INTERNATIONAL MARITIME ORGANIZATION

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REVIEW OF CHAPTER III OF THE STCW CONVENTION AND CODE

Review of tables A-III/1 and A-III/2 of the STCW Code

Columns 1, 2, 3 and 4

Submitted by Japan, Turkey and IMarEST

SUMMARY

Executive summary:	This document contains a proposal to amend tables A-III/1 and A-III/2 of the STCW Code in order to meet contemporary technologies and improve the texts of the tables
Strategic direction:	5
High-level action:	5.2
Planned output:	5.2.2.1
Action to be taken:	Paragraph 8
Related documents:	STW 38/17; STW 40/7/18, STW 40/7/37 and STW 40/14

Background

1 The comprehensive review of the STCW Convention and Code is in progress and the principles of the review are to meet the operational requirements of contemporary maritime technologies, while accommodating future and not to be scaled down by amending the Convention and Code (STW 38/17, paragraph 12.29).

2 At STW 40, Japan submitted a proposal to amend tables A-III/1 and A-III/2, aiming at a reformation of the functions, more specific descriptions, addressing contemporary technologies and so forth (STW 40/7/18). After the discussion, the Sub-Committee agreed to amend the tables under the existing functions and Japan agreed to resubmit a revised proposal on this issue to the next session.

3 With regard to the re-submission of the proposal, an informal group was organized to consider Japan's revised proposal, and India, Norway, the United Kingdom, Turkey, IMarEST and ITF participated in the group.

Discussion

4 The STCW Convention as adopted in 1978 had the minimum knowledge and ability required to qualify for certification were stipulated in the regulation, leaving the validation method to the discretion of each administration. The STCW Code was introduced when the Convention was amended in 1995 and the new tables were developed, which included not only "Competence" and "Knowledge, Understanding and Proficiency" but also "Method for demonstrating competence" and "Criteria for evaluating competence".

While this amendment was certainly groundbreaking, as far as "Competence" and "Knowledge, understanding and proficiency" were concerned, requirements were represented in the same manner and extent as the original 1978 Convention. Consequently, competence concerning maintenance was emphasized, with "use of tools" being placed on the top of the competence table at the operational level and "dismantling, maintenance repair and re-assembly" placed consecutively, as amended in 1995. However by 1995, for example, an electric filament indication lamp had been replaced by an LED and there was now no necessity to change indication lamps on control panels. Furthermore, the 1990s was the age of mechatronics with various technical innovations being introduced; e.g., the reliability of propulsion plant machinery had been increased, electronic circuit devices for monitoring systems, the so-called "annunciator" had been replaced with computerized monitoring system equipment and computer control for power generating systems had become popular. At the same time, there must have been changes concerning marine engineers' ability between the 1970s and the 1990s.

Thus, it has been noted that technological advancements in propulsion plant machinery and changes in marine engineers' ability were not reflected in the 1995 amendment.

With regard to control engineering, although the subject had a wide range of fields in the 1990s, the existing description in the competence tables is too general to clarify what should be learned by personnel training to be a marine engineer.

Taking the aforementioned into account, the existing tables require amendment based on the principles of the comprehensive review of the STCW Convention and Code.

5 The following policies were set up as a concept to amend tables A-III/1 and A-III/2:

.1 In principle, maintaining the existing functions and requirements and avoiding unnecessary detailed descriptions, the minimum requirements necessary to be learned should be stipulated in a concrete manner;

.2 The requirements should be expressed, focusing on functions and operational characteristics with future development in mind in order to make the tables more applicable for contemporary marine engineering wherever possible by deleting outdated machinery and requirements;

.3 It was suggested at STW 40 that the intention of the proposal by India (STW 40/7/37) for new tables for personnel serving on steam-powered ships should be reflected in the existing tables. Therefore this suggestion should be taken into account;

.4 Although requirements for structure and operation principles of machinery have been considered to be included in the competence for operating machinery, they should be clearly specified;

.5 Although inclusion of machinery using hydraulic and pneumatic systems has been ambiguous, requirements for this kind of equipment should be clearly specified;

.6 In the function of "Electrical, electronic and control engineering", although power electronics and high-voltage engineering are not recent engineering innovations, their inclusion has been ambiguous, they should now be clearly specified considering future and requirements for high-voltage engineering should be limited to general knowledge. In addition, with regard to control engineering, requirements for PID control should be emphasized since it is widely used in various systems such as electro-pneumatic control and computerized control on board ships. As this may be termed classical control engineering, learning its principles and acquiring its skills are essential. Furthermore, with regard to programmable and sequential control using computer, PLC or other means, functions, control characteristics and control flowchart should be also emphasized as a minimum requirement;

.7 Although some requirements for maintenance and repair are found in the existing function of "Marine engineering", they should be transferred into the function of "Maintenance and repair" in an appropriate manner. Requirements for propellers, troubleshooting, non-destructive testing and statutory verifications should also be added;

.8 Engine-room resource management and other requirements which have been already proposed need not be revised;

.9 With regard to the function of "Controlling the operation of the ship and care for persons on board", no amendment should be proposed in terms of harmonization to chapter III.

6 Bearing in mind the proposed amendment to tables A-III/1 and A-III/2 of sections A-III/1 and A-III/2 of the STCW Code, paragraph 1 in section B-III/1 of chapter III should consequently be deleted and paragraphs 2 and 3 should be renumbered as set out in annex 2.

Proposals

7 The group proposes a draft amendment to tables A-III/1 and A-III/2 of sections A-III/1 and A-III/2 of the STCW Code based on the concept mentioned above as set out in annex 1 and a consequent deletion of paragraph 1 of section B-III/1 of chapter III as set out in annex 2.

Action requested of the group

8 The group is invited to take the proposal contained in the attached annexes into consideration and decide as appropriate.

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ANNEX 1

PROPOSED AMENDMENTS TO TABLES A-III/1 AND A-III/2 OF THE STCW CODE

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**	**Method for demonstrating competence**	**Criteria for evaluating competence**
~~Use appropriate tools for fabrication and repair operations typically performed on ships~~ (Texts underlined were transferred to the function of Maintenance and repair)	~~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~~	~~Assessment of evidence obtained from one or more of the following:~~ ~~.1 approved workshop skills training~~ ~~.2 approved practical experience and tests~~	~~Identification of important parameters for fabrication of typical ship related components is appropriate~~ ~~Selection of material is appropriate~~ ~~Fabrication is to designated tolerances~~ ~~Use of equipment and machine tools is appropriate and safe~~
~~Use hand tools and measuring equipment for dismantling, maintenance repair and re-assembly of shipboard plant and equipment~~ (Texts underlined were transferred to the function of Maintenance and repair)	~~Design characteristics and selection of materials in construction of equipment~~ ~~Interpretation of machinery drawings and handbooks~~ ~~Operational characteristics of equipment and systems~~	~~Assessment of evidence obtained from one or more of the following:~~ ~~.1 approved workshop skills training~~ ~~.2 approved practical experience and tests~~	~~Safety procedures followed are appropriate~~ ~~Selection of tools and spare gear is appropriate~~ ~~Dismantling, inspecting, repairing and reassembling equipment is in accordance with manuals and good practice~~ ~~Re-commissioning and performance testing is in accordance with manuals and good practice~~

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
~~Use hand tools, electrical and electronic measuring and test equipment for fault finding, maintenance and repair operations~~ (Texts underlined were transferred to the function of Electrical, electronic and control engineering)	~~Safety requirements for working on shipboard electrical systems~~ ~~Construction and operational characteristics of shipboard AC and DC electrical systems and equipment~~ ~~Construction and operation of electrical test and measuring equipment~~	~~Assessment of evidence obtained from one or more of the following:~~ ~~.1 approved workshop skills training~~ ~~.2 approved practical experience and tests~~	~~implementation of safety procedures is satisfactory~~ ~~Selection and use of test equipment is appropriate and interpretation of results is accurate~~ ~~Selection of procedures for the conduct of repair and maintenance is in accordance with manuals and good practice~~ ~~Commissioning and performance testing of equipment and systems brought back into service after repair in accordance with manuals and good practice~~
Maintain a safe engineering watch	Thorough knowledge of basic principles to be observed in keeping an engineering watch including: .1 duties associated with taking over and accepting a watch .2 routine duties undertaken during a watch .3 maintenance of the machinery space log-book and the significance of the readings taken .4 duties associated with handing over a watch Safety and emergency procedures; change-over of remote/automatic to local control of all systems	Assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate .4 approved laboratory equipment training	The conduct, handover and relief of the watch conforms with accepted principles and procedures The frequency and extent of monitoring of engineering equipment and systems conforms to manufacturers' recommendations and accepted principles and procedures including basic principles to be observed in keeping an engineering watch A proper record is maintained of the movements and activities relating to the ship's engineering systems

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	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 *Engine-room Resource Management* Knowledge of engine-room resource management principles including: .1 allocation, assignment and principles of resources .2 effective communication .3 assertiveness and leadership .4 obtaining and maintaining situational awareness	Assessment of evidence obtained from one or more of the following: .1 approved training ship experience .2 approved in-service experience .3 approved simulator training	Resources are allocated and assigned as needed in correct priority to perform necessary tasks. Communication is clearly and unambiguously given and received Questionable decisions and/or actions result in appropriate challenge and response Effective leadership behaviours are identified Team member(s) share accurate understanding of current and predicted engine room and associated systems state, and external environment
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	English language publications relevant to engineering duties are correctly interpreted Communications are clear and understood
Use internal communication systems (Texts underlined were transferred from the Management level with introducing ERM into the operational level)	Operation of all internal communication systems on board	Assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	Transmission and reception of messages are consistently successful

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
		.4 approved laboratory equipment training	
Operate ~~main and auxiliary~~ shipboard plant machinery and associated control systems	Basic structure and operation principles of major machinery systems including: .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 and heat exchanger .7 automatic control systems Fluid flow and characteristics of major piping systems Basic structure and operation principles of refrigerator and ventilation systems	Assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved laboratory equipment training	Structures and operating mechanisms can be understood and explained with drawings/instructions
	Safety and emergency procedures for operation of propulsion plant machinery including control systems Operational characteristics of machinery and control systems ~~Main and auxiliary machinery:~~	Assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	Operation of equipment and systems is in accordance with operating manuals Operations are planned and carried out in accordance with established rules and procedures to ensure safety of operations and avoid pollution of the marine environment

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	Preparation, operation, fault detection and necessary measures to prevent damage for the following major machinery items and control systems: .1 ~~preparation of main machinery and preparation of auxiliary machinery for operation~~ main engine and associated auxiliaries .2 steam boiler and associated auxiliaries ~~.3 methods of checking water level in steam boilers and action necessary if water level is abnormal~~ ~~.4 location of common faults in machinery and plant in engine and boiler rooms and action necessary to prevent damage~~ .3 generator and associated systems .4 other auxiliaries including refrigerator and ventilation systems	.4 approved laboratory equipment training	The output of plant and engineering systems consistently meets requirements, including bridge orders relating to changes in speed and direction Deviations from the norm are promptly identified 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
Operate fuel, lubrication, ballast and other pumping systems and associated control systems	Operational characteristics of machinery and control systems Operation of pumping systems: .1 routine pumping operations .2 operation of bilge, ballast and cargo pumping systems	Assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	Operation of machinery and systems is in accordance with operating manuals Operations are planned and carried out in accordance with established rules and procedures to ensure safety of operations and avoid pollution of the marine environment

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	Oily water separators (or similar equipment) requirements and operation.	.4 approved laboratory equipment training	Deviations from the norm are promptly identified and appropriate action taken

Function: Maintenance and repair at the operational level

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
~~Maintain marine engineering systems, including control systems~~ Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board (Texts underlined were transferred from the function of Marine engineering)	~~*Marine systems*~~ ~~Appropriate basic mechanical knowledge and skills~~ ~~*Safety and emergency procedures*~~ ~~Safe isolation of electrical and other types of plant and equipment required before personnel are permitted to work on such plant or equipment~~ ~~Undertake maintenance and repair to plant and equipment~~ 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 Method of emergency/temporary repair	~~Assessment of evidence obtained from one or more of the following:~~ ~~.1 approved in-service experience~~ ~~.2 approved training ship experience~~ ~~.3 approved simulator training, where appropriate~~ ~~.4 approved laboratory equipment training~~ Assessment of evidence obtained from one or more of the following: .1 approved workshop skills training .2 approved practical experience and tests .3 approved in-service experience .4 approved training ship experience	~~Isolation, dismantling and reassembly of plant and equipment is in accordance with accepted practices and procedures.~~ ~~Action taken leads to the restoration of plant by the method most suitable and appropriate to the prevailing circumstances and conditions~~ Identification of important parameters for fabrication of typical ship related components is appropriate Selection of material is appropriate Use of hand tools, machine tools and measuring instruments is appropriate and safe

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	Safety measures to be taken for using hand tools, machine tools and measuring instruments Use of hand tools, machine tools and measuring instruments Use of various types of sealants and packings		
Maintenance and repair of shipboard plant machinery (Texts underlined were transferred from the function of Marine engineering)	Safety measures to be taken for repair and maintenance works Maintenance and repair works such as dismantling, adjustment and reassembling of plant machinery including propeller The use of specialized tools and measuring instruments Design characteristics and selection of materials in construction of equipment Interpretation of machinery drawings and handbooks The interpretation of piping, hydraulic and pneumatic diagrams	Assessment of evidence obtained from one or more of the following: .1 approved workshop skills training .2 approved practical experience and tests .3 approved in-service experience .4 approved training ship experience	Safety procedures followed are appropriate Selection of tools and spare gear is appropriate Dismantling, inspecting, repairing and reassembling equipment is in accordance with manuals and good practice Re-commissioning and performance testing is in accordance with manuals and good practice Selection of materials is appropriate

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

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
~~Operate alternators, generators and control systems~~	~~*Generating plant*~~ ~~Appropriate basic electrical knowledge and skills~~ ~~Location of common faults and action to prevent damage~~ ~~*Control systems*~~ ~~Location of common faults and action to prevent damage~~	~~Examination and~~ Assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate .4 approved laboratory equipment training	~~Operations are planned and carried out in accordance with established rules and procedures to ensure safety of operations~~
Operate electrical, electronic and control systems	Basic configuration and operation principles of the following electrical, electronic and control equipment: .1 electrical equipment a. power generation systems b. preparing, starting, paralleling ~~coupling~~ and changing over ~~alternators or~~ generators c. induction motors including starting methodologies d. high-voltage installations e. sequential control circuits and associated system devices		Structures and operating mechanisms can be understood and explained with drawings/instructions

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	.2 electronic equipment a. functions, characteristics and features of control systems for major machinery items including main propulsion plant operation control and steam boiler automatic combustion control b. flowchart for automatic and control systems c. characteristics of basic electronic circuit elements .3 control systems a. various automatic control methodologies and characteristics b. PID control characteristics and associated system devices for process control		
Maintenance and repair of electric and electronic equipment	Safety requirements for working on shipboard electrical systems Maintenance and repair works for electrical system equipment, main switch board, electric motor, generator and DC electrical system equipment Detection of electric malfunction, location of faults and measures to prevent damage	Assessment of evidence obtained from one or more of the following: .1 approved workshop skills training .2 approved practical experience and tests .3 approved in-service experience .4 approved training ship experience	Safety measures for working are appropriate Selection and use of hand tools, measuring instruments and testing devices are appropriate and interpretation of results is accurate Dismantling, inspecting, repairing and reassembling equipment are in accordance with manuals and good practice

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	Construction and operation of electrical test and measuring equipment Function and performance tests of the following equipment and their configuration .1 monitoring systems .2 automatic control devices .3 protective devices The interpretation of electrical and simple electronic diagrams		Reassembling and performance testing is in accordance with manuals and good practice

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**	**Method for demonstrating competence**	**Criteria for evaluating competence**
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	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience	Procedures for monitoring shipboard operations and ensuring compliance with MARPOL requirements are fully observed
Maintain sea-worthiness of the ship	*Ship stability* Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment Understanding of the fundamentals of watertight integrity	Assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	The stability conditions comply with the IMO intact stability criteria under all conditions of loading Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy *Ship construction* General knowledge of the principal structural members of a ship and the proper names for the various parts	.4 approved laboratory equipment training	
Prevent, control and fight fires on board	*Fire prevention and fire-fighting appliances* Knowledge of fire prevention Ability to organize fire drills Knowledge of classes and chemistry of fire Knowledge of fire-fighting systems Action to be taken in the event of fire, including fires involving oil systems	Assessment of evidence obtained from approved fire-fighting training and experience as set out in section A-VI/3	The type and scale of the problem is promptly identified and initial actions conform with the emergency procedure and contingency plans for the ship Evacuation, emergency shutdown and isolation procedures are appropriate to the nature of the emergency and are implemented promptly The order of priority, and the levels and time-scales of making reports and informing personnel on board, are relevant to the nature of the emergency and reflect the urgency of the problem
Operate life-saving appliance	*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.	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

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	Knowledge of survival at sea techniques		
Apply medical first aid on board ship	*Medical aid* 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	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 and protection of the marine environment	Assessment of evidence obtained from examination or approved training	Legislative requirements relating to safety of life at sea and protection of the marine environment are correctly identified

Table A-III/2

Specification of minimum standard of competence for chief engineer officers and second engineer officers on ships powered by main propulsion machinery of 3,000 kW propulsion power or more

Function: Marine engineering at the management level

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
Manage the operation of propulsion plant machinery	Structure features and operative mechanism of the following major machineries and associated auxiliaries .1 marine diesel engine .2 marine steam turbine .3 marine gas turbine .4 marine steam boiler	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved laboratory equipment training	Explanation and understanding of structures and operating mechanisms are appropriate

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
Plan and schedule operations	*Theoretical knowledge* Thermodynamics and heat transmission Mechanics and hydromechanics ~~Operating principles of ship power installations (diesel, steam and gas turbine) and refrigeration~~ Propulsive characteristics of diesel engines, steam and gas turbines including speed, output and fuel consumption	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate .4 approved laboratory equipment training	The planning and preparation of operations is suited to the design parameters of the power installation and to the requirements of the voyage
	Heat cycle, thermal efficiency and heat balance of the following engines .1 marine diesel engine .2 marine steam turbine .3 marine gas turbine Refrigerators and refrigeration cycle Physical and chemical properties of fuels and lubricants Technology of materials Naval architecture and ship construction, including damage control		
~~Start up and shut down main propulsion and auxiliary machinery, including associated systems~~ Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery	*Practical knowledge* ~~Operation and maintenance of:~~ ~~1. marine diesel engines~~ ~~2. marine steam propulsion plant~~ ~~3. marine gas turbines~~	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate .4 approved laboratory equipment training	~~The methods of preparing the start-up and of making available fuels, lubricants, cooling water and air are the most appropriate~~ ~~Checks of pressures, temperatures and revolutions during the start-up and warm-up period are in accordance with technical specifications and agreed work plans~~ Surveillance of main propulsion plant and auxiliary systems is sufficient to maintain safe operating conditions ~~The methods of preparing the shutdown and of supervising the cooling down of the engine are the most appropriate~~

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	~~Operation and maintenance of auxiliary machinery, including pumping and piping systems, auxiliary boiler plant and steering gear systems~~ ~~Operation, testing and maintenance of control systems~~ ~~Operation and maintenance of cargo handling equipment and deck machinery~~ Operating limits and efficient operation of propulsion plant		The methods of measuring the load capacity of the engines are in accordance with technical specifications Performance is checked against bridge orders Performance levels are in accordance with technical specifications ~~The methods of measuring the load capacity of the engines are in accordance with technical specifications~~
~~Operate, monitor and evaluate engine performance and capacity~~	Functions and mechanism of automatic control for main engine Functions and mechanism of automatic control for auxiliary machinery including but not limited to: .1 power generation systems .2 steam boilers .3 oil purifier	~~Examination and assessment of evidence obtained from one or more of the following:~~ ~~1. approved in-service experience;~~ ~~2. approved training ship experience~~ ~~.3 approved simulator training, where appropriate~~	~~The methods of measuring the load capacity of the engines are in accordance with technical specifications~~ ~~Performance is checked against bridge orders~~ ~~Performance levels are in accordance with technical specifications~~ (Texts underlined were transferred to the upper column)
~~Maintain safety of engine equipment, systems and services~~	.4 refrigeration system .5 pumping and piping systems .6 steering gear system	~~Examination and assessment of evidence obtained from one or more of the following:~~ ~~.1 approved in-service experience;~~ ~~.2 approved training ship experience~~	~~Arrangements for ensuring the safe and efficient operation and condition of the machinery installation are suitable for all modes of operation~~

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
Manage fuel, lubrication and ballast operation	Operation and maintenance of machinery, including pumps and piping systems Operation and maintenance of cargo-handling equipment and deck machinery	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	Fuel and ballast operations meet operational requirements and are carried out so as to prevent pollution of the marine environment
~~Use internal communication systems~~ (Texts underlined were transferred to the Operational level)	~~Operation of all internal communication systems on board~~	~~Examination and assessment of evidence obtained from one or more of the following:~~ ~~1. approved in-service experience;~~ ~~2. approved training ship experience~~ ~~3. approved simulator training, where appropriate~~ ~~.4 approved laboratory equipment training~~	~~Transmission and reception of messages are consistently successful~~ ~~Communication records are complete, accurate and comply with statutory requirements~~

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

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
Operate and supervise electrical and electronic control equipment	*Theoretical knowledge* Marine electrotechnology Electronics Power electronics Automatic control engineering	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience	Operation of equipment and system is in accordance with operating manuals Performance levels are in accordance with technical specifications

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	~~electronics and electrical equipment~~ ~~Fundamentals of automation, instrumentation and control systems~~ ~~Operation, testing and maintenance of electrical and electronic control equipment, including fault diagnostics~~	.3 approved simulator training, where appropriate .4 approved laboratory equipment training	
Test, detect faults and maintain and restore electrical and electronic control equipment to operating condition	Characteristic features and system configurations of automatic control equipment for the following: .1 main engine .2 generator .3 steam boiler Characteristic features and system configurations of operation control equipment for induction motor Characteristic features of high voltage installations Features of hydraulic and pneumatic control equipment *Practical knowledge* Troubleshooting of electric and electronic control equipment Function test of electric and electronic control equipment Troubleshooting of monitoring systems Software version control	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience ~~.3 approved simulator training, where appropriate~~ ~~.4~~.3 approved laboratory equipment training	Maintenance activities are correctly planned in accordance with technical, legislative, safety and procedural specifications ~~The effect of malfunctions on associated plant and systems is accurately identified, ship's technical drawings are correctly interpreted, measuring and calibrating instruments are correctly used and actions taken are justified~~ Inspection, testing and troubleshooting of equipment are appropriate

Function: Maintenance and repair at the management level

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
Organize and supervise safe maintenance and repair procedures	*Theoretical knowledge* Marine engineering practice *Practical knowledge* Organizing and supervising ~~carrying out~~ safe maintenance and repair procedures Planning maintenance including statutory verifications Planning repair works	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	Maintenance activities are correctly planned and carried out in accordance with technical, legislative, safety and procedural specifications Appropriate plans, specifications, materials and equipment are available for maintenance and repair Action taken leads to the restoration of plant by the most suitable method
Detect and identify the cause of machinery malfunctions and correct faults	*Practical knowledge* Detection of machinery malfunction, location of faults and action to prevent damage Inspection and adjustment of equipment Non-destructive examination	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate .4 approved laboratory equipment training	The methods of comparing actual operating conditions are in accordance with recommended practices and procedures Actions and decisions are in accordance with recommended operating specifications and limitations
Ensure safe working practices	*Practical knowledge* Safe working practices	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved laboratory equipment training	Working practices are in accordance with legislative requirements, codes of practice, permits to work and environmental concerns

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

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
Control trim, stability and stress	Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability Knowledge of the effect on trim and stability of a ship in the event of damage to and consequent flooding of a compartment and countermeasures to be taken Knowledge of IMO recommendations concerning ship stability	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	Stability and stress conditions are maintained within safety limits at all times
Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea and protection of the marine environment	Knowledge of relevant international maritime law embodied in international agreements and conventions Regard shall be paid especially to the following subjects: .1 certificates and other documents required to be carried on board ships by international conventions, how they may be obtained and the period of their legal validity .2 responsibilities under the relevant requirements of the International Convention on Load Lines	Examination and assessment of evidence obtained from one or more of the following: .1 approved in-service experience .2 approved training ship experience .3 approved simulator training, where appropriate	Procedures for monitoring operations and maintenance comply with legislative requirements Potential non-compliance is promptly and fully identified Requirements for renewal and extension of certificates ensure continued validity of survey items and equipment

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	.3 responsibilities under the relevant requirements of the International Convention for the Safety of Life at Sea .4 responsibilities under the International Convention for the Prevention of Pollution from Ships .5 maritime declarations of health and the requirements of the International Health Regulations .6 responsibilities under international instruments affecting the safety of the ships, passengers, crew or cargo .7 methods and aids to prevent pollution of the environment by ships .8 knowledge of national legislation for implementing international agreements and conventions		
Maintain safety and security of the vessel, crew and passengers and the operational condition of life-saving, fire-fighting and other safety systems	A thorough knowledge of life-saving appliance regulations (International Convention for the Safety of Life at Sea) Organization of fire and abandon ship drills Maintenance of operational condition of life-saving, fire-fighting and other safety systems	Examination and assessment of evidence obtained from practical instruction and approved in-service training and experience	Procedures for monitoring fire-detection and safety systems ensure that all alarms are detected promptly and acted upon in accordance with established emergency procedures

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	Actions to be taken to protect and safeguard all persons on board in emergencies Actions to limit damage and salve the ship following fire, explosion, collision or grounding		
Develop emergency and damage control plans and handle emergency situations	Ship construction, including damage control Methods and aids for fire prevention, detection and extinction Functions and use of life-saving appliances	Examination and assessment of evidence obtained from approved in-service training and experience	Emergency procedures are in accordance with the established plans for emergency situations
~~Organize and Manage the Crew~~ Use leadership and managerial skills	~~A knowledge of personnel management, organizing and training on board ship~~ Knowledge of shipboard personnel management and training ~~A knowledge of international maritime conventions and recommendations, and related national legislation~~ Knowledge of relevant international maritime and [flag State rules] [domestic] conventions, rules, and laws Task and workload management including: .1 planning and coordination .2 personnel assignment .3 time and resource constraints	~~Examination and assessment of evidence obtained from approved in-service training and experience~~ Assessment of evidence obtained from one or more of the following: .1 approved training .2 approved in-service experience .3 approved simulator training	The crew are allocated duties and informed of expected standards of work and behaviour in a manner appropriate to the individuals concerned Training objective and activities are based on assessment of current competence and capabilities and operational requirements Operations are demonstrated to be in accordance with applicable rules Operations are planned and resources are allocated as needed in correct priority to perform necessary tasks Communications are clearly and unambiguously given and received

Column 1	Column 2	Column 3	Column 4
Competence	**Knowledge, understanding and proficiency**	**Method for demonstrating competence**	**Criteria for evaluating competence**
	.4 prioritization Effective resource management: .1 allocation, assignment and prioritization of resources .2 effective communication on board and ashore .3 assertiveness and leadership including motivation .4 obtaining and Maintaining Situation awareness Knowledge and ability to apply decision making techniques: .1 situation and risk assessment .2 identify and generate options .3 selecting course of action .4 evaluation outcome effectiveness Development, implementation, and oversight of standard operating procedures		Effective leadership; behaviours are demonstrated Necessary team member(s) share accurate understanding of current and predicted vessel and operational status and external environment Decisions are most effective for the situation Operations are demonstrated to be effective and in accordance with applicable rules

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ANNEX 2

PROPOSED AMENDMENTS TO SECTION B-III/1 OF CHAPTER III OF THE STCW CODE

CHAPER 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, column 1, top block, the tools referred to should include hand tools, common measuring equipment, centres lathes, drilling machines, welding equipment and milling machines as appropriate.~~

~~2~~ 1 Training in workshop skills ashore can be carried out in a training institution or approved workshop.

~~3~~ 2 Onboard training should be adequately documented in the training record book by qualified assessors.

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