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TRAINING AND WATCHKEEPING  
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Agenda item 6

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## COMPREHENSIVE REVIEW OF THE 1995 STCW-F CONVENTION

### Proposed amendments to the mandatory minimum requirements for certification of chief engineer officers and second engineer officers of fishing vessels powered by main propulsion machinery of 750 kW propulsion power or more

Submitted by Japan, New Zealand and ITF

#### SUMMARY

*Executive summary:* This document presents a revised proposal on draft amendments to the mandatory minimum requirements for certification of chief engineer officers and second engineer officers of fishing vessels powered by main propulsion machinery of 750 kW propulsion power or more in the annex to the 1995 STCW-F Convention for consideration by the Sub-Committee

*Strategic direction, if applicable:* 1

*Output:* 1.22

*Action to be taken:* Paragraph 17

*Related documents:* MSC 95/19/3; HTW 3/6, HTW 3/19; MSC 96/25; HTW 4/WP.4, HTW 4/16; HTW 5/6, HTW 5/WP.4 and HTW 5/16

#### Introduction

1 At HTW 4, Japan proposed a base document (HTW 4/6) for the comprehensive review of the 1995 STCW-F Convention including draft tables for specification of minimum standards of competence for skippers on fishing vessels of 24 metres in length and over operating in unlimited waters (table A-II/1), for officers in charge of a navigational watch on fishing vessels of 24 metres in length and over operating in unlimited waters (table A-II/2), for skippers on fishing vessels of 24 metres in length and over operating in limited waters (table A-II/3), for officers in charge of a navigational watch on fishing vessels of 24 metres in length and over operating in limited waters (table A-II/4), for chief engineer officers and second engineer officers of fishing vessels powered by main propulsion machinery of 750 kW propulsion power or more (table A-II/5) and for personnel in charge of or performing radiocommunication duties on board fishing vessels (table A-II/6).

## Discussions at HTW 4 and HTW 5

2 A working group established at HTW 4 had continued discussions on the comprehensive review of the STCW-F Convention based on document HTW 4/6 and other commenting documents, and the Sub-Committee established a correspondence group under the coordination of Japan to continue the work.

3 At HTW 5, Japan submitted the report of the correspondence group as document HTW 5/6, and the working group established at HTW 5 continued discussions based on document HTW 5/6 and other commenting documents.

4 As a result of the above discussions, certain progress has been made including the tentative agreement for table A-II/1 and table A-II/2. However, it was also noted by some delegations during the discussions that table A-II/5 in document HTW 4/6 was not adequate because it was based on table A-III/2 of the STCW Code applying only the 1995 amendments but not further amendments, such as the 2010 Manila Amendments.

5 Considering the view in paragraph 4, Japan expressed its willingness to submit a document for consideration at HTW 6 including a draft new table A-II/5 based on the STCW Code, including the latest amendments.

## Discussion for developing the new draft table

6 To propose new draft table A-II/5, the co-sponsors considered the following issues to ensure competences for the safe operation:

- .1 it should be based on tables A-III/1, A-III/2 and A-III/3 of the STCW Code, as amended;
- .2 agreements and discussions on the comprehensive review of the 1995 STCW-F Convention in the Sub-Committee should be considered; and
- .3 it should be based on draft principles and provisional scope for comprehensive review of the 1995 STCW-F Convention agreed at HTW 3 and approved by MSC 96.

7 Both regulation II/5 of the 1995 STCW-F Convention and regulation III/2 of the 1978 STCW Convention, as amended, provide mandatory minimum requirements for chief engineer officers and second engineer officers. Hence, table A-III/2 of the STCW Code can be the base table for draft new table A-II/5 of STCW-F Code.

8 However, there is a significant difference between the above provisions. Regulation II/5 of the 1995 STCW-F Convention is applied with regard to fishing vessels powered by main propulsion machinery of 750 kW or more, whereas regulation III/2 of the STCW Convention is applied with regard to ships of 3,000 kW propulsion power or more. This difference in application should be considered.

9 Considering the aforementioned difference, the exemption provided in paragraph 2 in the appendix to regulation 5 of the 1995 STCW-F Convention should be retained in the draft of the revised Convention, in line with the provision of section A-III/3 of the STCW Code which is for the vessels with propulsion power between 750 kW and 3,000 kW.

10 It should also be considered that table A-III/2 of the STCW Code only addresses management level competences because operational level competences are covered by table A-III/1. In other words, the competences in table A-III/1 of the STCW Code are a prerequisite for acquiring competences in accordance with table A-III/2 of the STCW Code.

11 On the other hand, the 1995 STCW-F Convention has minimum requirements for chief engineer officers and second engineer officers apart from engineer officers at the operational level. Therefore, competences for both management and operational levels should be included in draft new table A-II/5 of the STCW-F Code. Otherwise, other additional requirements should be developed. In both cases, table A-III/1 of the STCW Code can be the basis for the standard of competence at the operational level.

12 As mentioned in paragraph 4, the Sub-Committee came to a tentative agreement on most parts of draft tables A-II/1 and A-II/2 of the 1995 STCW-F Code. Common competences between the minimum requirements for navigational officers and engineer officers of the STCW Code should be applied to draft new table A-II/5 of the 1995 STCW-F Code by aligning them with existing draft tables A-II/1 and A-II/2 of the draft Code, as outlined in annex 1 to document HTW 5/WP.4.

### **Proposal**

13 Taking into account the above discussions, the co-sponsors would like to propose a new draft table for the specification of minimum standard of competence for chief engineer officers and second engineer officers of fishing vessels powered by main propulsion machinery of 750 kW or more, as set out in the annex, which contains two options as a possible basis for further discussions.

14 OPTION 1 consists of a table that provides minimum requirements for both operational and management levels for certification of chief engineer officers and second engineer officers.

15 OPTION 2 consists of two separate tables. One provides specification of the standard of competence at the operational level for officers in charge of an engineering watch; and the other provides specification of the standard of competence at the management level for chief engineer officers and second engineer officers.

16 The co-sponsors are of the view that OPTION 1 is aligned in respect to maintaining the base structure of the present 1995 STCW-F Convention. However, the co-sponsors also have the view that OPTION 2 may align better to many Member States' legislative systems. Hence, the co-sponsors would like to propose both options and entrust the decision to the Sub-Committee.

### **Action requested of the Sub-Committee**

17 The Sub-Committee is invited to consider the proposed amendments set out in the annex and take action, as appropriate.

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## ANNEX

### [OPTION 1]

#### Section A-II/5

*Mandatory minimum requirements for certification of chief engineer officers and second engineer officers of fishing vessels powered by main propulsion machinery of 750 kW propulsion power or more*

#### Standard of competence

1 Every candidate for certification as chief engineer officer and second engineer officer of seagoing fishing vessels powered by main propulsion machinery of 750 kW power or more shall be required to demonstrate abilities to undertake, the tasks, duties and responsibilities listed in column 1 of table A-II/5.

2 The minimum knowledge, understanding and proficiency required for certification is listed in column 2 of table A-II/5.

3 The level of knowledge of the subjects listed in column 2 of table A-II/5 shall be sufficient to enable the candidate to serve in the capacity of chief engineer officer or second engineer officer.

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

5 Every candidate for certification shall be required to provide evidence of having achieved the required standard of competence in accordance with the methods for demonstrating competence and the criteria for evaluating competence tabulated in columns 3 and 4 of table A-II/5.

**Table A-II/5**

*Specification of minimum standard of competence for chief engineer officers and second engineer officers on fishing vessels powered by main propulsion machinery of 750 kW propulsion power or more*

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

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
<b>2 Use English in written and oral form</b>	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
<b>3 Use internal communication systems</b>	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
<b>4 Operate main and auxiliary machinery and associated control systems</b>  Note: The Party may omit knowledge requirements for types of propulsion machinery other than machinery installations for which the certificate to be awarded is to be valid	Basic construction and operation principles of 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	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	Construction and operating mechanisms can be understood and explained with drawings/instructions

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>compressor, purifier, fresh water generator, heat exchanger, refrigeration, air-conditioning and ventilation systems</p> <p>.7 steering gear</p> <p>.8 automatic control systems</p> <p>.9 fluid flow and characteristics of lubricating oil, fuel oil and cooling systems</p> <p>.10 deck machinery</p> <p>Safety and emergency procedures for operation of propulsion plant machinery, including control systems</p> <p>Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems:</p> <p>.1 main engine and associated auxiliaries</p> <p>.2 steam boiler and associated auxiliaries and steam systems</p> <p>.3 auxiliary prime movers and associated systems</p> <p>.4 other auxiliaries, including refrigeration, air-conditioning and ventilation systems</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>Operations are planned and carried out in accordance with operating manuals, established rules and procedures to ensure safety of operations and avoid pollution of the marine environment</p> <p>Deviations from the norm are promptly identified</p> <p>The output of plant and engineering systems consistently meets requirements, including bridge orders relating to changes in speed and direction</p>



Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
			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
<b>5 Operate fuel, lubrication, ballast and other pumping systems and associated control systems</b>	Operational characteristics of pumps and piping systems, including control systems  Operation of pumping systems:  .1 routine pumping operations  .2 operation of bilge and ballast pumping systems  Oily-water separators (or similar equipment) requirements and operation	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 operating manuals, established rules and procedures to ensure safety of operations and avoid pollution of the marine environment  Deviations from the norm are promptly identified and appropriate action is taken
<b>Function: Marine engineering at the management level</b>			
<b>6 Manage the operation of propulsion plant machinery</b>  Note: The Party may omit knowledge requirements for types of propulsion	Design features, and operative mechanism of the following machinery and associated auxiliaries:  .1 marine diesel engine  .2 marine steam turbine  .3 marine gas turbine	Examination and assessment of evidence obtained from one or more of the following:  .1 approved in-service experience  .2 approved training ship experience	Explanation and understanding of design features and operating mechanisms are appropriate

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
<p>machinery other than machinery installations for which the certificate to be awarded is to be valid</p>	<p>.4 marine steam boiler</p>	<p>.3 approved simulator training, where appropriate  .4 approved laboratory equipment training</p>	
<p><b>7 Plan and schedule operations</b></p> <p>Note: The Party may omit knowledge requirements for types of propulsion machinery other than machinery installations for which the certificate to be awarded is to be valid</p>	<p><i>Theoretical knowledge</i></p> <p>Thermodynamics and heat transmission</p> <p>Mechanics and hydromechanics</p> <p>Propulsive characteristics of diesel engines, steam and gas turbines, including speed, output and fuel consumption</p> <p>Heat cycle, thermal efficiency and heat balance of the following:</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience  .2 approved training ship experience  .3 approved simulator training, where appropriate  .4 approved laboratory equipment training</p>	<p>The planning and preparation of operations is suited to the design parameters of the power installation and to the requirements of the voyage</p>
<p><b>8 Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</b></p>	<p>.1 marine diesel engine  .2 marine steam turbine  .3 marine gas turbine  .4 marine steam boiler</p> <p>Refrigerators and refrigeration cycle</p> <p>Physical and chemical properties of fuels and lubricants</p> <p>Technology of materials</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience  .2 approved training ship experience  .3 approved simulator training, where appropriate  .4 approved laboratory equipment training</p>	<p>The methods of preparing for the start-up and of making available fuels, lubricants, cooling water and air are the most appropriate</p> <p>Checks of pressures, temperatures and revolutions during the start-up and warm-up period are in accordance with technical specifications and agreed work plans</p> <p>Surveillance of main propulsion plant and auxiliary systems is sufficient to maintain</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	<p>Naval architecture and ship construction, including damage control</p> <p><i>Practical knowledge</i></p> <p>Start up and shut down main propulsion and auxiliary machinery, including associated systems</p> <p>Operating limits of propulsion plant</p> <p>The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</p> <p>Functions and mechanism of automatic control for main engine</p> <p>Functions and mechanism of automatic control for auxiliary machinery including but not limited to:</p> <p>.1 generator distribution systems</p> <p>.2 steam boilers</p> <p>.3 oil purifier</p> <p>.4 refrigeration system</p> <p>.5 pumping and piping systems</p>		<p>safe operating conditions</p> <p>The methods of preparing the shutdown and of supervising the cooling down of the engine are the most appropriate</p> <p>The methods of measuring the load capacity of the engines are in accordance with technical specifications</p> <p>Performance is checked against bridge orders</p> <p>Performance levels are in accordance with technical specifications</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	<p>.6 steering gear system</p> <p>.7 catch-handling equipment and deck machinery</p>		
<p><b>9</b> <b>Manage fuel, lubrication and ballast operations</b></p>	<p>Operation and maintenance of machinery, including pumps and piping systems</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p>	<p>Fuel and ballast operations meet operational requirements and are carried out so as to prevent pollution of the marine environment</p>
<b>Function: Electrical, electronic and control engineering at the operational level</b>			
<p><b>10</b> <b>Operate electrical, electronic and control systems</b></p>	<p>Basic configuration and operation principles of the following electrical, electronic and control equipment:</p> <p>.1 electrical equipment:</p> <p>.1.a generator and distribution systems</p> <p>.1.b preparing, starting, paralleling and changing over generators</p> <p>.1.c electrical motors including starting methodologies</p> <p>[.1.d high-voltage installations]</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>Operations are planned and carried out in accordance with operating manuals, established rules and procedures to ensure safety of operations</p> <p>Electrical, electronic and control systems can be understood and explained with drawings/instructions</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>.1.e sequential control circuits and associated system devices</p> <p>.2 electronic equipment:</p> <p>.2.a characteristics of basic electronic circuit elements</p> <p>.2.b flowchart for automatic and control systems</p> <p>.2.c functions, characteristics and features of control systems for machinery items, including main propulsion plant operation control and steam boiler automatic controls</p> <p>.3 control systems:</p> <p>.3.a various automatic control methodologies and characteristics</p> <p>.3.b Proportional-Integral- Derivative (PID) control characteristics and associated system devices for process control</p>		
<p><b>11 Maintenance and repair of electrical and electronic equipment</b></p>	<p>Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p>	<p>Safety measures for working are appropriate</p> <p>Selection and use of hand tools, measuring instruments, and testing equipment are</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>permitted to work on such equipment</p> <p>Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment</p> <p>Detection of electric malfunction, location of faults and measures to prevent damage</p> <p>Construction and operation of electrical testing and measuring equipment</p> <p>Function and performance tests of the following equipment and their configuration:</p> <p>.1 monitoring systems</p> <p>.2 automatic control devices</p> <p>.3 protective devices</p> <p>The interpretation of electrical and simple electronic diagrams</p>	<p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>appropriate and interpretation of results is accurate</p> <p>Dismantling, inspecting, repairing and reassembling equipment are in accordance with manuals and good practice</p> <p>Reassembling and performance testing is in accordance with manuals and good practice</p>
<b>Function: Electrical, electronic and control engineering at the management level</b>			
<p><b>12 Manage operation of electrical and electronic control equipment</b></p>	<p><i>Theoretical knowledge</i></p> <p>Marine electrotechnology, electronics power electronics, automatic control engineering and safety devices</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p>	<p>Operation of equipment and system is in accordance with operating manuals</p> <p>Performance levels are in accordance with technical specifications</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	<p>Design features and system configurations of automatic control equipment and safety devices for the following:</p> <p>.1 main engine</p> <p>.2 generator and distribution system</p> <p>.3 steam boiler</p> <p>Design features and system configurations of operational control equipment for electrical motors</p> <p>[Design features of high-voltage installations]</p> <p>Features of hydraulic and pneumatic control equipment</p>	<p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	
<p><b>13</b> <b>Manage troubleshooting, restoration of electrical and electronic control equipment to operating condition</b></p>	<p><i>Practical knowledge</i></p> <p>Troubleshooting of electrical and electronic control equipment</p> <p>Function test of electrical, electronic control equipment and safety devices</p> <p>Troubleshooting of monitoring systems</p> <p>Software version control</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>Maintenance activities are correctly planned in accordance with technical, legislative, safety and procedural specifications</p> <p>Inspection, testing and troubleshooting of equipment are appropriate</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
<b>Function: Maintenance and repair at the operational level</b>			
<p><b>14</b> <b>Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board</b></p>	<p>Characteristics and limitations of materials used in construction and repair of ships and equipment</p> <p>Characteristics and limitations of processes used for fabrication and repair</p> <p>Properties and parameters considered in the fabrication and repair of systems and components</p> <p>Methods for carrying out safe emergency/temporary repairs</p> <p>Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments</p> <p>Use of hand tools, machine tools and measuring instruments</p> <p>Use of various types of sealants and packings</p>	<p>Assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>Identification of important parameters for fabrication of typical ship-related components is appropriate</p> <p>Selection of materials is appropriate</p> <p>Fabrication is to designated tolerances</p> <p>Use of equipment and hand tools, machine tools and measuring instruments is appropriate and safe</p>
<p><b>15</b> <b>Maintenance and repair of shipboard machinery and equipment</b></p>	<p>Safety measures to be taken for repair and maintenance, including the safe isolation of shipboard machinery and equipment required</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p>	<p>Safety procedures followed are appropriate</p> <p>Selection of tools and spare gear is appropriate</p>



Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	<p>before personnel are permitted to work on such machinery or equipment</p> <p>Appropriate basic mechanical knowledge and skills</p> <p>Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment</p> <p>The use of appropriate specialized tools and measuring instruments</p> <p>Design characteristics and selection of materials in construction of equipment</p> <p>Interpretation of machinery drawings and handbooks</p> <p>The interpretation of piping, hydraulic and pneumatic diagrams</p>	<p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>Dismantling, inspecting, repairing and reassembling equipment is in accordance with manuals and good practice</p> <p>Re-commissioning and performance testing is in accordance with manuals and good practice</p> <p>Selection of materials and parts is appropriate</p>
<b>Function: Maintenance and repair at the management level</b>			
<p><b>16</b> <b>Manage safe and effective maintenance and repair procedures</b></p>	<p><i>Theoretical knowledge</i></p> <p>Marine engineering practice</p> <p><i>Practical knowledge</i></p> <p>Manage safe and effective maintenance and repair procedures</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p>	<p>Maintenance activities are correctly planned and carried out in accordance with technical, legislative, safety and procedural specifications</p> <p>Appropriate plans, specifications, materials and</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>Planning maintenance, including statutory and class verifications</p> <p>Planning repairs</p>	<p>.3 approved workshop training</p>	<p>equipment are available for maintenance and repair</p> <p>Action taken leads to the restoration of plant by the most suitable method</p>
<p><b>17 Detect and identify the cause of machinery malfunctions and correct faults</b></p>	<p><i>Practical knowledge</i></p> <p>Detection of machinery malfunction, location of faults and action to prevent damage</p> <p>Inspection and adjustment of equipment</p> <p>Non-destructive examination</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>The methods of comparing actual operating conditions are in accordance with recommended practices and procedures</p> <p>Actions and decisions are in accordance with recommended operating specifications and limitations</p>
<p><b>18 Ensure safe working practices</b></p>	<p><i>Practical knowledge</i></p> <p>Safe working practices</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved laboratory equipment training</p>	<p>Working practices are in accordance with legislative requirements, codes of practice, permits to work and environmental concerns</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
<b>Function: Controlling the operation of the ship and care for persons on board at the operational level</b>			
<b>19</b> <b>Ensure compliance with pollution-prevention requirements</b>	<p><i>Prevention of pollution of the marine environment</i></p> <p>Knowledge of the precautions to be taken to prevent pollution of the marine environment</p> <p>Anti-pollution procedures and all associated equipment</p> <p>Importance of proactive measures to protect the marine environment</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved training</p>	<p>Procedures for monitoring shipboard operations and ensuring compliance with MARPOL requirements are fully observed</p> <p>Actions to ensure that a positive environmental reputation is maintained</p>
<b>20</b> <b>Maintain seaworthiness of the ship</b>	<p><i>Ship stability</i></p> <p>Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment</p> <p>Understanding of the fundamentals of watertight integrity</p> <p>Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy</p> <p><i>Ship construction</i></p> <p>General knowledge of the principal structural members of a ship and the proper names for the various parts</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>The stability conditions comply with IMO intact stability criteria under all conditions of loading</p> <p>Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
<p><b>21 Prevent, control and fight fires on board</b></p>	<p><i>Fire prevention and firefighting appliances</i></p> <p>.1 knowledge of classes and chemistry of fire</p> <p>[.2 knowledge of firefighting systems and procedures]</p> <p>[.2 knowledge of action to be taken in the event of fire, including fires involving oil systems]</p> <p>.3 knowledge of fire prevention measures</p>	<p>Assessment of evidence obtained from approved firefighting training and experience</p>	<p>The type and scale of the problem is promptly identified and initial actions conform with the emergency procedure and contingency plans for the ship</p> <p>Evacuation, emergency shutdown and isolation procedures are appropriate to the nature of the emergency and are implemented promptly</p> <p>The order of priority, and the levels and time-scales of making reports and informing personnel on board, are relevant to the nature of the emergency and reflect the urgency of the problem</p>
<p><b>22 Operate life-saving appliances</b></p>	<p><i>Life-saving</i></p> <p>Ability to direct abandon ship drills and knowledge of the operation of life-saving appliances and their equipment, including the two-way radio-telephone apparatus. Survival at-sea techniques including participation in an approved survival at-sea course</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>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</p>
<p><b>23 Medical aid</b></p>	<p><i>Medical aid</i></p> <p>Knowledge of first aid procedures. Practical</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>The identification of probable cause, nature and extent of injuries or conditions</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	application of medical guides and advice by radio		is prompt and treatment minimizes immediate threat to life
<b>24 Monitor compliance with legislative requirements</b>	<p>Basic working knowledge of the relevant IMO conventions and other relevant international instruments concerning safety of life at sea and protection of the marine environment</p> <p>Basic working knowledge of relevant international instruments concerning the responsible conservation, management and development of living aquatic resources as well as key international instruments related to the fight against illegal, unreported and unregulated (IUU) fishing</p>	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
<b>Function: Controlling the operation of the ship and care for persons on boards at the management level</b>			
<b>25 Control trim and stability</b>	<p>[Fishing vessel construction and stability</p> <p>.1 general knowledge of principal structural members of a vessel and the proper names of the various parts</p> <p>.2 knowledge of the theories and factors affecting trim and stability and measures</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p>	<p>[Stability conditions are maintained within safe limits at all times</p> <p>Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice]</p> <p style="text-align: center;"><b>OR</b></p> <p>[Stability and stress conditions are</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>necessary to preserve safe trim and stability</p> <p>.3 demonstrate ability to use stability data, stability and trim tables and pre-calculated operating conditions</p> <p>.4 knowledge of the significance of weathertight and watertight integrity</p> <p>.5 knowledge of internationally recognized stability criteria and conditions]</p> <p style="text-align: center;"><b>OR</b></p> <p>[Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability</p> <p>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</p> <p>Knowledge of IMO recommendations concerning ship stability]</p>	<p>.3 approved simulator training, where appropriate</p> <p>[Using: stability and trim tables, diagrams]</p>	<p>maintained within safety limits at all times]</p>
<b>26 Monitor and control</b>	<i>Maritime law</i>	Examination and assessment of evidence obtained	Procedures for monitoring operations and maintenance

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
<p><b>compliance with legislative requirements and measures to ensure safety of life at sea, security and the protection of the marine environment</b></p>	<p>A knowledge of international maritime law as embodied in the international agreements and conventions as they affect the specific obligations and responsibilities of the chief engineer officer, particularly those concerning safety and the protection of the marine environment</p> <p>Particular regard shall be paid to the following subjects:</p> <p>.1 certificates and other documents required to be carried on board fishing vessels by international conventions, how they may be obtained and the period of their legal validity</p> <p>.2 responsibilities under a relevant international convention related to the safety of fishing vessels</p> <p>.3 responsibilities under the relevant requirements of chapter V of the International Convention for the Safety of Life at Sea, 1974, as amended</p> <p>.4 responsibilities under the International Convention for the Prevention of Pollution</p>	<p>from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p>	<p>comply with legislative requirements</p> <p>Potential non-compliance is promptly and fully identified</p> <p>Planned renewal and extension of certificates ensures continued validity of surveyed items and equipment</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>from Ships, 1973, as modified by the Protocol of 1978 thereto, as amended</p> <p>.5 maritime declarations of health and the requirements of the international health regulations</p> <p>.6 responsibilities under the Convention on International Regulations for Preventing Collisions at Sea, 1972, as amended</p> <p>.7 responsibilities under other international instruments affecting the safety of the ship and crew</p> <p>The extent of knowledge of national maritime legislation is left to the discretion of the Party, but shall include national arrangements for implementing applicable international agreements and conventions</p> <p>.8 knowledge of relevant international instruments on safety and health of personnel on board fishing vessels</p> <p>.9 the principles and international standards applicable to the responsible</p>		



Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	<p>conservation, management and development of living aquatic resources</p> <p>.10 knowledge of key international instruments and tools related to the fight against illegal, unreported and unregulated (IUU) fishing</p>		
<p><b>[27 Maintain safety and security of the ship's crew and the operational condition of life-saving, firefighting and other safety systems</b></p>	<p>[Fire prevention and firefighting appliances</p> <p>.1 organization of fire drills</p> <p>.2 classes and chemistry of fire</p> <p>.3 firefighting systems</p> <p>.4 participation in an approved firefighting course</p> <p>.5 knowledge of provisions concerning firefighting equipment</p> <p>[.6 knowledge of fire prevention measures]</p> <p>Life-saving</p> <p>.1 thorough knowledge of life-saving appliances and arrangements</p> <p>.2 thorough knowledge of emergency procedures, musters and drills]</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>Procedures for monitoring fire detection and safety systems ensure that all alarms are detected promptly and acted upon in accordance with established emergency procedures]</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>[Knowledge of provisions concerning firefighting equipment</p> <p>Thorough knowledge of life-saving appliances and arrangements</p> <p>Organization of fire drills and abandon ship drills</p> <p>Maintenance of operational condition of life-saving, firefighting and other safety systems</p> <p>Actions to be taken to protect and safeguard all persons on board in emergencies</p> <p>Actions to limit damage and save the ship following a fire, explosion, collision or grounding]</p>		
<p><b>[28 Develop emergency and damage control plans and handle emergency situations</b></p>	<p>Ship construction, including damage control</p> <p>Methods and aids for fire prevention, detection and extinction</p> <p>Functions and use of life-saving appliances</p>	<p>Examination and assessment of evidence obtained from approved in-service training and experience</p>	<p>Emergency procedures are in accordance with the established plans for emergency situations]</p>

**[OPTION 2]**

**Section A-II/5-1**

*Mandatory minimum requirements for certification of chief engineer officers and second engineer officers of fishing vessels powered by main propulsion machinery of 750 kW propulsion power or more*

**Standard of competence**

1 Every candidate for certification as chief engineer officer and second engineer officer of seagoing fishing vessels powered by main propulsion machinery of 750 kW power or more shall be required to demonstrate abilities to undertake, the tasks, duties and responsibilities listed in column 1 of table A-II/5-1.

2 The minimum knowledge, understanding and proficiency required for certification is listed in column 2 of table A-II/5-1.

3 The level of knowledge of the subjects listed in column 2 of table A-II/5-1 shall be sufficient to enable the candidate to serve in the capacity of chief engineer officer or second engineer officer.

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

5 Every candidate for certification shall be required to provide evidence of having achieved the required standard of competence in accordance with the methods for demonstrating competence and the criteria for evaluating competence tabulated in columns 3 and 4 of table A-II/5-1.

**Table A-II/5-1**

*Specification of minimum standard of competence for chief engineer officers and second engineer officers of fishing vessels powered by main propulsion machinery of 750 kW propulsion power or more*

<b>Column 1</b>	<b>Column 2</b>	<b>Column 3</b>	<b>Column 4</b>
<b>Competence</b>	<b>Knowledge, understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
<b>Function: Marine engineering at the management level</b>			
<p><b>1</b> <b>Manage the operation of propulsion plant machinery</b></p> <p>Note: The Party may omit knowledge requirements for types of propulsion machinery other than machinery installations for which the certificate to be awarded is to be valid</p>	<p>Design features, and operative mechanism of the following machinery and associated auxiliaries:</p> <p>.1 marine diesel engine</p> <p>.2 marine steam turbine</p> <p>.3 marine gas turbine</p> <p>.4 marine steam boiler</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>Explanation and understanding of design features and operating mechanisms are appropriate</p>
<p><b>2</b> <b>Plan and schedule operations</b></p> <p>Note: The Party may omit knowledge requirements for types of propulsion machinery other than machinery installations for which the certificate to be awarded is to be valid</p>	<p><i>Theoretical knowledge</i></p> <p>Thermodynamics and heat transmission</p> <p>Mechanics and hydromechanics</p> <p>Propulsive characteristics of diesel engines, steam and gas turbines, including speed, output and fuel consumption</p> <p>Heat cycle, thermal efficiency and heat</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>The planning and preparation of operations is suited to the design parameters of the power installation and to the requirements of the voyage</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
<p><b>3</b> <b>Operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</b></p>	<p>balance of the following:</p> <p>.1 marine diesel engine</p> <p>.2 marine steam turbine</p> <p>.3 marine gas turbine</p> <p>.4 marine steam boiler</p> <p>Refrigerators and refrigeration cycle</p> <p>Physical and chemical properties of fuels and lubricants</p> <p>Technology of materials</p> <p>Naval architecture and ship construction, including damage control</p> <p><i>Practical knowledge</i></p> <p>Start up and shut down main propulsion and auxiliary machinery, including associated systems</p> <p>Operating limits of propulsion plant</p> <p>The efficient operation, surveillance, performance assessment and maintaining safety of propulsion plant and auxiliary machinery</p> <p>Functions and mechanism of</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>The methods of preparing for the start-up and of making available fuels, lubricants, cooling water and air are the most appropriate</p> <p>Checks of pressures, temperatures and revolutions during the start-up and warm-up period are in accordance with technical specifications and agreed work plans</p> <p>Surveillance of main propulsion plant and auxiliary systems is sufficient to maintain safe operating conditions</p> <p>The methods of preparing the shutdown and of supervising the cooling down of the engine are the most appropriate</p> <p>The methods of measuring the load capacity of the engines are in accordance with technical specifications</p> <p>Performance is checked against bridge orders</p> <p>Performance levels are in accordance with technical specifications</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>automatic control for main engine</p> <p>Functions and mechanism of automatic control for auxiliary machinery including but not limited to:</p> <p>.1 generator distribution systems</p> <p>.2 steam boilers</p> <p>.3 oil purifier</p> <p>.4 refrigeration system</p> <p>.5 pumping and piping systems</p> <p>.6 steering gear system</p> <p>.7 catch-handling equipment and deck machinery</p>		
<b>4 Manage fuel, lubrication and ballast operations</b>	Operation and maintenance of machinery, including pumps and piping systems	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p>	Fuel and ballast operations meet operational requirements and are carried out so as to prevent pollution of the marine environment
<b>Function: Electrical, electronic and control engineering at the management level</b>			
<b>5 Manage operation of</b>	<i>Theoretical knowledge</i>	Examination and assessment of evidence obtained	Operation of equipment and system

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
<p><b>electrical and electronic control equipment</b></p>	<p>Marine electrotechnology, electronics power electronics, automatic control engineering and safety devices</p> <p>Design features and system configurations of automatic control equipment and safety devices for the following:</p> <p>.1 main engine</p> <p>.2 generator and distribution system</p> <p>.3 steam boiler</p> <p>Design features and system configurations of operational control equipment for electrical motors</p> <p>[Design features of high-voltage installations]</p> <p>Features of hydraulic and pneumatic control equipment</p>	<p>from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>is in accordance with operating manuals</p> <p>Performance levels are in accordance with technical specifications</p>
<p><b>6 Manage trouble-shooting, restoration of electrical and electronic control equipment to operating condition</b></p>	<p><i>Practical knowledge</i></p> <p>Troubleshooting of electrical and electronic control equipment</p> <p>Function test of electrical, electronic control equipment and safety devices</p> <p>Troubleshooting of monitoring systems</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p>	<p>Maintenance activities are correctly planned in accordance with technical, legislative, safety and procedural specifications</p> <p>Inspection, testing and troubleshooting of equipment are appropriate</p>

<b>Column 1</b>	<b>Column 2</b>	<b>Column 3</b>	<b>Column 4</b>
<b>Competence</b>	<b>Knowledge, understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
	Software version control	.4 approved laboratory equipment training	
<b>Function: Maintenance and repair at the management level</b>			
<b>7</b> <b>Manage safe and effective maintenance and repair procedures</b>	<i>Theoretical knowledge</i>  Marine engineering practice  <i>Practical knowledge</i>  Manage safe and effective maintenance and repair procedures  Planning maintenance, including statutory and class verifications  Planning repairs	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 workshop training	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
<b>8</b> <b>Detect and identify the cause of machinery malfunctions and correct faults</b>	<i>Practical knowledge</i>  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
<b>9</b> <b>Ensure safe working practices</b>	<i>Practical knowledge</i>  Safe working practices	Examination and assessment of evidence obtained	Working practices are in accordance with legislative requirements, codes



Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
		from one or more of the following:  .1 approved in-service experience  .2 approved training ship experience  .3 approved laboratory equipment training	of practice, permits to work and environmental concerns
<b>Function: Controlling the operation of the ship and care for persons on boards at the management level</b>			
<b>10 Control trim and stability</b>	[Fishing vessel construction and stability  .1 general knowledge of principal structural members of a vessel and the proper names of the various parts  .2 knowledge of the theories and factors affecting trim and stability and measures necessary to preserve safe trim and stability  .3 demonstrate ability to use stability data, stability and trim tables and pre-calculated operating conditions  .4 knowledge of the significance of weathertight and watertight integrity  .5 knowledge of internationally recognized stability criteria and conditions]  <b>OR</b>	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  [Using: stability and trim tables, diagrams]	[Stability conditions are maintained within safe limits at all times  Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice]  <b>OR</b>  [Stability and stress conditions are maintained within safety limits at all times]

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	<p>[Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability</p> <p>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</p> <p>Knowledge of IMO recommendations concerning ship stability]</p>		
<p><b>11</b> <b>Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea, security and the protection of the marine environment</b></p>	<p><i>Maritime law</i></p> <p>A knowledge of international maritime law as embodied in the international agreements and conventions as they affect the specific obligations and responsibilities of the chief engineer officer, particularly those concerning safety and the protection of the marine environment</p> <p>Particular regard shall be paid to the following subjects:</p> <p>.1 certificates and other documents required to be carried</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p>	<p>Procedures for monitoring operations and maintenance comply with legislative requirements</p> <p>Potential non-compliance is promptly and fully identified</p> <p>Planned renewal and extension of certificates ensures continued validity of surveyed items and equipment</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>on board fishing vessels by international conventions, how they may be obtained and the period of their legal validity</p> <p>.2 responsibilities under a relevant international convention related to the safety of fishing vessels</p> <p>.3 responsibilities under the relevant requirements of chapter V of the International Convention for the Safety of Life at Sea, 1974, as amended</p> <p>.4 responsibilities under the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 thereto, as amended</p> <p>.5 maritime declarations of health and the requirements of the international health regulations</p> <p>.6 responsibilities under the Convention on International Regulations for Preventing Collisions at Sea, 1972, as amended</p> <p>.7 responsibilities under other international</p>		

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>instruments affecting the safety of the ship and crew</p> <p>The extent of knowledge of national maritime legislation is left to the discretion of the Party, but shall include national arrangements for implementing applicable international agreements and conventions</p> <p>.8 knowledge of relevant international instruments on safety and health of personnel on board fishing vessels</p> <p>.9 the principles and international standards applicable to the responsible conservation, management and development of living aquatic resources</p> <p>.10 knowledge of key international instruments and tools related to the fight against illegal, unreported and unregulated (IUU) fishing</p>		
<p><b>[12 Maintain safety and security of the ship's crew and the operational condition of life-saving,</b></p>	<p>[Fire prevention and firefighting appliances</p> <p>.1 organization of fire drills</p> <p>.2 classes and chemistry of fire</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>Procedures for monitoring fire detection and safety systems ensure that all alarms are detected promptly and acted upon in accordance with</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
<b>firefighting and other safety systems</b>	<p>.3 firefighting systems</p> <p>.4 participation in an approved firefighting course</p> <p>.5 knowledge of provisions concerning firefighting equipment</p> <p>[.6 knowledge of fire prevention measures]</p> <p>Life-saving</p> <p>.1 thorough knowledge of life-saving appliances and arrangements</p> <p>.2 thorough knowledge of emergency procedures, musters and drills]</p> <p>[Knowledge of provisions concerning firefighting equipment</p> <p>Thorough knowledge of life-saving appliances and arrangements</p> <p>Organization of fire drills and abandon ship drills</p> <p>Maintenance of operational condition of life-saving, firefighting and other safety systems</p> <p>Actions to be taken to protect and safeguard all persons on board in emergencies</p>		<p>established emergency procedures]</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	Actions to limit damage and save the ship following a fire, explosion, collision or grounding]		
<b>[13 Develop emergency and damage control plans and handle emergency situations</b>	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]

## **Section A-II/5-2**

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

### **Standard of competence**

1 Every candidate for certification as officer in charge of an engineering watch in a manned engine-room or designated duty engineers in a periodically unmanned engine-room shall be required to demonstrate abilities to undertake, the tasks, duties and responsibilities listed in column 1 of table A-II/5-2.

2 The minimum knowledge, understanding and proficiency requires for certification is listed in column 2 of table A-II/5-2.

3 The level of knowledge of the subjects listed in column 2 of table A-II/5-2 shall be sufficient to enable the candidate to serve in the capacity of engineer officers.

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

5 Every candidate for certification shall be required to provide evidence of having achieved the required standard of competence in accordance with the methods for demonstrating competence and the criteria for evaluating competence tabulated in columns 3 and 4 of table A-II/5-2.

**Table A-II/5-2**

*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*

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



<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
<b>2 Use English in written and oral form</b>	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
<b>3 Use internal communication systems</b>	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
<b>4 Operate main and auxiliary machinery and associated control systems</b>  Note: The Party may omit knowledge requirements for types of propulsion machinery other than machinery installations for which the certificate to be awarded is to be valid	Basic construction and operation principles of 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	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	Construction and operating mechanisms can be understood and explained with drawings/instructions

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>compressor, purifier, fresh water generator, heat exchanger, refrigeration, air-conditioning and ventilation systems</p> <p>.7 steering gear</p> <p>.8 automatic control systems</p> <p>.9 fluid flow and characteristics of lubricating oil, fuel oil and cooling systems</p> <p>.10 deck machinery</p> <p>Safety and emergency procedures for operation of propulsion plant machinery, including control systems</p> <p>Preparation, operation, fault detection and necessary measures to prevent damage for the following machinery items and control systems:</p> <p>.1 main engine and associated auxiliaries</p> <p>.2 steam boiler and associated auxiliaries and steam systems</p> <p>.3 auxiliary prime movers and associated systems</p> <p>.4 other auxiliaries, including refrigeration, air-conditioning and ventilation systems</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>Operations are planned and carried out in accordance with operating manuals, established rules and procedures to ensure safety of operations and avoid pollution of the marine environment</p> <p>Deviations from the norm are promptly identified</p> <p>The output of plant and engineering systems consistently meets requirements, including bridge orders relating to changes in speed and direction</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
			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
<b>5 Operate fuel, lubrication, ballast and other pumping systems and associated control systems</b>	Operational characteristics of pumps and piping systems, including control systems  Operation of pumping systems:  .1 routine pumping operations  .2 operation of bilge and ballast pumping systems  Oily-water separators (or similar equipment) requirements and operation	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 operating manuals, established rules and procedures to ensure safety of operations and avoid pollution of the marine environment  Deviations from the norm are promptly identified and appropriate action is taken
<b>Function: Electrical, electronic and control engineering at the operational level</b>			
<b>6 Operate electrical, electronic and control systems</b>	Basic configuration and operation principles of the following electrical, electronic and control equipment:  .1 electrical equipment:  .1.a generator and distribution systems	Examination and assessment of evidence obtained from one or more of the following:  .1 approved in-service experience  .2 approved training ship experience	Operations are planned and carried out in accordance with operating manuals, established rules and procedures to ensure safety of operations  Electrical, electronic and control systems can be understood and explained with drawings/instructions

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>.1.b preparing, starting, paralleling and changing over generators</p> <p>.1.c electrical motors including starting methodologies</p> <p>[.1.d high-voltage installations]</p> <p>.1.e sequential control circuits and associated system devices</p> <p>.2 electronic equipment:</p> <p>.2.a characteristics of basic electronic circuit elements</p> <p>.2.b flowchart for automatic and control systems</p> <p>.2.c functions, characteristics and features of control systems for machinery items, including main propulsion plant operation control and steam boiler automatic controls</p> <p>.3 control systems:</p> <p>.3.a various automatic control methodologies and characteristics</p> <p>.3.b Proportional-Integral- Derivative (PID) control</p>	<p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	<p>characteristics and associated system devices for process control</p>		
<p><b>7 Maintenance and repair of electrical and electronic equipment</b></p>	<p>Safety requirements for working on shipboard electrical systems, including the safe isolation of electrical equipment required before personnel are permitted to work on such equipment</p> <p>Maintenance and repair of electrical system equipment, switchboards, electric motors, generator and DC electrical systems and equipment</p> <p>Detection of electric malfunction, location of faults and measures to prevent damage</p> <p>Construction and operation of electrical testing and measuring equipment</p> <p>Function and performance tests of the following equipment and their configuration:</p> <p>.1 monitoring systems</p> <p>.2 automatic control devices</p> <p>.3 protective devices</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>Safety measures for working are appropriate</p> <p>Selection and use of hand tools, measuring instruments, and testing equipment are appropriate and interpretation of results is accurate</p> <p>Dismantling, inspecting, repairing and reassembling equipment are in accordance with manuals and good practice</p> <p>Reassembling and performance testing is in accordance with manuals and good practice</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
	The interpretation of electrical and simple electronic diagrams		
<b>Function: Maintenance and repair at the operational level</b>			
<p><b>8</b> <b>Appropriate use of hand tools, machine tools and measuring instruments for fabrication and repair on board</b></p>	<p>Characteristics and limitations of materials used in construction and repair of ships and equipment</p> <p>Characteristics and limitations of processes used for fabrication and repair</p> <p>Properties and parameters considered in the fabrication and repair of systems and components</p> <p>Methods for carrying out safe emergency/temporary repairs</p> <p>Safety measures to be taken to ensure a safe working environment and for using hand tools, machine tools and measuring instruments</p> <p>Use of hand tools, machine tools and measuring instruments</p> <p>Use of various types of sealants and packings</p>	<p>Assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>Identification of important parameters for fabrication of typical ship-related components is appropriate</p> <p>Selection of materials is appropriate</p> <p>Fabrication is to designated tolerances</p> <p>Use of equipment and hand tools, machine tools and measuring instruments is appropriate and safe</p>

Column 1 Competence	Column 2 Knowledge, understanding and proficiency	Column 3 Methods for demonstrating competence	Column 4 Criteria for evaluating competence
<p><b>9</b> <b>Maintenance and repair of shipboard machinery and equipment</b></p>	<p>Safety measures to be taken for repair and maintenance, including the safe isolation of shipboard machinery and equipment required before personnel are permitted to work on such machinery or equipment</p> <p>Appropriate basic mechanical knowledge and skills</p> <p>Maintenance and repair, such as dismantling, adjustment and reassembling of machinery and equipment</p> <p>The use of appropriate specialized tools and measuring instruments</p> <p>Design characteristics and selection of materials in construction of equipment</p> <p>Interpretation of machinery drawings and handbooks</p> <p>The interpretation of piping, hydraulic and pneumatic diagrams</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved workshop skills training</p> <p>.2 approved practical experience and tests</p> <p>.3 approved in-service experience</p> <p>.4 approved training ship experience</p>	<p>Safety procedures followed are appropriate</p> <p>Selection of tools and spare gear is appropriate</p> <p>Dismantling, inspecting, repairing and reassembling equipment is in accordance with manuals and good practice</p> <p>Re-commissioning and performance testing is in accordance with manuals and good practice</p> <p>Selection of materials and parts is appropriate</p>
<p><b>Function: Controlling the operation of the ship and care for persons on board at the operational level</b></p>			
<p><b>10</b> <b>Ensure compliance with pollution-</b></p>	<p><i>Prevention of pollution of the marine environment</i></p>	<p>Examination and assessment of evidence obtained</p>	<p>Procedures for monitoring shipboard operations and ensuring compliance</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
<b>prevention requirements</b>	<p>Knowledge of the precautions to be taken to prevent pollution of the marine environment</p> <p>Anti-pollution procedures and all associated equipment</p> <p>Importance of proactive measures to protect the marine environment</p>	<p>from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved training</p>	<p>with MARPOL requirements are fully observed</p> <p>Actions to ensure that a positive environmental reputation is maintained</p>
<b>11 Maintain seaworthiness of the ship</b>	<p><i>Ship stability</i></p> <p>Working knowledge and application of stability, trim and stress tables, diagrams and stress-calculating equipment</p> <p>Understanding of the fundamentals of watertight integrity</p> <p>Understanding of fundamental actions to be taken in the event of partial loss of intact buoyancy</p> <p><i>Ship construction</i></p> <p>General knowledge of the principal structural members of a ship and the proper names for the various parts</p>	<p>Examination and assessment of evidence obtained from one or more of the following:</p> <p>.1 approved in-service experience</p> <p>.2 approved training ship experience</p> <p>.3 approved simulator training, where appropriate</p> <p>.4 approved laboratory equipment training</p>	<p>The stability conditions comply with IMO intact stability criteria under all conditions of loading</p> <p>Actions to ensure and maintain the watertight integrity of the ship are in accordance with accepted practice</p>
<b>12 Prevent, control and fight fires on board</b>	<p><i>Fire prevention and firefighting appliances</i></p> <p>.1 knowledge of classes and chemistry of fire</p>	<p>Assessment of evidence obtained from approved firefighting training and experience</p>	<p>The type and scale of the problem is promptly identified and initial actions conform with the emergency procedure and</p>



<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
	<p>[.2 knowledge of firefighting systems and procedures]</p> <p>[.2 knowledge of action to be taken in the event of fire, including fires involving oil systems]</p> <p>.3 knowledge of fire prevention measures</p>		<p>contingency plans for the ship</p> <p>Evacuation, emergency shutdown and isolation procedures are appropriate to the nature of the emergency and are implemented promptly</p> <p>The order of priority, and the levels and time-scales of making reports and informing personnel on board, are relevant to the nature of the emergency and reflect the urgency of the problem</p>
<p><b>13</b> <b>Operate life-saving appliances</b></p>	<p><i>Life-saving</i></p> <p>Ability to direct abandon ship drills and knowledge of the operation of life-saving appliances and their equipment, including the two-way radio-telephone apparatus. Survival at-sea techniques including participation in an approved survival at-sea course</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>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</p>
<p><b>14</b> <b>Medical aid</b></p>	<p><i>Medical aid</i></p> <p>Knowledge of first aid procedures. Practical application of medical guides and advice by radio</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>The identification of probable cause, nature and extent of injuries or conditions is prompt and treatment minimizes immediate threat to life</p>

<b>Column 1 Competence</b>	<b>Column 2 Knowledge, understanding and proficiency</b>	<b>Column 3 Methods for demonstrating competence</b>	<b>Column 4 Criteria for evaluating competence</b>
<p><b>15 Monitor compliance with legislative requirements</b></p>	<p>Basic working knowledge of the relevant IMO conventions and other relevant international instruments concerning safety of life at sea and protection of the marine environment</p> <p>Basic working knowledge of relevant international instruments concerning the responsible conservation, management and development of living aquatic resources as well as key international instruments related to the fight against illegal, unreported and unregulated (IUU) fishing</p>	<p>Assessment of evidence obtained from examination or approved training</p>	<p>Legislative requirements relating to safety of life at sea and protection of the marine environment are correctly identified</p>