deck watch depending on the conditions of mooring, type of the ship and character of duties.

93 If the master considers it necessary, a qualified officer shall be in charge of the deck watch.

94 The necessary equipment shall be so arranged as to provide for efficient watchkeeping.

95 The chief engineer officer, in consultation with the master, shall ensure that engineering watchkeeping arrangements are adequate to maintain a safe engineering watch while in port. When deciding the composition of the engineering watch, which may include appropriate engine-room ratings, the following points are among those to be taken into account:

- .1 on all ships of 3,000 kW propulsion power and over there shall always be an officer in charge of the engineering watch;
- .2 on ships of less than 3,000 kW propulsion power there may be, at the master's discretion and in consultation with the chief engineer officer, no officer in charge of the engineering watch; and

- .3 officers, while in charge of an engineering watch, shall not be assigned or undertake any task or duty which would interfere with their supervisory duty in respect of the ship's machinery system.

Taking over the watch

96 Officers in charge of the deck or engineering watch shall not hand over the watch to their relieving officer if they have any reason to believe that the latter is obviously not capable of carrying out watchkeeping duties effectively, in which case the master or chief engineer shall be notified accordingly. Relieving officers of the deck or engineering watch shall ensure that all members of their watch are apparently fully capable of performing their duties effectively.

97 If, at the moment of handing over the deck or engineering watch, an important operation is being performed, it shall be concluded by the officer being relieved, except when ordered otherwise by the master or chief engineer officer.

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Part 5-2 – Taking over the engineering watch

100 Prior to taking over the engineering watch, the relieving officer shall be informed by the officer in charge of the engineering watch as to:

- .1 the standing orders of the day, any special orders relating to the ship operations, maintenance functions, repairs to the ship's machinery or control equipment;
- .2 the nature of all work being performed on machinery and systems on board ship, personnel involved and potential hazards;
- .3 the level and condition, where applicable, of water or residue in bilges, ballast tanks, slop tanks, sewage tanks, reserve tanks and special requirements for the use or disposal of the contents thereof;
- .4 any special requirements relating to sanitary system disposals;
- .5 the condition and state of readiness of portable fire-extinguishing equipment and fixed fire-extinguishing installations and fire-detection systems;
- .6 authorized repair personnel on board engaged in engineering activities, their work locations and repair functions and other authorized persons on board and the required crew;
- .7 any port regulations pertaining to ship effluents, fire-fighting requirements and ship readiness, particularly during potential bad weather conditions;
- .8 the lines of communication available between the ship and shore personnel, including port authorities, in the event of an emergency arising or assistance being required;
- .9 any other circumstance of importance to the safety of the ship, its crew, cargo or the protection of the environment from pollution; and
- .10 the procedures for notifying the appropriate authority of environmental pollution resulting from engineering activities.

101 Relieving officers, before assuming charge of the engineering watch, shall satisfy themselves that they are fully informed by the officer being relieved, as outlined above, and:

- .1** be familiar with existing and potential sources of power, heat and lighting and their distribution;
- .2** know the availability and condition of ship's fuel, lubricants and all water supplies; and
- .3** be ready to prepare the ship and its machinery, as far as is possible, for stand-by or emergency conditions as required.

* * * * *

Part 5-4 – Performing the engineering watch

103 Officers in charge of the engineering watch shall pay particular attention to:

- .1** the observance of all orders, special operating procedures and regulations concerning hazardous conditions and their prevention in all areas in their charge;
- .2** the instrumentation and control systems, monitoring of all power supplies, components and systems in operation;
- .3** the techniques, methods and procedures necessary to prevent violation of the pollution regulations of the local authorities; and
- .4** the state of the bilges.

104 Officers in charge of the engineering watch shall:

- .1** in emergencies, raise the alarm when, in their opinion, the situation so demands, and take all possible measures to prevent damage to the ship, persons on board and cargo;
- .2** be aware of the deck officer's needs relating to the equipment required in the loading or unloading of the cargo and the additional requirements of the ballast and other ship stability control systems;
- .3** make frequent rounds of inspection to determine possible equipment malfunction or failure, and take immediate remedial action to ensure the safety of the ship, of cargo operations, of the port and the environment;
- .4** ensure that the necessary precautions are taken, within their area of responsibility, to prevent accidents or damage to the various electrical, electronic, hydraulic, pneumatic and mechanical systems of the ship; and
- .5** ensure that all important events affecting the operation, adjustment or repair of the ship's machinery are satisfactorily recorded.

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**GUIDANCE REGARDING PROVISIONS OF THE ANNEX TO
THE STCW CONVENTION
PART B**

Chapter I

Guidance regarding general provisions

Section B-I/6

Guidance regarding training and assessment

Qualifications of instructors and assessors

1 Each Party should ensure that instructors and assessors are appropriately qualified and experienced for the particular types and levels of training or assessment of competence of seafarers, as required under the Convention, in accordance with the guidelines in this section.

In-service training and assessment

2 Any person, on board or ashore, conducting in-service training of a seafarer intended to be used in qualifying for certification under the Convention should have received appropriate guidance in instructional techniques*.

3 Any person responsible for the supervision of in-service training of a seafarer intended to be used in qualifying for certification under the Convention should have appropriate knowledge of instructional techniques and of training methods and practice.

4 Any person, on board or ashore, conducting an in-service assessment of the competence of a seafarer intended to be used in qualifying for certification under the Convention should have:

- .1** received appropriate guidance in assessment methods and practice* ; and
- .2** gained practical assessment experience under the supervision and to the satisfaction of an experienced assessor.

5 Any person responsible for the supervision of the in-service assessment of competence of a seafarer intended to be used in qualifying for certification under the Convention should have a full understanding of the assessment system, assessment methods and practice*.

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Section B-I/12

Guidance regarding the use of simulators

1 When simulators are being used for training or assessment of competency, the following guidelines should be taken into consideration in conducting any such training or assessment.

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* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

Recommended performance standards for non-mandatory types of simulation

67 Performance standards for non-mandatory simulation equipment used for training and/or assessment of competence or demonstration of skills are set out hereunder. Such forms of simulation include, but are not limited to, the following types:

- .1 navigation and watchkeeping;
- .2 ship handling and manoeuvring;
- .3 cargo handling and stowage;
- .4 reporting and radiocommunications; and
- .5 main and auxiliary machinery operation.

* * * * *

Main and auxiliary machinery operation simulation

73 Engine-room simulation equipment should be capable of simulating a main and auxiliary machinery system and incorporate facilities to:

- .1 create a real-time environment for seagoing and harbour operations, with communication devices and simulation of appropriate main and auxiliary propulsion machinery equipment and control panels;
- .2 simulate relevant sub-systems that should include, but not be restricted to, boiler, steering gear, electrical power general and distribution systems, including emergency power supplies, and fuel, cooling water, refrigeration, bilge and ballast systems;
- .3 monitor and evaluate engine performance and remote sensing systems;
- .4 simulate machinery malfunctions;
- .5 allow for the variable external conditions to be changed so as to influence the simulated operations: weather, ship's draught, seawater and air temperatures;
- .6 allow for instructor-controlled external conditions to be changed: deck steam, accommodation steam, deck air, ice conditions, deck cranes, heavy power, bow thrust, ship load;
- .7 allow for instructor-controlled simulator dynamics to be changed: emergency run, process responses, ship responses; and
- .8 provide a facility to isolate certain processes, such as speed, electrical system, diesel oil system, lubricating oil system, heavy oil system, seawater system, steam system, exhaust boiler and turbo generator, for performing specific training tasks.*

* The relevant IMO Model Course(s) may be of assistance in the preparation of courses.

Chapter III

Guidance regarding the engine department

Section B-III/1

Guidance regarding the certification of officers in charge of an engineering watch in a manned engine-room or as designated duty engineers in a periodically unmanned engine-room

- 1 In table A-III/1, the tools referred to should include hand tools, common measuring equipment, centre lathes, drilling machines, welding equipment and milling machines as appropriate.
- 2 Training in workshop skills ashore can be carried out in a training institution or approved workshop.
- 3 Onboard training should be adequately documented in the training record book by qualified assessors.

Chapter VIII

Guidance regarding watchkeeping

Section B-VIII/2

Guidance regarding watchkeeping arrangements and principles to be observed

- 1 The following operational guidance should be taken into account by companies, masters and watchkeeping officers.

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Part 4 – Guidance on watchkeeping at sea

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Part 4-2 – Guidance on keeping an engineering watch

- 6 Particular guidance may be necessary for special types of propulsion systems or ancillary equipment and for ships carrying hazardous, dangerous, toxic or highly flammable materials or other special types of cargo. The chief engineer officer should provide this operational guidance as appropriate.

- 7 It is essential that officers in charge of the engineering watch appreciate that the efficient performance of engineering watchkeeping duties is necessary in the interest of the safety of life and property at sea and of preventing pollution of the marine environment.

- 8 The relieving officer, before assuming charge of the engineering watch, should:

- .1 be familiar with the location and use of the equipment provided for the safety of life in a hazardous or toxic environment;
- .2 ascertain that materials for the administration of emergency medical first aid are readily available, particularly those required for the treatment of burns and scalds; and
- .3 when in port, safely anchored or moored, be aware of:
 - .3.1 cargo activities, the status of maintenance and repair functions and all other operations affecting the watch, and
 - .3.2 the auxiliary machinery in use for passenger or crew accommodation services, cargo operations, operational water supplies and exhaust systems.