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United States Coast Guard

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NAVIGATION AND VESSEL INSPECTION CIRCULAR NO. 09 04

Subj: GUIDELINES FOR ASSESSING MERCHANT MARINERS THROUGH DEMONSTRATIONS OF PROFICIENCY AS OFFICERS IN CHARGE OF ENGINEERING WATCHES IN MANNED ENGINE-ROOMS OR AS DESIGNATED DUTY ENGINEERS IN PERIODICALLY UNMANNED ENGINE-ROOMS

Ref: (a) International Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW), 1978, as amended, Regulation III/1 and Section A-III/1 of STCW Code, incorporated into regulations at 46 CFR 10.102(b)
(b) Federal Register dated August 12, 2003, Docket No. USCG-2001-9269, Guidelines for Assessing Merchant Mariners Through Demonstrations of Proficiency as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms

1. PURPOSE. This Circular provides the national guidelines for assessing merchant mariners through demonstrations of proficiency as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms. These guidelines are for use in training programs approved or accepted by the Coast Guard as meeting reference (a) and by designated examiners (DEs) when carrying out their assessments unless alternatives are used as discussed in paragraph 5.c.

2. ACTION. Officers in Charge, Marine Inspection (OCMIs), should use this Circular when establishing that candidates are entitled to hold STCW certificates as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms pursuant to 46 CFR 10.205(p). OCMIs should also bring this Circular to the attention of the appropriate people in the maritime industry within their zones. This Circular is available on the World Wide Web at

DISTRIBUTION – SDL No. 141

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http://www.uscg.mil/hq/g-m/nvic/. The Coast Guard will distribute it by electronic means only.

3. DIRECTIVES AFFECTED. None.

4. BACKGROUND.

   a. The guidance from the International Maritime Organization (IMO) on shipboard assessments of proficiency, MSC/Circular 853, suggests that administrations should develop standards and measures of performance for practical tests as part of a program of training and assessment of mariners. These standards and measures ensure the uniform assessment of mariners without regard to individuality of the DEs and will result in standardization, fairness, and consistency. Enclosure (1) provides an overview of the Coast Guard's policy on assessments of mariners as required by the STCW.

   b. The Coast Guard tasked the Merchant Marine Personnel Advisory Committee (MERPAC) to recommend national assessment criteria for certification attesting proficiency as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms. The National Maritime Center (NMC) then used MERPAC's recommendations to develop proposed national guidelines, which we published for public comment in reference (b). Out of this process came the final version of the national assessment guidelines for practical demonstration of skills contained in enclosure (2).

5. DISCUSSION.

   a. All mariners who commence training or sea service required by the STCW Convention on or after August 1, 1998, or all mariners applying for STCW certification attesting proficiency as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms on or after February 1, 2002, must present documentation demonstrating competence in those skills specified in the table of enclosure (2). The practical demonstrations of skills are required by 46 CFR 10.205(p) to be completed in the presence of, and certified by, a DE. Unless a mariner demonstrates proficiency in the skills required for competence as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms in enclosure (2), the OCMI will not issue the STCW certification as stipulated in 46 CFR 10.202(j).

   b. A person assessing mariners for STCW certification attesting proficiency as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms may use either the guidelines in enclosure (2) or an alternative as discussed in paragraph 5. c when assessing practical demonstrations of proficiency.

   c. Pursuant to 46 CFR 10.302, the Coast Guard approves courses that satisfy regulatory requirements or that substitute for a Coast Guard examination or a portion of a sea-service requirement. Those who assess the proficiency of mariners may refine these published guidelines and develop innovative alternatives; however, before they use any

deviations from these guidelines, they must submit them to the NMC for approval by the Coast Guard as required by 46 CFR 10.303(e). A training institution submitting a course that leads to certification attesting proficiency as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms should either state that the guidelines in enclosure (2) will apply or otherwise identify the guidelines to be used.

d. Merchant mariners required to demonstrate proficiency through demonstrations of skills for certification as Officers in Charge of Engineering Watches in Manned Engine-Rooms or as Designated Duty Engineers in Periodically Unmanned Engine-Rooms may use these guidelines for self-study and self-assessment.

6. DISCLAIMER.

a. While the guidance contained in this document may assist the industry, the public, the Coast Guard, and other Federal and State regulators in applying statutory and regulatory requirements, the guidance is not a substitute for applicable legal requirements; nor is it itself a rule. Thus, it is not intended to nor does it impose legally-binding requirements on any party, including the Coast Guard, other Federal agencies, the States, or the regulated community.

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Encl (1) Assessments of mariners
(2) Assessment Guidelines for STCW Code Table A-III/1

Non-Standard Distribution:

B:a G-M(1); G-MS(1); G-MSO (4)

D:l CG Liaison Officer MILSEALIFTCOMD (Code N-7CG) (1)

ASSESSMENTS OF MARINERS

1. ASSESSMENT OF SKILLS.

a. Traditionally, in the United States, the Coast Guard has measured mariners' competency through assessments of knowledge. Knowledge-based components of this competency usually involve the recalling of facts or concepts, and written examinations are normally valid and reliable instruments for assessing such components. Historically, the Coast Guard has issued licenses and documents based predominantly on written essay and multiple-choice examinations. Currently, the Coast Guard employs a bank of over 25,000 multiple-choice questions to examine mariners.

b. Assessment of understanding is more complex than assessment of knowledge. Understanding involves specific principles and information processes necessary to analyze alternatives, make conclusions, make choices and decisions, or affect outcomes. Because it is a covert characteristic, understanding must be ascertained through assessment of an overt behavior that demonstrates understanding. Ascertainment can employ a variety of mechanisms, ranging from written problems involving calculations or analysis of facts to practical demonstrations requiring diagnostic or analytical reasoning. Many of the Coast Guard's 25,000 written questions for multiple-choice examinations involve problems that assess an understanding; but, in many instances, complete understanding is best measured through actual assessment of a mariner's performance.

c. Guidance provided by the IMO on certain assessments of proficiency requires development of standards and measures of performance for practical tests as part of seafarers' training programs. This is a new requirement for many flag-state administrations and their maritime industries. Performance assessment is part of a larger, well-established body of knowledge called instructional system design (ISD). Within this body, assessment methodologies range from the simple and straightforward to the complex and difficult. For the purposes of STCW, the Coast Guard believes the simplest and most straightforward approach works best and has decided to develop a set of national guidelines. In these, a performance standard has three components: the conditions, the behavior, and the criteria. The first establishes the conditions under which the candidate demonstrates the knowledge, understanding, or proficiency. The second specifies the precise set of knowledge, understandings, or skills (the 'behaviors') that is recalled, demonstrated, or performed. The third are the particular standards against which we measure an applicant's behavior to determine whether the performance is minimally competent.

d. The third component is normally expressed in terms of "measures" or combinations of "measures," such as a time limit or requirement, a specific sequence, a number or a percentage, a tolerance, or a degree of conformance or accuracy required. For highly critical skills, the criteria may require precise answers, require exact sequences of actions, or have very small tolerances of

errors or degrees of conformance. For instance, missing just one step of a sequence may constitute failure because that step was critical to achieving the final outcome. In less-critical skills, wider tolerances or degrees of conformance may pass; however, in every case the applicant must demonstrate the minimal level of competence set forth in the criteria.

2. DEVELOPMENT OF STANDARDS.

a. While the STCW Code gives broad guidance on the standards of performance and methods of assessment, the responsibility for the development of specific performance standards for each competency lies with the training provider. Development of valid and reliable performance standards is a resource-intensive effort. To minimize cost to the industry, promote uniformity, expedite the development process, and provide valid examples of these new performance standards, the Coast Guard asked that the Merchant Marine Personnel Advisory Committee (MERPAC) develop recommendations for a set of these standards.

b. MERPAC developed the core elements of a set of these standards and forwarded them to the Coast Guard. We reviewed the initial recommendations and compared them to the requirements of the STCW Code. We incorporated the final products into the proposed national assessment guidelines and published them in the Federal Register for public comments. After considering the comments, we have made them the standards for identifying minimum levels of competence during demonstrations of a mariner's proficiency.

c. We encourage companies and maritime training institutions to use the national guidelines for assessment of STCW proficiencies in training programs submitted for our approval or for acceptance by a recognized quality-standards system. We recommend that they use them during STCW proficiency assessments conducted by their designated examiners (DEs). They may develop alternative assessment standards; however, they may not use these in accepted or approved training programs until the National Maritime Center of the Coast Guard has reviewed and approved them pursuant to 46 CFR 10.303(e).

3. WRITTEN EXAMINATIONS.

a. Written examinations used in training programs under the STCW Convention deserve particular emphasis. Companies and maritime training institutions are encouraged to review their written instruments for assessing each knowledge-based and understanding-based competency from the STCW Code to ensure they include at least one question for each competency in the appropriate table from Part A of the Code.

b. We recommend that companies and maritime training institutions should also have multiple questions for addressing each knowledge-based and understanding-based competency from the STCW to afford candidates a fair opportunity to demonstrate minimum ability. If only one question assessed a required

knowledge or understanding, an incorrect answer would constitute a failure to have demonstrated the knowledge or understanding and would leave the candidate ineligible to have that competency certified by the DE, unless the DE used an alternative method. Accordingly, it would be preferable for the assessment to contain several questions. For example, in a written multiple-choice examination, if four questions concerned the same critical knowledge and if the performance standard were a score of 70%, three correct answers and one incorrect answer would meet the requirements for minimum competency. In this case the mariner would qualify as competent for that knowledge.

Assessment Guidelines for STCW Code Table A-III/1

Specification for minimum standard of competency in demonstration of skill

Proficiency as Officers in Charge of an Engineering Watch in a manned engine-room or designated duty engineers in a periodically unmanned engine-room

Any candidate for a certificate as an Officer in Charge of an Engineering Watch in a manned engine-room or designated duty engineer in a periodically unmanned engine-room must meet the standards of competence set out in STCW Code Table A-III/1. In order to accomplish this, a candidate must:

- Acquire the appropriate sea service;
- Pass a written examination for the knowledge and understanding portion of those competencies; and
- Successfully accomplish a practical demonstration of skill for selected competencies.

Methods for demonstrating competence in the practical demonstration of skills include either one or more of the following:

- In-service experience;
- Training ship experience;
- Simulator training, where appropriate;
- Laboratory equipment training, where appropriate;
- Approved training courses; or
- Approved workshop skills training.

Nothing in these tables should be construed as requiring that these assessments be completed through an approved training course only. One or more of the listed methods may be utilized.

OCMIs will use these assessment guidelines to ensure that candidates have met the standards of competence. The Coast Guard may accept similar guidelines in a program submitted by individuals and institutions who assess the competence of mariners as meeting the OCMI's guidance. If you wish to submit alternatives to these guidelines, you should submit them to the Coast Guard's National Maritime Center (NMC):

Practical Demonstrations of Skill

OCMIs will confirm that candidates have demonstrated the following skills from Table A-III/1:

Function: Marine engineering at the operational level

Use appropriate tools for fabrication and repair operations typically performed on ships;
Use hand tools and measuring equipment for dismantling, maintenance, repair, and re-assembly of shipboard plant and equipment;
Use hand tools and electrical and electronic measuring and test equipment for fault-finding, maintenance, and repair operations;
Maintain safe engineering watch;
Use English in written and oral form;
Operate main and auxiliary machinery and associated control systems; and
Operate pumping systems and associated control systems.

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

Operate alternators, generators, and control systems.

Function: Maintenance and repair at the operational level

Maintain marine-engineering systems, including control system.

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

Ensure compliance with pollution-prevention requirements;
Prevent, control, and fight fires on board;
Operate lifesaving appliances; and
Apply medical first aid on board ship.

In addition, for this table and its competencies, the unique requirements of different manufacturers for operating, maintenance, and repair; the different generations and configurations of systems; and the specific nature of the shipboard installation 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. In these instances, the role of assessor-developed checklists reflecting manufacturers' instructions, recommendations and specifications, or the ship's standard operating procedures is critical.

Table A-III/1, Assessment Guidelines
Specification of minimum standard of competence as an
Officer in Charge of an Engineering Watch in a Manned Engine Room or Designated Duty Engineer in a Periodically Unmanned Engine Room

Function: Marine engineering at the operational level

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
Use appropriate tools for fabrication and repair operations typically performed on ships.	*Characteristics and limitations of materials used in construction and repair of ships and equipment** *Characteristics and limitations of processes used for fabrication and repair** *Properties and parameters considered in the fabrication and repair of systems and components** *Application of safe working practices in the workshop environment**	In a workshop, laboratory, or other safe working environment, given proper tools, lighting, ventilation, and a thin steel plate of no less than 1/4 inch thickness,	the candidate will plan, prepare, and safely cut out a circular blank flange with four 7/16" bolt holes 90 degrees apart and corresponding to the dimensions of a two-inch pipe flange, or similar multi-tasked project using oxyacetylene process, and describe actions as they are being performed.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. sets up all required equipment and properly lays out the job; 3. cuts the hole uniformly according to plan within tolerance of +/- 1/8 inch; and 4. ensures that no safety violations occur.

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
		In a workshop, laboratory, or other safe working environment, given proper tools, lighting, ventilation, and two sections of sheet metal,	the candidate will plan, prepare, and form two rectangular pieces of sheet metal (ferrous or non-ferrous) together using the oxyacetylene process, and describe actions as they are being performed.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. selects the correct flux material and proper heat; 3. forms the sections of sheet metal according to plan and the finished joint has no evidence of lack of fill, flux entrapment, non-continuous fillet, base metal erosion, base cracks, or other defects; and 4. ensures that no safety violations occur.
		In a workshop, laboratory, or other safe working environment, given proper tools, lighting, ventilation, and two steel plates of no less than 3/8 inch thickness,	the candidate will plan, prepare, and form two steel plates with a T-joint design in a vertical position using an electric arc welding process, and describe actions as they are being performed.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. joins the plates according to plan and the finished joint has adequate penetration and no evidence of flux entrapment, non-continuous fillet, base metal erosion, base cracks, or other defects; and 3. ensures that no safety violations occur.
		In a workshop, laboratory, or other safe working environment, given proper tools, lighting, ventilation, and ½ inch copper tube and coupling,	the candidate will plan, prepare, and make a sweat joint forming the copper tube and coupling (or similar sweat fitting), and describe actions as they are being performed.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. forms the tubing according to plan and the finished joint has no evidence of lack of fill, flux entrapment, non-continuous fillet, base metal erosion, base cracks, or other defects; and 3. ensures that no safety violations occur.
		In a workshop, laboratory, or other safe	the candidate will plan, prepare, and form a 90	The candidate: 1. correctly plans for and lays out the job, in proper

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
		(cont'd) working environment, given ½ inch copper tube of at least 10 inches long, proper tools, and lighting,	(cont'd) degree bend on the copper tube using a tube bender.	(cont'd) sequence, and incorporates all safety considerations; 2. properly bends the copper tube (proper angle achieved +/- 2 degrees) and the bend is free of defects and kinks; and 3. ensures that no safety violations occur.
Use hand tools and measuring equipment for dismantling, maintenance, repair, and re-assembly of shipboard plant and equipment.	*Operational characteristics of equipment and systems**	In a workshop, laboratory, or other safe working environment, given a drilling machine, proper tools, lighting, ventilation, and steel stock of no less than 1-inch thickness,	the candidate will plan, prepare, and drill a ½ inch diameter blind hole ¾ of an inch deep, perpendicular to the surface using a drilling machine, and describe actions as they are being performed.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. drills the hole according to plan, round and within tolerance of +/- 1/64 inch; and 3. ensures that no safety violations occur.
		In a workshop, laboratory, or other safe working environment, given proper tools, lighting, ventilation, and steel stock of no less than 1-inch thickness, with a ½ inch diameter blind hole perpendicular to the surface,	the candidate will plan, prepare, and thread a blind hole using a set of National Coarse or National Fine hand taps, and describe actions as they are being performed.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. taps the hole according to plan, and it is threaded the entire depth, and it holds a bolt perpendicular to the surface; 3. correctly describes the actions as they are being performed; and 4. ensures that no safety violations occur.
		In a workshop, laboratory, or other safe working environment,	the candidate will plan, prepare, and externally thread rod stock using a	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
		(cont'd) given a hand die, proper tools, lighting, ventilation, and steel round stock of no less than 3/8 inch diameter,	(cont'd) set of National Coarse or National Fine hand dies.	(cont'd) 2. threads the rod stock according to plan and with fully-formed threads with less than 1% pitting or chipping with the axes of the thread and stock being co-linear; and 3. ensures that no safety violations occur.
Use hand tools, electrical and electronic measuring and test equipment for fault finding, maintenance, and repair operations.	*Construction and operational characteristics of shipboard AC and DC electrical systems and equipment** *Construction and operation of electrical test and measuring equipment** *Safety requirements for working on shipboard electrical systems**	Given a voltmeter, ammeter, ohmmeter, simple circuit with a power source, and a schematic of the circuit with at least five electrical components indicated,	the candidate will outline a plan and use the test equipment to report voltage, amperage, and resistance readings related to the components indicated, describing actions as they are being performed.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. properly calibrates the test equipment; 3. records and reports that readings are within 5% of the assessor's readings; and 4. ensures that no safety violations occur.
		Aboard a vessel or in a workshop, given the schematic of and access	the candidate will locate and describe the components and the	The candidate: 1. correctly locates the components; 2. correctly explains the components and their operating

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
		(cont'd) to the electrical distribution system, proper tools, and safety equipment,	(cont'd) operating characteristics, or troubleshoot a fault of the electrical distribution system.	(cont'd) characteristics; or 3. correctly performs troubleshooting; and 4. ensures that no safety violations occur.
		Aboard a vessel or in a workshop, given access to an electrical distribution system, and proper tools and safety equipment,	the candidate will plan and carry out a logical procedure to detect the location of grounds, describing actions as they are being performed.	The candidate: 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; 3. correctly identifies grounding source(s); 4. correctly describes the actions as they are being performed; and 5. ensures that no safety violations occur.
		Aboard a vessel or in a workshop, given access to 3-phase electrical AC motor and controller, a Megger test meter, and other proper tools and safety equipment,	the candidate will plan and use 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.	The candidate: 1. correctly plans for and lays out the job, in proper sequence, and incorporates all safety considerations; 2. confirms that the system is de-energized and uses the Megger correctly in accordance with manufacturer's instructions; 3. corrects the reported resistance value for temperature and it is within +/- 5% of the assessor's solution; 4. correctly describes the actions as they are being performed; and 5. ensures that no safety violations occur.
Maintain safe engineering watch.	*Duties associated with taking over and accepting a watch**	Aboard a vessel which has main propulsion machinery of 750 kW or more, while	the candidate will conduct an inspection of machinery spaces before taking the	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),

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
		(cont'd) underway in an engine room,	(cont'd) engine room watch.	(cont'd) 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. ensures that no safety violations occur.
		Aboard a vessel which has main-propulsion machinery of 750 kW or more, while underway, or in an approved simulator, given the engineering log book, the pertinent standing orders, and proper safety equipment,	the candidate will assume 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.	The candidate: 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, inspecting, and recording: a. that the water level in the fresh-water expansion tank for main and auxiliary engine is half-full;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 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; g. air conditioning compressor suction and discharge pressures and temperatures, chill water cooler circulating pump discharge pressure, and outlet and return temperatures; h. that the potable water and sanitary systems hydro-pneumatic tank water level is at half-full and the air charge is at 80 psi with the pump cycled off; i. that the ship service system air compressor lube-oil level is within the normal range on the dipstick, recording the ship service system air compressor air discharge temperature and cooling water inlet/outlet temperatures and air flask pressure; j. that he or she has drained the moisture from the ship service system air compressor intercooler, air moisture separating device, and air flasks/receiver; k. the generator amps, Kva, and frequency;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) l. the lube-oil centrifuge oil input pressure and temperature; m. the waste-oil tank level and that he/she has used the lube-oil centrifuge to transfer contents; n. the fresh-water generator, salt-water cooling and air conditioning/refrigeration system salt-water supply pump discharge pressures; o. the sea temperature; p. that he or she has sounded and recorded the bilge-water holding tank; q. the stern-tube supply pump discharge pressure and temperature; r. that when directed, he/she has provided "air on deck", posting a notice on the engine room status board; s. that he or she has de-watered the engine-room and cargo-hold bilge wells according to level, draft, and heel of the vessel; and t. that when directed, he/she has provided "water on deck" by preparing and starting the main fire pump. 4. Answers maneuvering orders while in engine-room control mode.
	Safety precautions to be observed during a watch and immediate actions to be taken	Aboard a vessel with propulsion machinery of 750 kW or more, or in an approved engine room simulator, given	the candidate will demonstrate the ability to distinguish between different alarm systems by naming the alarm,	The candidate: 1. correctly identifies each alarm; 2. correctly acknowledges each alarm; 3. correctly confirms each alarm condition; 4. ensures timely action is taken to correct each indicated

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
	*(cont'd) in the event of fire or accident, with particular reference to oil system**	(cont'd) appropriate alarms,	(cont'd) acknowledging the alarm, confirming the condition indicated by the alarm, and taking appropriate action to correct the alarm condition, such as but not limited to the following engine-room alarms: a. low lube-oil pressure alarm; b. boiler low-water alarm; c. high lube-oil temperature alarm; d. General Alarm; and e. steering-gear alarm.	(cont'd) alarm condition; 5. clears an alarm when corrective actions have been taken; and 6. ensures that no safety or environmental violations occur.
Use English in written and oral form.	*Adequate knowledge of the English language to enable the officer to use engineering publications and to perform*	Non-standard Note: The candidate has met the reading comprehension requirement when he or she passes an unassisted written U.S. Coast Guard	the candidate will complete the reading comprehension test instrument in accordance with the instructions and conditions specified in the test instrument	The candidate achieves the minimum score specified in the approval for the test instrument administered.

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
	*(cont'd) engineering duties**	(cont'd) examination for the license for which the endorsement is sought. If this qualification is not met, the alternative method listed below may be used at the discretion of the assessor. <u>Alternative Method of Demonstrating Competency</u>: In a suitable classroom or other testing environment and given any approved, commercially available and recognized English-language reading comprehension test instrument,	(cont'd) instructions.	
Operate main and auxiliary machinery and associated control systems.	*Preparation of main machinery and of auxiliary machinery for operation**	Aboard a vessel with propulsion machinery of 750 kW or more,	the candidate will demonstrate the ability to assist in testing internal communications, engine order	The candidate: 1. within 12 hours of departure time, coordinates with the Officer in Charge of the Navigation Watch (OICNW) the time by which the steering gear will be tested; 2. uses the engine-room phone to notify the OICNW that the engine department is ready to test the gear;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
			(cont'd) telegraph, alarm systems, and ship's whistle.	(cont'd) 3. responds to movement of the engine room telegraph, notifies the 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. telephones the senior engineer in the steering-gear room when the bridge makes notification that it is ready to test the steering gear; 6. assists the senior engineer in contacting the navigation bridge when ready to test the steering gear; 7. during testing of the steering gear, observes the "run" indicator lights and power failure alarms and makes note that they are functional; 8. receives the report from the OICNW that the testing of the ship's internal communications, whistle, engine order telegraph, and steering gear have been completed; 9. makes an entry in the engine room log book which states, "Tested all gear at .....hours;" and 10. prepares the engine-room bell log for pending departure, noting the time that all gear was tested.
		Aboard a vessel, or in a workshop, laboratory, or other safe working environment, given access to an air compressor,	the candidate will plan for securing the on-line low pressure service air compressor and start up and place on line the stand-by unit, describing actions as	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;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
			(cont'd) they are being performed.	(cont'd) 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. ensures that no safety violations occur.
		Aboard a vessel or using an approved simulator, and given access to a fresh-water generator,	the candidate will plan for and start up the fresh-water generator, describing actions as they are being performed.	The candidate: 1. opens the eductor overboard hull valve; 2. opens the brine overboard eductor salt-water supply valve; 3. opens the vacuum eductor salt-water supply valve; 4. opens the salt-water feed pump discharge and suction valves 5. starts the salt-water 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 submerged tube nest; 10. adjusts the main-engine jacket water distiller submerged tube nest outlet valve to maintain 10 degrees Centigrade jacket-water temperature

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) differential between inlet and outlet; 11. adjusts the salt-water feed to distiller to maintain minimum inlet temperature of 74 degrees Centigrade; 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; 15. continues to adjust the salt-water supply valve, controlling salt-water feed temperature, and brine overboard flow rate; 16. monitors the distillate pump salinity level output; 17. verifies the tank to be replenished is lined up; 18. energizes the three-way valve when the distillate level is below 4.24 PPM (.25 GPG); 19. verifies the salinity meter reading by comparing to chemical test of 50 ml sample; and 20. records the meter reading once discharge to tank has been established.
		Aboard a vessel or using an approved simulator, and given access to a fresh-water generator,	the candidate will plan for and shut down the fresh-water generator, describing actions as they are being performed.	The candidate: 1. trips three-way solenoid valve when all tanks have been topped off; 2. closes main heat source valve to distiller submerged tube nest; 3. secures salt-water feed pump and salt-water supply to both eductors; 4. closes salt-water feed pump discharge and

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) suction valves; 5. opens vacuum breaker valve atop evaporator shell; 6. secures distillate pump motor and closes distillate pump discharge valve; and 7. logs the time that the unit is secured and the final water meter reading.
		Aboard a steam-propelled vessel or using an approved simulator, and given access to a fresh-water distiller,	the candidate will plan for and start up the fresh-water distiller, describing actions as they are being performed. Note (1)	The candidate: 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 salt-water feed pump is open; 4. opens the salt-water feed pump suction and discharge valves; 5. starts the salt-water feed pump to fresh-water 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 salt-water feed heater (not if the salt water feed water heater shell vacuum is less than 75% of normal operational vacuum); 10. lines up and opens the L.P. bleed steam to the salt-water feed water heater. (OR applies and regulates

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) desuperheater condensate flow if live steam supply provided to salt-water feed water heater); 11. lines up and regulates the salt-water feed heater L.P. drain to maintain half of a gauge glass in the salt-water feed heater hot well; 12. adjusts the salt-water flow from the salt-water feed heater to maintain minimum temperature of feed water at 165 F to first stage; 13. observes spray pattern of the feed water and level of water at bottom of the flash chamber; 14. regulates the brine overboard pump discharge valve to maintain water seal and level of brine in bottom of the first and second stages; 15. energizes the salinity indicating panel and verifies the three-way dump valve is tripped and will discharge to the bilge; 16. monitors each salinity in the distillate path for indications of abnormal conditions; 17. starts the distillate pump when the static suction line gauge glass is at least half-full; 18. adjusts as necessary the salt-water feed temperature, brine overboard flow rate, and monitors the distillate pump output salinity level; 19. verifies the tank to be replenished (potable water or distilled water) is lined up; 20. engages the three-way dump valve when the distillate level is indicated to be at or below .25 GPG (4.24 PPM); 21. verifies the salinity meter reading by chemical test

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) comparison of the distillate sample; and 22. records the water meter reading once discharge to the tanks has been established.
		Aboard a steam-propelled vessel or using an approved simulator, and given access to a fresh-water distiller,	the candidate will plan for and shut down the fresh-water distiller, describing actions as they are being performed. Note (1)	The candidate: 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 salt-water feed water heater; 6. secures the salt-water 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 salt-water feed pump to the fresh-water distilling unit as temperatures and vacuum have decreased and closes the salt-water feed pump suction and discharge valves; and 10. stops the brine overboard pump and secures the overboard skin valve when the level in the flash chamber no longer visible.

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
		Aboard a vessel or using an approved simulator, and given access to a fuel-oil or lube-oil purifier,	the candidate will plan for and start the purifier, describing actions as they are being performed.	The candidate: 1. verifies that brake has been released; 2. checks centrifuge sump oil level and adds oil as necessary; 3. depresses start button to re-start centrifuge motor; 4. depresses RPM indicating plunger cap occasionally as rotating speed increases; 5. checks for 10 to 12 pulses per 15 second period as an indication centrifuge has attained operating speed; 6. adds sealing/priming water until overflow is detected at heavy phase discharge; 7. opens input valve from main sump or tank; 8. opens steam supply to lube centrifuge pre-heater; 9. observes cessation of seal/priming water displacement from centrifuge; and 10. monitors increase of lube-oil temperature input to a maximum of 160 degrees Fahrenheit.
		Aboard a vessel or using an approved simulator, and given access to a running fuel-oil or lube-oil purifier,	the candidate will plan for and secure the purifier for cleaning, describing actions as they are being performed.	The candidate: 1. secures steam to oil centrifuge preheater; 2. depresses centrifuge motor controller stop button; 3. verifies centrifuge has come to a complete stop; 4. releases clamp from atop oil input/supply tube; 5. raises and withdraws input/supply tube to fully extracted position; 6. releases both frame clamps; 7. lifts up front end of bowl hood and pivots back to locked position; 8. carefully and slowly screws in locking bolt while rotating bowl slowly to line up and locate recess provided;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 9. repeats for second locking bolt; 10. locates and removes bowl cover ring wrench from tool board; 11. places bowl ring wrench level on bowl ring and gently drives wrench in clock-wise direction to loosen and un-screw ring; 12. lifts bowl ring and gently sets aside on soft surface; 13. locates and removes bowl cover-lifting tool from tool board; 14. places bowl cover-lifting tool around ring dam locking ring, lifts cover and places along side bowl ring; 15. removes top disk and gently sets in cleaning fluid (diesel-oil). 16. firmly grasps distribution tube/disk stack, gently rocking and lifting to dislodge from bowl bottom; 17. removes distribution tube/disk stack and places on wood stand placed in bottom of cleaning solution receptacle; 18. removes accumulated sludge from top disk surfaces and wipes down to remove all traces of cleaning solution; 19. either singularly or as a stack lifts all disks from distribution tube and inverts in cleaning solution; 20. wipes out bowl with lint-free rag; 21. cleans sludge deposits from distribution tube and wipes cleaning solution residue from all surfaces; 22. firmly replaces distribution tube in center of bowl bottom and locks onto locating pin; 23. uses stiff-bristled brush to remove accumulated sludge

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) from each disk, beginning with "bottom" disk, then wiping off disk surfaces to remove cleaning solution; 24. places "bottom disk" over distribution tube; 25. consecutively cleans and places each numbered intermediate disk until all disks have been cleaned and installed; 26. with all intermediate disks in place, positions cleaned top disk onto disk stack; 27. checks bowl cover gasket for resilience, chipping, or fraying, replacing as necessary; 28. wipes off underside of bowl cover; 29. places bowl cover in place noting to line up tang on cover to bowl notch; 30. sets bowl ring in place and rotates counterclockwise by hand until tight; 31. uses bowl ring wrench to drive bowl ring around until tight (make sure mark on top of bowl ring surface lines up within eighth-inch of corresponding mark on bowl cover); 32. unscrews side-jacking bolts until bowl can be rotated freely by hand, and without binding; 33. releases bowl frame cover and gently lowers into place. 34. pushes supply tube/arm down and into position, securing with clamp; 35. secures opposite cover clamp; and 36. returns all tools to centrifuge tool board, stows brushes, rags, and cleaning solutions.

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
		Aboard a vessel in port or at anchor, or in an approved simulator, and given access to a main-propulsion diesel engine,	the candidate will assist in starting a main propulsion diesel engine, describing the actions as they are being performed.	The candidate: 1. completes all necessary checks on the cooling water and associated equipment; a. checks all valves to ensure system is lined up for operation; b. starts required motor-driven cooling-water pump, if provided or necessary; c. ensures systems have adequate pressure and flow available; d. vents cooling-water heat exchangers, using the vent cocks or vent valves on the heat-exchanger shells; e. re-checks water level in fresh-water expansion tanks for adequacy; and f. verifies above actions are indicated on the control panel 2. completes all necessary checks on lube-oil system: a. checks that all valves and pumps are lined up for proper operation; b. ensures cooling-water system is on line and operational; c. checks sump level for adequate supply; d. checks all necessary temperatures and pressures for normal operating conditions; and e. verifies above actions are indicated on control panel. 3. checks for open indicator cocks and rotates engine on engine-turning gear; 4. checks indicator cocks for water and disengages jacking gear;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 5. completes all necessary checks on the air system: a. ensures all tanks are charged; b. checks valves to ensure system is properly lined up; c. ensures compressor is properly lined up and ready for operation; d. checks associated systems (reducers and dryers) for proper operation and flow; and e. verifies above actions are indicated on control panel. 6. performs blowdown; 7. takes appropriate action to eliminate moisture; 8. restores valves and 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: a. lines up and primes fuel system; b. checks to ensure sufficient clean fuel for anticipated engine operation is available and starts fuel-oil purifier systems and transfer system; c. checks heaters, filters, and pumps for acceptable operation; d. vents heaters; e. checks temperatures and pressure for normal operating conditions; and f. verifies above actions are indicated on control panels. 11. starts engine, following all proper procedures for the

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 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 EOT setting with bridge; 13. correctly describes actions as they are being performed; and 14. ensures that no safety violations occur.
			the candidate will assist in securing a main propulsion diesel engine, describing actions as they are being performed.	The candidate: 1. at "Finished With Engines," coordinates with navigation bridge to shift main engine "bridge control" to "engine-room control"; 2. changes over and verifyies that change in control has occurred; 3. secures fuel-oil supply and booster pumps, 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;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 12. secures power to mist detector; 13. secures salt-water cooling supply valves to intercooler; 14. opens scavenging air receiver drain valve; 15. opens fresh-water jacket cooling water flow crossover valve to diesel generators; and 16. enters the time that all systems were secured in logbook.
		Aboard a vessel in port or at anchor, or in an approved simulator, and given access to a main steam turbine,	the candidate will assist in preparing a main steam turbine for operation, describing actions as they are being performed. Note (1)	The candidate: 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 1.5 psig; 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 salt-water 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

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 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. ensures that no safety violations occur.
		Aboard a vessel at sea or in an approved simulator, given access to a main steam turbine,	the candidate will plan for and monitor an operating main steam turbine, describing actions as they are being performed. Note (1)	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 main sump; 6. maintains the proper water level in the de-aerating feed tank; 7. constantly monitors the salinity indicators; 8. checks the lube-oil temperature from the lube-oil cooler, and maintains the oil temperature at 110-130 degrees F.;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 9. checks the pressure of the cooling-water main; 10. is constantly alert for unusual sounds and/or vibrations, and will report them to the OICEW; 11. correctly describes actions as they are performed; and 12. ensures that no safety violations occur.
		Aboard a vessel in port or at anchor, or in an approved simulator, and given access to a main steam turbine,	the candidate will assist in securing a main steam turbine. Note (1)	The candidate: 1. at *Finished With Engines*, secures the main steam stops; 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 as no longer rotating; 7. posts notice that main-engine "**Jacking Gear Engaged**"; 8. verifies that lube-oil system continues to operate; 9. verifies 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 not less than 110°F nor more than 130°F; 12. verifies that each main shaft steady-bearing oil ring rotates freely; 13. shifts load evenly and simultaneously between generator to remain on-line and off-going unit, observing available switchboard meters;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 14. continues to reduce off-going generator load/increasing load to unit remaining on-line until breaker trips to off-going unit; 15. secures steam throttle valve; 16. monitors lube-oil pressure as unit rotating speed slows; 17. operates generator hand driven lube-oil pump when lube-oil pressure is observed to drop to 10 psig and until rotor has come to a complete stop; 18. secures cooling water flow to generator air cooler; 19. secures cooling water flow to generator lube-oil cooler; 20. secures operating steam to auxiliary air ejectors; 21. secures gland seal steam to turbine rotor; 22. secures auxiliary condensate pump; and 23. secures auxiliary circulator when exhaust trunk temperature has dropped to 120°F.
	Operation of steam boilers, including combustion system.	Aboard a vessel or in an approved simulator, and given access to a main propulsion boiler,	the candidate, when directed, will plan for and demonstrate the duties involved in "lighting off" a boiler, describing actions as they are being performed. Note (1)	The candidate: 1. opens all air registers to idle boiler furnace; 2. starts idle boiler forced draft fan for minimum five-minute purge; 3. engages and sets fuel-oil service system master valve; 4. opens fuel-oil service system re-circulation valve; 5. verifies fuel-oil manifold pressure is set to minimum 125 psi; 6. verifies steam drum air cock is open; 7. verifies that superheater vent (if fitted) is open; 8. verifies that superheater drain valves (if fitted) are open; 9. verifies that a minimum of one inch of water is visible

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) at bottom of gauge glass; 10. readies burner with small orifice sprayer plate tip; 11. positions burner in register; 12. closes all air registers, with exception of register with burner in place; 13. adjusts and locks air damper to "light-off" position; 14. verifies fuel-oil has attained light-off temperature; 15. opens fuel-oil atomizer valve and ignites burner; 16. adjusts combustion air to maintain brown haze issuing from stack; 17. closes fuel-oil re-circulating valve; 18. periodically observes periscope/light intensity to modify supply of combustion air to prevent "smoking;" and 19. secures steam drum air cock at 15 psig.
		Aboard a vessel or in an approved simulator, and given access to a main propulsion boiler,	the candidate, when directed, will plan for and secure a main boiler, describing actions as they are being performed. Note (1)	The candidate: 1. opens superheater vents wide and cracks superheater drains when directed; 2. secures oil to burners to cut fires; 3. leaves air registers open to assure all oil has been burned and furnace gases purged; 4. secures main stops and auxiliary steam stops, as boiler steam pressure drops; 5. opens steam drum air vent cocks when pressure has dropped to about 30 psi; 6. maintains proper water level as steam pressure drops and boiler is cooling; 7. secures all forced draft fans and closes dampers when

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) pressure has dropped to 0 psi; and 8. directs that atomizer is removed and cleaned.
		Aboard a vessel while underway or in an approved laboratory and given access to (a) main propulsion boiler(s),	the candidate will test the boiler water for the following: • P-alkalinity; • Total alkalinity; • Chlorides; • Phosphate; • Dissolved oxygen; and • Total dissolved solids. Note (1)	On a daily basis, for no less than a two-week period, the candidate will: 1. properly line up the sample cooler system and obtain required samples of water from each boiler; 2. correctly perform each required test procedure according to the directions provided by the vessel's boiler-water treatment vendor; and 3. record the results daily.
		Aboard a vessel while underway and given access to a main propulsion boiler,	the candidate will dose and/or seek to control the boiler water quality by: • Use of 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 two-week period, the candidate will: 1. identify which corrective actions associated with the results of chemical testing are applicable; 2. correctly identify the type and quantity of chemicals to be used to treat the boiler; 3. add appropriate chemicals to the boiler water while underway; and 4. perform dosing and controls, observing all safety and environmental practices and procedures.

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
			(cont'd) Note (1)	
		Aboard a vessel in port or underway, or in a mechanical shop or laboratory, given a boiler gauge glass and proper tools,	the candidate will apply knowledge and skill in rebuilding a boiler gauge glass. Note (1)	The candidate will rebuild a boiler gauge glass using the following procedures: 1. move the gauge glass to be rebuilt to a work bench; 2. choose both required consumable materials and appropriate tools; 3. use chalk or a center punch to apply appropriate reassembly and line up marks to the side of the gauge glass frame; 4. loosen and remove all gauge glass studs and nuts; 5. carefully separate the outer frames from the inner frame; 6. carefully lift each glass segment and inspect for cracks and potential reuse; 7. remove each mica sheet and discard, unless inspection indicates an impervious and intact surface exists that can be applied to high pressure/high temperature boiler water; 8. remove both the high pressure and soft gaskets from the respective frames; 9. use these gaskets as respective templates to cut new gaskets before discarding; 10. using "soft" metal scraping tools, remove all traces of old gaskets that have adhered to seating surfaces (lands) of gauge glass frames; 11. carefully dress lands with emery cloth; 12. using a wire wheel, carefully and safely clean the threads of all studs and inspect for thread integrity before reuse. Replace all studs that reveal significant wear of threads;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 13. run tap through each nut to remove all built up corrosion and scale from threads; 14. apply light coat of high temperature anti-seize compound to the end of each stud and thread a nut onto one end of each stud, allowing one full thread to be exposed and set aside in area free of debris; 15. place the high pressure gasket, sheet of mica, and boiler water glass into the center frame; 16. carefully set soft gasket and the appropriate outer frame on top of the glass; 17. firmly holding the outer frame in place with the inner frame, turn the entire assembly over and repeat the assembly of the second outer frame; 18. firmly holding the entire assembly together, lift and insert a stud into each of the center holes on each side of the frame; 19. lay flat, thread, and finger tighten a nut to each of the studs; 20. continue with re-installation of remaining studs and nuts; 21. beginning at the center and working outwards to the ends, criss-crossing diagonally to progressively tighten the nuts using two box-end wrenches, continue until all nuts are tightened firmly, yet without excessive strain being placed upon the wrenches; and 22. move to storage rack until needed.

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		Aboard a vessel in port or underway, given a main propulsion boiler gauge glass and proper tools,	the candidate will apply knowledge and skill in reinstalling a boiler gauge glass on a boiler in operation. Note (1)	The candidate will install a boiler gauge glass using the following procedure: 1. verify that the gauge glass shut off valves are properly secured; 2. while wearing appropriate hand and eye protection, carefully loosen the packing gland nuts, checking and verifying that the shut off valves are not leaking; 3. using thick insulated gloves, carefully lift the gauge glass up and out of the gauge glass shut-off valve apertures and set safely aside; 4. from the gauge glass rack, obtain a rebuilt gauge glass and place it into the shut-off valve aperture and secure it in place; 5. verify that the nuts are firmly in place and cannot be rotated by hand; 6. verify that the drain valve is closed and fully open the bottom gage glass shut off valve allowing the glass to fill; 7. if glass demonstrates immediate leakage, close the bottom valve again; 8. using two box end wrenches, beginning at the center and working outwards to the ends, criss-crossing diagonally, progressively tighten the nuts by no more than one flat of the nut, open the bottom gauge glass valve again, if the glass still continues to weep or leak, continue to carefully tighten the nuts as before; 9. open the top valve and if necessary continue to tighten each nut progressively but no more than one flat; and 10. check operation of new gauge glass by performing a double shut-off test.

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		Aboard a vessel or in an approved simulator, and given access to a main boiler,	the candidate, under the supervision of the Chief Engineer, when directed, will perform a bottom blow of a boiler. Note (1)	The candidate, under the supervision of the Chief Engineer, when directed: 1. performs bottom blow when directed, slowing main engine to prevent carry-over or other adverse affects on steaming boiler, as follows; 2. secures fires in boiler and opens superheater vent to boiler to be given bottom blow; 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 be given bottom blow to one 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 gauge glass water level, securing bottom blow valve when level is no less than one inch from the bottom of the 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 one inch from the bottom; 10. prepares to re-light boiler; 11. starts boiler forced draft fan and pre-purges furnace for five minutes; 12. raises water level to two inches below normal level; 13. re-lights burner with torch 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

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) pressures are observed to be equal and slight drop in burner manifold fuel oil pressure is noted; 16. closes off superheater and main steam line 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.
Operate pumping systems and associated control systems.	*Routine pumping operations**	Aboard a vessel or in an approved simulator, and given proper fuel-oil transfer procedures and equipment,	the candidate, when directed, will plan for and conduct an onboard fuel transfer, describing actions as they are being performed.	The candidate: 1. lines up the fuel-oil transfer pump and fuel-oil manifold to take a suction on the desired fuel-oil storage tank or fuel-oil settling tank as directed; 2. lines up the fuel-oil transfer pump to discharge to the desired settling or service pump tank as directed; 3. determines the fuel-oil settling or service-tank level; 4. starts the fuel-oil transfer pump; 5. checks the fuel-oil transfer pump suction and discharge pressures to determine that the pump picks up suction; 6. monitors the fuel-oil settling or service-tank level; 7. stops the fuel-oil transfer pump when the fuel settling or service tank approaches full; and 8. restores the fuel transfer system piping to normal.
		Aboard a vessel or in an approved simulator, and given a piping diagram for the vessel and ballast-pumping procedures,	the candidate, when directed, will plan for and conduct a ballasting operation of double bottom or wing tanks, describing actions as they are	The candidate: 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;

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
			(cont'd) being performed.	(cont'd) 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; and 6. restores the ballast system piping to normal.
		Aboard a vessel or in an approved simulator, and given the piping diagram for the vessel and ballast-pumping procedures,	the candidate, when directed will plan for and conduct a deballasting operation of double bottom or wing tanks, describing actions as they are being performed.	The candidate: 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; and 6. restores the ballast system piping to normal.
	*Operation of bilge, ballast, and systems**	Aboard a vessel while underway, or in an approved simulator, and given the engineering log book, the pertinent standing orders, the oil record book, and proper safety equipment,	the candidate will plan for and pump out the engine-room bilge wells describing actions as they are being performed.	The candidate: 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

STCW Competence	Knowledge, Understanding, and Proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 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; and 9. properly fills in information in the Oil Record Book.
		Aboard a vessel or in an approved simulator, and given the engineering log book, the pertinent standing orders, the oil record book, and proper safety equipment,	the candidate, when directed, will plan for and pump out a cargo-hold or the shaft-alley bilge wells.	The candidate: 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; and 9. properly fills in information in the Oil Record Book.

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

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
Operate alternators, generators and control systems.	*Preparing, starting, coupling, and changing over alternators or generators**	Aboard a vessel or in an approved simulator, given access to generator and proper tools,	the candidate, when directed, will plan for and manually start the emergency generator, describing actions as they are being performed.	The candidate: 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. inspects the emergency diesel generator for loose components or other items laying beneath the unit that would warrant disassembly before operation; 3. determines the emergency diesel generator lube-oil level using the dip stick and adds oil as necessary; 4. checks the coolant level on a radiator-cooled installation, and adds distilled water as necessary; 5. places the starter switch in the start position until the engine is in operation or for no more than ten seconds; 6. ensures engine attains set speed; and 7. places in service on emergency bus.
		Aboard a vessel or in an approved simulator given access to proper equipment and manufacturer's technical manual,	the candidate, when directed, will plan for and conduct a pre-start-up inspection of a diesel generator, describing actions as they are being performed.	The candidate: 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 overspeed and resets the trip to determine if the mechanism operates without binding; 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;

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 7. opens the indicator cocks and rolls the engine over; 8. correctly describes actions as they are being performed; and 9. ensures that no safety violations occur.
		Aboard a vessel or in an approved simulator, given access to proper equipment and manufacturer's technical manual,	the candidate, when directed, will plan for and conduct a pre-start-up inspection of a steam turbo-generator, describing actions as they are being performed. Note (1)	The candidate: 1. ensures that the plan reflects proper sequence of actions, is complete, and conforms to the requirements of manufacturer's instructions and ship's procedures; 2. inspects and prepares the steam turbo-generator for operation; 3. inspects alternator for loose cable connections, brush rigging, and loose items that may damage unit during start-up; 4. inspects coupling between turbine/ reduction gear and alternator for readiness; 5. inspects governor unit, reduction gear casing, and bearing housings for indications of lubrication leaks; 6. inspects manual overspeed trip for excessive wear; 7. determines level of lube-oil in sump and adds lube-oil as necessary; 8. manually trips and resets over-speed trip to determine operation without binding; 9. raises vacuum on auxiliary condenser to prepare steam-turbo generator for start-up; 10. inspects auxiliary circulator pump and its piping for leaks and cracks; 11. verifies that sea suction and discharge valves are open to auxiliary circulator; 12. inspects auxiliary condensate pump and its piping for

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) leaks and cracks; 13. verifies that hot well condensate level is visible; 14. verifies that suction, discharge, and vent line valves to auxiliary condensate pump are open; 15. inspects auxiliary circulator and condensate pump motor controllers for readiness; 16. starts auxiliary circulator; 17. vents off condenser heads and observes stabilizing of circulated water pressure; 18. starts auxiliary condensate pump; 19. adjusts opening of re-circulating valve to maintain visible level of condensate in hot well; 20. returns to operating level and applies gland seal steam to turbine rotor; 21. admits operating steam to air ejectors, adjusting supply pressure as necessary; 22. determines visible level in hot well, adjusting re-circulating valve as necessary; 23. starts lube-oil supply to unit when vacuum reaches 18-22 inches (obtains assistance if pump is hand-operated); 24. sets throttle valve; 25. slowly opens throttle valve, gradually increasing turbine rotating speed; 26. allows unit to rotate without load for even warming; and 27. applies lube-oil and alternator cooler water supply as necessary.

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
		Aboard a vessel or in an approved simulator, given access to a generator and proper tools, approved instruction, and safe working environment,	the candidate, when directed, will plan for and connect the ship's service generator to the main switchboard, describing actions as they are being performed.	The candidate: 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. verifies that automatic voltage regulator is at 440 volts and manually adjusts as necessary; 3. turns on synchroscope and observes direction and speed of rotation; 4. manually adjusts generator speed to control direction of scope rotation in the "fast" direction; 5. manually closes on-coming unit circuit breaker to stop synchroscope at 12 o'clock; 6. manually divides load evenly and simultaneously between on-line and in-coming units by observing available switch board meters; 7. manually shifts load evenly and simultaneously between unit to remain on-line and off-going unit, observing available switch board meters; and 8. continues to manually reduce the off-going unit load while increasing load to unit remaining on-line until circuit breaker trips to off-going unit.

Function: Maintenance and repair at the operational level

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
Maintain marine-engineering systems, including control system.	Undertake maintenance and repair to plant and equipment.	Aboard a vessel or in a workshop, given a centrifugal pump and other equipment, manuals and specifications needed to complete the task,	the candidate will perform operational inspections of centrifugal pumps in operation.	The candidate: 1. correctly plans for the job, using the proper sequence of actions to examine an operating centrifugal pump (such as a salt-water service pump) to determine if its operation is outside of operating norms; 2. determines whether higher than normal temperature of medium outflow to be cooled exists; 3. determines whether sea temperature has changed by five (5) or more degrees in past 24 hours. Places additional service pump into service if temperature rise has occurred. Secures additional service pump if temperature drop has been determined; 4. listens for indication of pump suction cavitation; 5. checks suction differential pressure gauge to determine if suction strainer is fouled; 6. opens casing vent to dispel trapped air if discharge pressure is fluctuating or lower than normal; 7. cycles discharge and suction to fully open position and backs down each by quarter-turn regardless of change in indicated pressure; and 8. slowly throttles pump discharge and observes resulting pressure. Notifies senior engineer if pump unable to establish shut-off head.
		Aboard a vessel or in a workshop, given a centrifugal pump and other equipment, manuals and specifications needed to	the candidate will tighten an excessively leaking centrifugal or gear pump packing stuffing box while in	The candidate: 1. correctly plans for the job, using the proper sequence of actions to examine an operating centrifugal pump (without a mechanical seal) to tighten an excessively leaking packing stuffing box and determine if further examination of the pump is required;

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
		(cont'd) complete the task,	(cont'd) operation.	(cont'd) 2. determines through visual inspection if leakage of pumped fluid is dripping at an acceptable rate; 3. determines (for salt-water 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 quarter-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.
		Aboard a vessel or in a workshop, given a reciprocating pump and other equipment, manuals and specifications needed to complete the task,	the candidate will tighten an excessively leaking reciprocating pump packing stuffing box while in operation. Note (1)	The candidate: 1. correctly plans for the job, using the proper sequence of actions to examine an operating reciprocating pump to tighten an excessively leaking packing stuffing box and to determine if further examination of the pump is required; 2. determines through visual inspection if leakage of pumped fluid is acceptable; 3. determines (for salt-water cooling service) if leakage is cool to the touch; 4. determines by using a set of dividers if packing is

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) evenly distant from casing; 5. tightens packing gland by turning both packing gland nuts by a quarter-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.
		Aboard a vessel or in a workshop, given a reciprocating pump and other equipment, manuals and specifications needed to complete the task,	the candidate will adjust the stroke of an operating reciprocating pump. Note (1)	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 one-quarter 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 one-quarter inch); 5. re-starts the pump observes for proper operation; and 6. checks if pump strokes are continued to be too long (if

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont) so, gradually adjust the tappets until satisfactory).
		Aboard a vessel or in a workshop, given a piping diagram and other equipment needed to complete the task,	the candidate will plan for and inspect a bilge valve manifold, describing actions as they are being performed.	The candidate: 1. correctly plans for the job, reflecting knowledgeable use of stop-check valves formed as a bilge system suction/discharge manifold as a preliminary investigation as to why bilge pump is unable to develop or maintain suction and bilge wells can not be emptied; 2. verifies that sea suction is secured; 3. removes each stop-check valve from manifold one at a time; 4. inspects each stem for extensive pitting and potential wear on inner face of stuffing-box packing rings; 5. removes and inspects valve disc seat and manifold seat for cuts; 6. determines free movement of valve disc on its stem; 7. inspects manifold valve seat for signs of obstruction, rags, or deep cuts into the surface; 8. re-installs valve bonnet, applying new gasket or sealant as necessary to flange body; 9. cycles valve through open and closed position, taking up on packing gland if leakage is observed; 10. cycles through the de-watering of individual bilge wells to determine if only one individual bilge suction line is affected or all are affected at one time; 11. physically runs hands over individual bilge suction line if isolation test determines only one line affected, feeling for significant openings in pipe surface; and 12. if entire system is still affected, searches out openings in suction pipe surface material, improper or missing strainer cover gasket, signs of inadequate priming of

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) bilge pump, faulty pump shaft packing, excessively scored shaft, and/or inadequate or blocked pump sealing line flow.
		Aboard a vessel or in a workshop, given a globe valve and other equipment needed to complete the task,	the candidate will plan for, inspect, and maintain a globe valve, describing actions as they are being performed.	The candidate devises a plan which reflects the proper sequence of actions to examine a piping system globe isolation valve; 1. correctly disassembles valve to remove bonnet for internal examination of: a. seating surfaces for cuts or impressions upon seating surfaces; and b. greater than normal pitting of valve stems, particularly in area passing through packing; 2. laps in valves on seats using a series of coarse to fine lapping compounds; 3. removes old packing, selecting replacement packing according to system use; 4. re-packs stuffing box, replaces gland bolts as necessary, and tightens to allow snug but free movement of valve stem; 5. replaces valve bonnet with valve disc in fully raised/retracted position; and 6. re-establishes flow through valve and adjusts packing gland for leaks.
		Aboard a vessel,	the candidate will perform operational inspections of heat exchangers in use.	The candidate: 1. performs actions which reflect knowledge of the systems and the fluids passing through the shell and tubes; 2. correctly opens header vents to dispel trapped air;

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) 3. where appropriate, manipulates steam trap by-pass for signs of improper operation of the trap; and 4. notes in logbook and discusses with senior engineer any indications of abnormal heat exchanger operation.

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

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
Ensure compliance with pollution prevention requirements.	Anti-pollution procedures to be taken to prevent pollution of the marine environment	Aboard a vessel or in an approved simulator, and given access to a sanitary flushing-water system and proper tools and equipment,	the candidate will monitor the sanitary flushing-water system.	The candidate: 1. ensures that the plan reflects proper sequence of actions, is complete, and conforms to the requirements of manufacturer's instructions and ship's procedures; 2. successfully monitors the sanitary flushing system according to plan; 3. correctly describes the actions as they are being performed; and 4. ensures that no safety or environmental violations occur.
		Aboard a vessel or in an approved simulator, and given access to a sewage waste-treatment plant and proper tools and equipment,	the candidate will monitor the sewage waste-treatment plant.	The candidate: 1. ensures that the plan reflects proper sequence of actions, is complete, and conforms to the requirements of manufacturer's instructions and ship's procedures; 2. successfully monitors the sewage waste-treatment plant according to plan; 3. correctly describes the actions as they are being performed; and 4. ensures that no safety or environmental violations occur.
		Aboard a vessel or in an approved simulator, and given access to an oily-water separator system and proper tools and equipment,	the candidate will monitor the oily-water separator system.	The candidate: 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: a. ensures that equipment is not bypassed, sampling

STCW Competence	Knowledge, understanding and proficiency	Performance Condition	Performance Behavior	Performance Standard
				(cont'd) line is open, and flushing water is not being supplied to sensor; b. automatic valves are not operated in manual mode or disconnected from controlling devices; and c. no temporary hoses are used during operation and when possible, checks cleanliness of sensors; 7. checks for any unusual conditions or noises; 8. notifies the watch engineer of any unusual or unsafe conditions; and 9. ensures that no safety or pollution violations have occurred.

- ***Italics denote STCW proficiency from Table A-III/1 of the STCW Code***

Note (1) Required for steam endorsement