


**THE EXAMINATION AND CERTIFICATION  
OF  
SEAFARERS  
SECTION ONE OF FIVE  
REVISION 04**

<b>Responsible Authority</b>  The Director, Marine Personnel Standards and Pilotage is responsible for this document, including any changes, corrections, or updates.	<b>Approval</b>  <hr/> <p>Donald Roussel Director, Marine Personnel Standards and Pilotage Marine Safety</p> <b>Date signed:</b> _____
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**MARINE SAFETY  
OTTAWA**


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**Important :**


**This publication is subject to periodical reviews and it is updated accordingly /  
Cette publication est sujette à des revues périodiques et elle est mise-à-jour en conséquence**

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## INTRODUCTION

This publication was prepared with input from various federal, provincial and industry organizations including:

- Canadian Marine Advisory Council
- Canadian Marine Training Institutions
- Canadian Ship Owners Association
- Canadian Petroleum Association
- Canadian Association of Oil Well Drilling Contractors
- Canadian Offshore Vessel Operators Association
- Canadian Institute of Marine Engineers
- Company of Master Mariners of Canada
- Canada-Newfoundland Offshore Petroleum Board
- Canada-Nova Scotia Offshore Petroleum Board
- Government of Newfoundland -Department of Mines and Energy
- Government of Nova Scotia -Department of Mines and Energy
- Government of Canada -Department of Energy, Mines and Resources
- National Energy Board


This publication is intended as a guide for the certification of officers and crews of ships and marine offshore drilling units.

**The contents of this publication reflect the requirements of the Marine Certification and Crewing Regulations. In case of conflict, the regulations take precedence.**

This publication is subject to ongoing review and amendment as a result of consultation with the Canadian Marine Advisory Council.


For ease of reference and to reduce printing costs this publication has been divided into five sections pertaining to specific areas of specialization as follows:

- Section 1: General Information
- Section 2: Deck Certificates
- Section 3: Engineering Certificates
- Section 4: Rating Certificates
- Section 5: Mobile Offshore Unit (MODU) Certificates.

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- TP 4958: Simulated Electronic Navigation (SEN) courses.
- TP 5562: Co-operative Cadet Training Program, Navigation.
- TP 8060: Training courses for Fishing Service Certificate, Master of Fishing Vessels 60 to 100 Tons.
- TP 8129: Tanker Safety courses.
- TP 8911: Three-year Marine Engineer course.
- TP 10655: Transport Canada-approved marine training courses.
- TP 10933: Engine-Room Rating training courses.
- TP 10934: Course for Certificate of Service, Master of Vessels of Not More Than 1600 Tons.
- TP 10935: Simulated Engine Room and Control Room course.
- TP 10936: Bridge Watchman training courses.
- TP 10937: Mobile Offshore Drilling Unit courses.
- TP 11130: Marine Cooking training course.
- TP 13008: Marine First Aid and Marine Medical Care training program.
- TP 13024: Ro-Ro Passenger Ship Personnel training standards.
- TP 13117: Bridge Resource Management.
- TP 13720: Practical Skills for Marine Engineers Training Course.
- TP 13721: Training Record Book Requirements for Watchkeeping Engineer Candidates.

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## CHAPTER 1 - DEFINITIONS AND INTERPRETATION

### PART I - PROVISIONS OF THE *CANADA SHIPPING ACT*


- 1.1 (1) The regulations made pursuant to the *Canada Shipping Act* require that every Canadian ship, except:
- (a) a ship, other than a MODU, that is not self-propelled;
  - (b) a ship not carrying passengers and not exceeding 10 tons;
  - (c) a passenger ship not exceeding five tons; and
  - (d) a fishing vessel or a ship engaged in transferring to shore the unprocessed catch of a fishing vessel if the fishing vessel or the ship is 60 tons or less shall, when going from any place, be provided with a duly certificated master and seafarers according to the following scale:
    - (aa) in all cases with a master or offshore installation manager (OIM);
    - (bb) if the ship is 200 tons or more or is certificated to carry or carries more than 50 passengers, with a first mate;
    - (cc) with an engineer if the propulsion power is more than 750 kW for cargo ships, tow boats and fishing vessels and 75 kW for passenger ships; and
    - (dd) in all cases with a sufficient number of officers and ratings to ensure that the navigational and engine room watches comply at all times with the Crewing Regulations.
- (2) A pleasure yacht of 20 metres or more in length shall, when going from any place, be provided with:
- (a) a duly certificated master; and
  - (b) where the yacht is more than 100 tons, a duly certificated first mate.
- (3) A Canadian ship shall also be provided with properly certificated officers and ratings when going from any place outside Canada.

NOTE: It is not sufficient that personnel holding certificates of the required grade and class are on board and employed. The position of the officer in a ship should in no case be higher than the position rank indicated in the certificate he/she holds.


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## PART II - CLASSES OF VOYAGE

- 1.2 (1) VOYAGE includes a passage or trip, and any movement of a ship from one place to another or from one place and returning.
- (2) A FOREIGN VOYAGE is a voyage extending beyond the area of a home-trade voyage and not being an inland or minor waters voyage.
- (3) An INTERMEDIATE VOYAGE is a voyage not being a local or minor waters voyage within the area bounded by meridians of longitude 30 degrees and 180 degrees west and north of parallel latitude 6 degrees north.
- (4) A LOCAL VOYAGE is a voyage not being a minor waters voyage that is between places that are no further south than the port of New York, New York or Portland, Oregon; and
- (a) is on any lake, river or canal in North America; or
- (b) does not extend more than 200 miles from shore or beyond the continental shelf, whichever is further.
- (5) A NEAR COASTAL VOYAGE is a voyage other than a Minor Waters voyage, between places within the area following, namely, Canada, United States except Hawaii, St. Pierre and Miquelon, the West Indies, Mexico, Central America and the northeast coast of South America, in the course of which a ship does not go south of the sixth parallel of north latitude, and not more than 200 miles from shore, nor beyond the continental shelf, whichever is farther, at any time.
- (6) A HOME-TRADE VOYAGE CLASS II is a voyage in the course of which:
- (a) on the Atlantic coast, a steamship does not go south of the port of New York.;
- (b) on the Pacific coast, a steamship does not go south of Portland, Oregon;
- (c) the steamship is at no time more than 120 miles off shore; and
- (d) the distance between suitable ports of refuge on the voyage does not exceed 200 miles.
- (7) A MINOR WATERS VOYAGE is a voyage within the minor waters of Canada, together with such part of any lake or river forming part of any such water as lies within the United States of America (see subsection 11).
- (8) A FISHING VOYAGE CLASS I is a voyage during the course of which a fishing vessel may proceed anywhere in the world.
- (9) A FISHING VOYAGE CLASS II is a voyage during the course of which a fishing vessel may proceed anywhere within an area around North America bounded by the parallel of 6 degrees north and the meridians of 30 degrees west and westward to 180 degrees.
- (10) A FISHING VOYAGE CLASS III is a voyage during the course of which a fishing vessel may proceed anywhere within the coastal waters of North America not more than 200 miles off shore or beyond the continental shelf, whichever is further.

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- (11) The MINOR WATERS OF CANADA include all inland waters of Canada other than lakes Ontario, Erie, Huron (including Georgian Bay) and Superior, and the St. Lawrence River east of a line drawn from Father Point to Point Orient, and include all bays, inlets and harbours of or on the said lakes and Georgian Bay and the sheltered waters on the sea coast of Canada as listed below:
- (a) British Columbia:
- (i) Alberni Inlet and the eastern channel of Barclay Sound as far west as Bamfield Inlet;
  - (ii) Quatsino Sound and all waters connected therewith as far west as Kaprino Harbour;
  - (iii) False Creek, Vancouver, east of Burrard Bridge;
  - (iv) Jarvis Inlet inside a line drawn between Thunder Point and Ball Point, and all waters connected therewith not seaward of Fox Island in Telescope Passage, including the Agamemnon Channel and Pender Harbour inside a line drawn between Fearney Point and Moore Point;
  - (v) Prince Rupert Harbour as far south as Charles Point;
  - (vi) Fraser River, downstream from Pitt River; and
  - (vii) Skeena River, downstream from Port Essington.
- (b) New Brunswick:
- (i) Saint John Harbour inside the southern breakwater and inside a line drawn between the southern extremity of the northern breakwater and the most eastern point of Partridge Island;
  - (ii) Shediac Harbour westward of a line drawn between Point du Chêne and Shediac Point;
  - (iii) Miramichi Bay westward of a line drawn from the eastern shore of Neguac Beach to the eastern shores of Portage and Fox islands and thence to the western point of Preston Beach;
  - (iv) Nepisiquit Bay inside a line drawn between Alston and Carron points;
  - (v) Dalhousie Harbour and the Restigouche River westward of a line drawn from Miguasha Point in the province of Quebec to the mouth of Charlo River;
  - (vi) Shippigan Sound inside the breakwater at Shippigan Gulley and south of a line drawn between Grasse Point and Pokesudi Point;
  - (vii) Miscou Harbour east of a line drawn from Herring Point and Mya Point; and
  - (viii) Passamoquoddy Bay as far as Campobello Island and inside a line drawn at the northern entrance between East Quoddy Head and Deadman Head.

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- (c) Prince Edward Island:
  - (i) Charlottetown Harbour inside Canseaux and Battery points;
  - (ii) Summerside Harbour inside a line between Phelan Point and Indian Head Breakwater; and
  - (iii) Cardigan Bay inside a line drawn between Pannure Head and Red Point.
- (d) Nova Scotia:
  - (i) Bras d'Or Lake, Great Bras d'Or and all waters connected therewith inside a line joining Carey and Noir points, and northward of the seaward end of St. Peter's Canal;
  - (ii) Annapolis Basin and Digby Gut inside a line between Prim Point lighthouse and Victoria Beach at the entrance to Digby Gut; and
  - (iii) Halifax Harbour and the waters inside a line joining the triangulation station on Osborne Head and the eastern extremity of Chebucto Head.
- (e) Northwest Territories:

Kugmallit Bay, south of a line drawn from the northern tip of the peninsula adjoining Kidluit Bay to the northern tip of Hendreckson Island and to Topkak Point.
- (f) Newfoundland:

Humber Arm.
- (12) PARTIALLY SMOOTH WATERS means minor waters of Canada and waters of home-trade voyage class IV, within the meaning of the Home-Trade, Inland and Minor Waters Voyage Regulations.
- (13) A MILE refers to the standard nautical mile of 1852 metres.

### **PART III - CLASSES OF VESSEL**


- 1.3 (1) A GOVERNMENT SHIP is a ship or vessel registered as a government vessel that is in the service of Her Majesty in right of Canada or of any province thereof, or is wholly employed in the service of Her Majesty in such right.
- (2) A PASSENGER SHIP is a ship carrying passengers (refer to section 1.5).
- (3) A PILOT VESSEL is any ship or boat employed in the pilotage service of any pilotage district.
- (4) A PLEASURE YACHT is a ship, however propelled, that is used exclusively for pleasure and does not carry passengers.

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- (5) A SAILING SHIP, except for the purposes of the load line rules, means:
- (a) a ship capable of being propelled wholly by sails; and
  - (b) a ship principally employed in fishing, not exceeding 200 tons gross tonnage, provided with masts, sails and rigging sufficient to allow it to make voyages under sail alone and that, in addition, is fitted with mechanical means of propulsion other than a steam engine.
- (6) Not in use.
- (7) A SHIP, for the purpose of certification of masters and seafarers, includes any description of a vessel, boat or craft designed, used or capable of being used solely or partly for marine navigation, regardless of method or lack of propulsion, but excludes:
- (a) pleasure yachts of less than 20 metres in length; and
  - (b) a vessel, boat or craft of any length, propelled manually by oars or paddles.
- (8) (a) A STEAMSHIP OR STEAMER is any ship of which the propulsive power is derived from boilers or steam engines.
- (b) A MOTOR SHIP is any ship of which the propulsive power is derived from internal combustion engines, including gas turbines.

NOTE: The examiner, while in verbal communication with a candidate, should emphasize the definitive difference between subsections 8(a) and 8(b) to prevent any misunderstanding.

- (9) TONS means the gross tonnage stated in the certificate of registry or, where a ship is not registered, the figure found in accordance with the rules for the time being in force for the measurement of ships in respect of tonnage.
- (10) A TUG is a ship used exclusively for towing purposes.
- (11) A VESSEL includes any ship, boat or any other description of vessel used or designed to be used in navigation.
- (12) An INTERMEDIATE RUN FERRY means a ferry ship of any size carrying passengers operating on home-trade or inland waters voyages between terminals not more than seven miles apart.
- (13) A SHORT RUN FERRY means a ferry ship of any size carrying passengers operating on partially smooth waters between terminals in line or nearly in line of sight and not more than two miles apart.
- (14) A MOBILE OFFSHORE UNIT means a vessel that can be readily relocated and can perform an industrial function involving offshore operations other than those traditionally provided by vessels covered in Chapter I of the 1974 *SOLAS Convention*. Such vessels include at least the following:
- (a) surface units, which have a ship or barge-type hull of single- or multiple-hull construction intended for operation in floating condition;
  - (b) self elevating units, which have moveable legs capable of raising their hulls above the surface of the sea;
  - (c) column stabilized units, which have a main deck connected to their underwater hulls or footings by columns or caissons; and

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- (d) mobile offshore drilling units, which are capable of engaging in drilling operations for the exploration or exploitation of resources beneath the sea bed, such as liquid or gaseous hydrocarbons, sulphur or salt. Mobile offshore units do not include vessels such as:

- supply vessels;
- standby vessels;
- anchor-handling vessels;
- seismic vessels; and
- ship-shape mono-hull diving support vessels.

#### **PART IV - DEFINITIONS**

##### **Master**

- 1.4 The term MASTER includes every person having command or charge of any ship, but does not include a pilot (refer to section 1.6).

##### **Passenger**

- 1.5 (1) The term PASSENGER means any person carried on a ship, but does not include:
- (a) a person carried on a safety convention ship who is:
    - (i) the master, a member of the crew, or a person employed or engaged in any capacity on board the ship on the business of that ship; or
    - (ii) a child under one year of age;
  - (b) a person carried on a ship that is not a safety convention ship who is:
    - (i) the master, a member of the crew, or a person employed or engaged in any capacity on board the ship on the business of that ship;
    - (ii) the owner or charterer of the ship, a member of his/her family or a servant connected with his/her household;
    - (iii) a guest of the owner or charterer of the ship, if it is used exclusively for pleasure and the guest is carried on the ship without remuneration or any object of profit; or
    - (iv) a child under one year of age; or
  - (c) a person carried on any ship in pursuance of the obligation laid upon the master to carry shipwrecked, distressed or other persons or by reason of any circumstances that neither the master, nor the owner, nor the charterer, if any, could have prevented or forestalled.

##### **Pilot**

- 1.6 The term PILOT means any person not belonging to a ship who has the conduct thereof.
- 1.7 Not used.



### Engineer Examinations

SUBJECT CERTIFICATE	M A T H	A M P E P C H	T H E R M	D S K E T C H I N G A W I N G	E L E C	N A R V A L	E G K N	E M O K T O R	E S T K E A M	O R A L S
FIRST-CLASS MOTOR.		X	X		X	X	X	X		X
FIRST-CLASS STEAM		X	X		X	X	X		X	X
SECOND-CLASS MOTOR		X	X	X	X	X	X	X		X
SECOND-CLASS STEAM		X	X	X	X	X	X		X	X
THIRD CLASS MOTOR	X	X	X		X		X	X		X
THIRD CLASS STEAM	X	X	X		X		X		X	X
FOURTH-CLASS MOTOR							X	X		X
FOURTH-CLASS STEAM							X		X	X
CHIEF ENG. MDFV	X	X	X		X		X	X		X
W. K. ENG MDFV							X	X		X
RESTRICTED ENGINEER										X
ELECTRICAL					X		X	OR X	OR X	X
MAINT. SUPER MODU/SURFACE		X	X		X	X	X	X		X
MAINT. SUPER MODU/SELF-ELEVATING	X	X	X	X	X	X	X	X		X

NOTE 1: MDFV means motor-driven fishing vessel.

NOTE 2: MODU means mobile offshore drilling unit.



### Fishing Examinations

SUBJECT / CERTIFICATE	01			02			04			05	06			07	09	11	15		16			
	C o m m.	I N S T.	S I M	C H A R T	S I M	Nav.	Nav Safety			Met.	Sh Mgt	Stability	GSK		Gen. Sea							
	2	0	1	0	1	2	0	0	1	3	9	1	7	8	6	7	8	9				
Class I						2	050			061		073			111		158					169
Class II	011		1		041					061		073		099	111	157						168
Class III	011	020			041					061		073			111	157						167
Class IV		020		040						061								166				

### MODU Examinations

SUBJECT / CERTIFICATE	M O D U	R I G	E N G	P R A C	M E T E	S T A B	S I M	C O M M	C H A R T	N A V	G E N
	M A N A G	C O N S T	K N O W	S E A	O R O L G Y	& B A L	1	U N I C A T	W O R K	S A F E T Y	R I G K N
OIM MODU/SURFACE	X	X	X	X							
BARGE SUP. MODU/SURF.		X		X	X	X	X				
WKM MODU/SURF.				X			X	X	X	X	X
OIM MODU/SELF-ELEVAT	X	X	X	X							
BARGE SUP. MODU/SELF.		X		X	X	X	X				
WKM MODU/SELF-ELEVAT				X			X	X	X	X	X
OIM MODU/INLAND	X	X	X	X							X
BARGE SUP. MODU/INLAND		X		X	X	X	X				X
WKM MODU/INLAND				X			X	X	X	X	X

### MODU Courses

COURSE	M E D B1	M E D B2	M E D C	M E D D	B O S	D R I L B A S I C	D R I L A D V A N	B O P	H 2 S A L I V E	S T A B I L I T Y	S E N I
CERTIFICATE											
OIM MODU/SURFACE	X	X	X	X	X		X	X			
OIM MODU SELF-ELEV	X	X	X	X	X		X	X			
OIM MODU INLAND	X	X	X	X	X		X	X			
BARGE SUP.MODU SUR	X	X	X	X	X	X		X			X
BARGE SUP.MODU SEL	X	X	X	X	X	X		X			X
BARGE SUP.MODU INL	X	X	X	X	X	X		X			X
WKM MODU/SURFACE	X	X	X		X				X	X	X
WKM MODU/SELF-ELEV	X	X	X		X				X	X	X
WKM MODU/INLAND	X	X	X		X				X	X	X

BOS: basic offshore survival

BOP: blowout prevention

H<sub>2</sub>S: hydrogen sulphide

- (2) The examinations associated with lower-grade certificates are as important as those associated with higher certificates. No final certificate can be issued until all credits listed in the applicable table have been passed or credited. For credits covering old-style certificates, refer to Appendix F.
- (3) A Canadian certificate may be obtained on the basis of a foreign certificate by applying for direct examination at any Marine Safety office (refer to Part III for details).


2.4 (1) In certain cases, approved training courses must have been taken before an examination may be attempted, as indicated below:

<b>Examination</b>	<b>Approved Course</b>
SIM 1	Simulated Electronic Navigation Course 1 (SEN 1) (Parts A and B)
SIM 2	Simulated Electronic Navigation Course 2 (SEN 2)
Oral Examinations for Fourth-Class Engineer, Third-Class Engineer, Chief Engineer Motor- Driven Fishing Vessel	Propulsion Plant Simulator (PPS Level 1) (Ship Watchkeeping Practices) Practical Skills for Marine Engineer (PSME) MED A1, B1, B2 and C, Marine 1 <sup>ST</sup> Aid
Oral Examinations for Third-Class Chief Engineer, Second- Class Engineer, First-Class Engineer	Propulsion Plant Management (PPS Level 2) (Ship Management Practices) Practical Skills for Marine Engineer (PSME) MED A1, B1, B2, C and D, Marine 1 <sup>ST</sup> Aid
169	Marine Emergency Duties courses C and D
168	Marine Emergency Duties courses A1, B1 and B2
166. 167	Marine Emergency Duties Course A1
161	Marine Emergency Duties courses B1, B2 and C


- (2) A pass in a written examination or successful completion of an approved credit course is valid for 60 months, except where “locked-in” by issue of the certificate of competency for which it was written and except for credits from an approved cadet program, issued upon graduation, which do not expire.
- (3) Holders of deck certificates of competency will have unlimited validity for an examination if that examination was a regulatory requirement for that certificate.
- (4) Examinations passed before the coming into force of the Marine Certification Regulations (July 30, 1997) for an engineering certificate of competency will have unlimited validity.

### **Application**

- 2.5 (1) Completed forms, supporting documents and testimonials must be submitted to an examiner not less than two FULL weeks before the commencement date of the examination. Applications for written examinations received after this time may be disallowed. All documents will be returned to the candidate.
- (2) It is important that application be made as early as possible to allow time for the verification of discharges and testimonials. The examination is not conducted until this verification is complete.

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- 2.6 (1) With every application for an examination, the candidate must submit:
- (a) a general application on form EXN-3; and
  - (b) the correct fee (refer to chapter 7).
- (2) Upon application for examination for a first certificate, the candidate must also submit:
- (a) a general application on form EXN-3;
  - (b) the original birth or baptismal certificate (refer to subsection 2.12 [2]);
  - (c) proof of Canadian citizenship or permanent resident status;
  - (d) a statement of qualifying service on form EXN- 2;
  - (e) a discharge book or other proof of service claimed on EXN-2;
  - (f) testimonials (refer to section 2.15); and
  - (g) in the case of a first application for examination for a deck certificate where no certificate has been held before, a testimonial signed by a master under whom the applicant has served certifying the applicant's ability to steer (refer to subsection 2.14 [1]).
- (3) On all subsequent applications for an examination, the candidate must submit, in addition to the requirements in subsection (1):
- (a) a statement of subsequent qualifying service on form EXN-2 if this service affects the eligibility;
  - (b) a discharge book or other proof of service claimed on EXN-2 (refer to section 2.13);
  - (c) a watchkeeping certificate to cover watchkeeping service claimed on the Testimonial of Sea Service form in Appendix A or on EXN-25 in Appendix J; and
  - (d) a certificate of completion for a SEN 1 or SEN 2 course, if required, as set out in TP 4958 at a school listed in TP 10655.
- 2.7 (1) On application for the final examination for the certificate, a candidate shall submit, in addition to the requirements of subsection 2.6 (1);
- (a) a medical certificate, including sight and hearing;
  - (b) a valid, applicable first aid certificate (refer to section 2.19);
  - (c) a valid radiotelephone certificate, where required (refer to section 2.20);
  - (d) a certificate of completion for a SEN 1 or SEN 2 course, as required;
  - (e) an applicable MED certificate as set out in TP 4957 from a school listed in TP 10655 (refer to section 2.18);

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- (f) a propulsion plant simulator certificate Level 1 or Level 2, as required; and
- (g) Practical Skills for Marine Engineers (PSME), Training Record Book (TRBE) for Engineering Certificates.

Note: To receive a certificate, all regulatory requirements must be fulfilled.

2.8 **Not in use**

**Special Cases**

- 2.9 An applicant holding an old-style certificate may be granted credits according to the table in Appendix F when converting to the new structure.

Holders of certificates endorsed "radar observer" and "radar simulator" may be accepted in lieu of an EXN-24 for SEN 1 or SEN 2, respectively, for continued proficiency requirements. Certificates not so endorsed will have to satisfy alternative requirements.


- 2.10 An applicant who holds an approved engineering diploma may be granted exemption from all mathematical subjects for engineering examinations up to the second-class certificate level.

**Inquiries**

- 2.11 Requests for information concerning examinations should be directed to the nearest examination centre. Refer to Chapter 9, Appendix D – List of Marine Safety Offices.

**PART II – Not in use**

- 2.12 Not in use.
- 2.13 Not in use.
- 2.14 Not in use.
- 2.15 Not in use.
- 2.16 Not in use.
- 2.17 Not in use.
- 2.18 Not in use.
- 2.19 Not in use.
- 2.20 Not in use.
- 2.21 Not in use.
- 2.22 Not in use.
- 2.23 Not in use.

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### PART III - SPECIAL PROVISIONS FOR DIRECT EXAMINATION

#### Certificates Issued by Foreign Administrations


- 2.24 “Direct examination” is a process whereby Canadian citizens or permanent residents of Canada may be assessed for the purpose of obtaining an equivalent certificate without having previously held a Transport Canada, Marine Safety Branch certificate of competency.
- 2.25 The examiner may, with the approval of Headquarters, permit the lawful holder of the following certificates to be examined directly for a certificate of equivalent or lower grade, class and rank after having satisfied that the requirements of the Marine Certification Regulations are fully met:
- (a) a certificate issued by a “white-list” country that is accompanied by an STCW 95 endorsement issued by that country, is valid for use at sea, and is without tonnage or geographical area limitations. Certificates of equivalent competency or STCW 95 endorsements are not considered a certificate.
  - (b) a certificate of service issued by Canada;
  - (c) a Canadian Navy Upper Deck Watchkeeping Certificate or an official document from the Department of National Defence awarding a command qualification; or
  - (d) a Canadian Coast Guard (Fleet Systems) Watchkeeping or Command certificate.

#### Conditions of Acceptance

- 2.26 An applicant must:
- (a) hold one of the certificates listed in 2.25;
  - (b) be a Canadian citizen or a permanent resident of Canada, as defined by the *Immigration Act*; and
  - (c) have qualifying sea and watchkeeping service or their equivalent not less than that required for the certificate for which application is being made.
- 2.27 If the applicant meets the conditions as listed in 2.26, he/she may choose to be examined at any certificate level up to the level at which acceptance was initially granted. Irrespective of the examinations taken or certificates obtained, the applicant retains the right to be examined at any level up to the level of initial acceptance.

#### Assessment Process

- 2.28 The onus is on the applicant to provide the required documentation in English or French. If the original documentation is not in English or French, the documentation must include the original of a certified translation into one of these languages.

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- 2.29 The applicant must submit:
- (a) a completed application for a certificate at the level of the highest certificate currently held;
  - (b) the original certificate, as stated in 2.25;
  - (c) proof of civic status claimed in 2.26 (b);
  - (d) proof of the qualifying service claimed in 2.26 (c); and
  - (e) a completed record of sea service and watchkeeping service on form EXN-2.
- 2.30 The examiner will forward an authenticated photocopy of the applicant's certificate to the Director, Marine Personnel Standards and Pilotage, Ottawa, for verification with the country of issue and, on receipt of confirmation of the certificate's authenticity, shall:
- (a) determine the authenticity and completeness of all other documents submitted by the applicant;
  - (b) determine the highest certification level at which the applicant may be accepted;
  - (c) complete the tombstone information in the Automated Certification and Examination System (ACES); and
  - (d) issue a letter to the applicant indicating the level of acceptance established in (b).
- 2.31 Unless specified in the following requirements, no exemption from the requirement to take an examination or to successfully complete an approved course may be granted to an applicant for having completed a course that has not been approved by Transport Canada or for possessing a qualification that has no Canadian equivalent. Any exemption from the requirement to take an examination or to successfully complete an approved course may only be granted on the basis of original transcripts or original authenticated communication from the country that issued the certificate, as listed in 2.25 (a).

#### **Requirements for Nautical Certificates**

- 2.32 An applicant who holds a certificate listed in 2.25 (a) must meet the following requirements to attempt direct examination:
- (a) eligibility criteria, as set out in Table I;
  - (b) the sea and watchkeeping service, as set out in Table II; and
  - (c) the examinations, training courses and ancillary certificates, as set out in Table III.

**Table I - Eligibility to Attempt Direct Examination for a Nautical Certificate**

<b>Required Certificate</b>	<b>Person holding certificate in this column may attempt direct examination for any certificate to its left and below</b>
Master Mariner	STCW II/2 Master, Unlimited
Master, Intermediate Voyage	STCW II/2 Chief Mate, Unlimited
Master, Local Voyage	STCW II/2 Chief Mate, Unlimited
First Mate, Intermediate Voyage	STCW II/2 Chief Mate, Unlimited
First Mate, Local Voyage	STCW II/2 Chief Mate, Unlimited
Master, Fishing Class I	Master, Foreign-Going Fishing

**Table II - Sea and Watchkeeping Requirements for a Nautical Certificate**

<b>Certificate Required</b>	
Master Mariner	24 months sea service + 24 months watchkeeping service holding any certificate + 12 months watchkeeping service holding Chief Mate Certificate.
Master, Intermediate Voyage Master, Local Voyage	24 months sea service + 12 months watchkeeping service holding any certificate + 12 months watchkeeping service holding Chief Mate Certificate.
Master, Fishing Class I First Mate, Intermediate Voyage First Mate, Local Voyage	24 months sea service + 12 months watchkeeping service holding any certificate.



**Table III - Examinations and Training Courses Required to be Successfully Completed for  
Direct Examination for a Nautical Certificate**

Master Mariner	Master, Intermediate Voyage	Master, Local Voyage	First Mate, Intermediate Voyage	First Mate, Local Voyage	Master, Fishing Vessel Class I
062	062	062	061	061	050
093	092	092	091	091	061
114	123	123	113	112	158
123	163	163	162	162	169
164	SIM 2	SIM 2	SIM 1	SIM 1	SIM 2
SIM2	MED B1*	MED B1*	MED B1*	MED B1*	MED B1*
MED B1*	MED B2**	MED B2**	MED B2**	MED B2**	MED B2**
MED B2**	MED C	MED C	MED C	MED C	MED C
MED C	MED D	MED D	MED D	MED D	MED D
MED D	SEN 2	SEN 2	SEN 1B	SEN 1B	SEN 2
SEN 2	ROC-MC	ROC-MC	ROC-MC	ROC-MC	ROC-MC
ROC-MC	MARINE F/A ADVANCED	MARINE F/A ADVANCED	MARINE F/A ADVANCED	MARINE F/A ADVANCED	MARINE F/A ADVANCED
MARINE F/A ADVANCED	MEDICAL	MEDICAL	MEDICAL	MEDICAL	MEDICAL
MEDICAL					

\* If Proficiency in Survival Craft course (issued under STCW Regulation VI/2) not completed.

\*\* If Advanced Fire Fighting course (issued under STCW Regulation VI/3) not completed.

2.33 An applicant who holds a Canadian Forces (Naval) Certificate of Service as Master, issued under section 119 of the CSA (1985) and Canadian Navy qualifications listed in 2.25 (b) and 2.25 (c), respectively, will receive credits as follows:

- (a) Table IV outlines credits to be deducted from the requirements in Table III.
- (b) The holder of a Canadian Forces (Naval) Certificate of Service as Master, issued under section 119 of CSA (1985) between August 25, 1961, and September 1, 1974, may be accepted without proof of sea or watchkeeping service.

- (c) Naval qualifications are not generally proved by a certificate produced on demand by the holder. Although a certificate is presented when an Upper Deck Watchkeeping qualification is obtained, any other qualification is generally promulgated in message form. This may be the only proof that a serving officer will have in his/her possession. There are no credits for the partial completion of a qualification. It must have been completed in its entirety, including any oral board, and the results promulgated.

**Table IV - Credits for Canadian Naval Qualifications**

	Upper Deck Watchkeeping	Destroyer, Navigating Officer	Surface Ship Command	Reserve Upper Deck Watchkeeping	Minor War Vessel Command (Patrol)
012	X	X	X	X	X
023		X	X		
041	X	X	X		X
051	X	X	X		X
052		X	X (Part A written)		
061		X (after 1991)	X (after 1991)		X (after 1991)
062		X (after 1991)	X (after 1991)		X (after 1991)
072		X	X		X
073		X	X		X
132		X	X		X
SEN1		X	X		
SEN2		X	X		

2.34 An applicant who holds a Canadian Coast Guard (Fleet) Certificate, as listed in 2.25 (d), will receive credit as follows:

- (a) Table V outlines credits to be deducted from the requirements in Table III.
- (b) Applicants must produce appropriate certificates and a graduation certificate indicating year of graduation.

Table V - Credits for Canadian Coast Guard (Fleet) Qualifications

By virtue of Graduation and then Certificate Held	Year of Graduation from the Canadian Coast Guard College		
	A. 1969-1982	B. 1983-1987	C. 1989 -1998  (There were no Nautical Graduates in 1988)
1. Upon Graduation.	023, 072, 073, 112, 113, 132, 133, 134, and 141.  Credits are not subject to limitation on the period of validity.	012, 051, 072, 073, 112, 113, 132, 134, and 141.  Also 023 and 133, if the respective examination was passed, passes credited are not subject to limitation on the period of validity.	012, 023, 051, 072, 073, 112, 113, 132, 133, 134, and 141.  Credits are not subject to limitation on the period of validity.
2. M.O.T. Watchkeeping Mate (issued from 1983 - 1997), or the M.O.T. Watchkeeping Mate, Ship (first issued 1998).		Credits in cell 1.B and, by virtue of examination, SIM 1, 041, 061, 091, 122, 151, and 161.  (Credits are not subject to the limitation on period of validity of passes in examinations, unless the M.O.T. Watchkeeping Mate with a Fleet Systems Operations Endorsement was not completed within 30 months of graduation).	Credits in cell 1.C and, by virtue of examination, SIM 1, 041, 061, 091, 122, 151, and 161.  (Note that for these years of graduation, the CCG Fleet Systems endorsement is not a Marine Safety requirement and is therefore not required to obtain the credits).
3. Coast Guard (Fleet) Watchkeeping.	Credits in cell 1.A and 012, SIM 1, 041, and 061.		
4. Coast Guard (Fleet) Command completed in the year stated in this row.	A. 1972-1976 : Credits in cells 1.A and 3.A and 051, and 114.  1977-1979 : Credits in cells 1.A and 3.A and SIM 2, 051, 052, and 114.  1980-1982 : Credits in cells 1.A and 3.A and SIM 2, 051, 052, 092, 093, and 114.		B. Other M.O.T. examinations written after 1982 and passed were to have been recorded in the usual manner in M.O.T. records on an individual candidate basis, and are therefore not part of this Table of Credits.

### Acceptance and Requirements for Engineering Certificates

2.35 The lawful holder of an engineer certificate issued by another country that is accompanied by STCW 95 endorsement issued by that country and valid for use at sea must meet the following conditions of acceptance, including service examinations and courses:

- (a) provide satisfactory proof of qualifying service as required by the Marine Certification Regulations;
- (b) complete marine emergency duties training courses appropriate to the certificate applied for; and
- (c) complete propulsion plant simulator training at the appropriate level for the certificate applied for.

2.36 Tables VI and VII below list countries from which an applicant, by Board decision, can be granted credits for certain examination subjects.

**Table VI - Conditions to be Satisfied to Obtain a Marine Engineer Certificate by Direct Examination**

Country	Board Minute & Date	Highest Foreign Certificate Held	Eligible to be Examined For	Examinations Required & Credits
UK & Commonwealth	3773 82/02/04 3980 84/05/01	Class 1	1M 1S 1C 2M 2S 2C 3M 3S 3C 4M 4S 4C	EK and oral at appropriate level. Credits for all other subjects previously passed for certificate held.
		Class 2	2M 2S 2C 3M 3S 3C 4M 4S 4C	
		Class 3	3M 3S 3C 4M 4S 4C	
		Class 4	4M 4S 4C	No credits for any subjects. No exemptions from qualifying service.
France	2666 69/09/16	Class 1	1M 1S 1C 2M 2S 2C 3M 3S 3C 4M 4S 4C	No credits for any subjects.
		Class 2	2M 2S 2C 3M 3S 3C	EK and oral at appropriate level. Credits for all other subjects
			4M 4S 4C	No credits for any subjects. No exemptions from qualifying service.

**Table VII - Conditions to be Satisfied to Obtain a Marine Engineer Certificate by Direct Examination**

Country	Board Minute & Date	Highest Foreign Certificate Held	Eligible to be Examined For	Examinations Required & Credits
Denmark	4921	Class 1	1M 1S 1C 2M 2S 2C 3M 3S 3C 4M 4S 4C	Credits for certain subjects upon application.
Germany	4200			
Greece	3559			
Norway	4977			
Poland	2686	Class 2	2M 2S 2C 3M 3S 3C 4M 4S 4C	
Romania	3005			
Russia	3535	Class 3	3M 3S 3C 4M 4S 4C	
The Netherlands	3032			
United Arab Emirates	3614			
Yugoslavia	3303	Class 4	4M 4S 4C	
All other countries not listed in this table		Class 1	1M 1S 1C 2M 2S 2C 3M 3S 3C 4M 4S 4C	Forward authenticated copies of all documentation and recommended action to Headquarters for evaluation and ruling.
		Class 2	2M 2S 2C 3M 3S 3C 4M 4S 4C	
		Class 3	3M 3S 3C 4M 4S 4C	
		Class 4	4M 4S 4C	

- 2.37 An engineer Certificate of Service issued by a foreign government does not have an equivalent in the Marine Safety Branch Certification System. An applicant with this qualification must furnish full documentation relevant to qualifying service ashore and at sea and transcripts of marks obtained in examination subjects for the purpose of obtaining the certificate. All these documents are to be forwarded to Headquarters in Ottawa for evaluation and ruling. Each case will be treated on its merits.


#### **PART IV - REPLACEMENT OF CERTIFICATES**

##### **Loss of Certificates**

- 2.38 In the event of the loss or mutilation of a certificate, application for a replacement certificate should be made to the nearest Marine Safety office or to the Director, Marine Personnel Standards and Pilotage, Transport Canada, 330 Sparks Street, Ottawa, Ontario, K1A 0N8. Use form EXN-9, which may be obtained from any Examination Centre, and enclose the appropriate fee.

##### **Change of Name**

- 2.39 Where the lawful holder of a certificate legally changes his/her name, application for a certificate in the new name should be made to the nearest Marine Safety office.

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## CHAPTER 3 - ESTIMATION OF SEA SERVICE

### PART I - GENERAL PROVISIONS

#### Assessment of Service

- 3.1 All service must be assessed solely on its technical merits. The nature of any service must be decided by the articles of agreement and official logbook entries (where these have been maintained).

#### Calculation of Service


- 3.2
- (1) Time on articles must be reckoned from the date of engagement to the date of discharge.
  - (2) Sea service cannot overlap. A sea service day counted on one voyage or ship cannot be counted on another voyage or ship.
  - (3) Calculation of sea service on more than one ship shall follow the criteria indicated in (2).
  - (4) For the purpose of calculating service other than service on a ship that is under way, an eight-hour shift is equal to one day.
  - (5) Where only part of a month of service is performed, the days of service performed shall be counted individually and reckoned at 30 days to the month.

#### Absence from Ship

- 3.3
- (1) Where shore leave is taken or where a seaman is otherwise absent during a period of engagement, only the days worked aboard ship at sea can be accepted as sea service.
  - (2) Where any doubt exists, a supplementary testimonial must be produced, signed by the master or owner, clearly showing the periods spent on board at sea (refer to Appendix K).
  - (3) Where an applicant deserts a ship during agreement, any service performed on that ship by the applicant before the applicant's desertion is not recognized in the computation of service requirements with respect to any certificate.

#### Service on Shifts

- 3.4
- (1) Where service is performed on regular shifts, only those days worked aboard ship can be accepted as qualifying sea service.
  - (2) Where an examiner is satisfied by a supplementary testimonial signed by the master, chief engineer or owner that service has been performed under the terms of a contract providing for regular shifts exceeding eight working-hours per shift worked on a day-on-day-off or equivalent basis, the days worked on board ship are calculated at a ratio of hours regularly worked to eight hours. This ratio shall never exceed 1.5:1.
  - (3) Where service is performed on a mobile offshore drilling unit in transit, the time spent attached to the unit will be counted as full time. Length of shifts on board and regularly scheduled time away shall not be taken into account in the calculation of service. Time on station calculated as per Section 3.38.

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### Mixed Service

- 3.5 Where sea service is performed in more than one capacity, on more than one class of ship, or on more than one class of voyage, proportionate allowance may be made for each kind of service according to the provisions in this chapter.

### Calculating Service Using Days at Sea


- 3.6 Where an applicant is required to perform service on a ship, service time shall be calculated based on the number of days during which the ship is under way as follows:
- (a) Where a watchkeeping routine consists of a watch of eight hours in a 24-hour period, service may be credited at the rate of one and a half times the number of days during which the ship is under way, without exceeding the total number of days served on board.
  - (b) Where a watchkeeping routine consists of a watch of twelve hours in a 24-hour period, service may be credited at a rate of two and a quarter times the number of days during which the ship is under way, without exceeding one and a half times the total number of days served on board.

### Service Below Age 15

- 3.7 Service performed below the age of 15 years cannot be accepted.

## PART II - PROVISIONS CONCERNING VOYAGES

- 3.8 (1) Service performed entirely on rivers, lakes other than the Great Lakes, or entirely within partially smooth water limits can be accepted for:
- (a) Master, Limited; and
  - (b) First Mate, Limited.
- (2) For the purposes of (1), the lower limit of the St. Lawrence River is deemed to be a line drawn from Father Point to Point Orient.
- (3) Where any doubt exists, a supplementary testimonial must show the extreme ports called at, or the geographical limits of the voyage. The testimonial must establish the employment of the ship during the period concerned (refer to Appendix K).
- 3.9 Service performed on board ship between engagement and discharge may be accepted as qualifying service, provided the ship proceeded beyond the limits of partially smooth, inland or home-trade waters to meet the applicable certificate requirements during the period concerned.

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### **Deep Sea Passage**

- 3.10 "Deep sea passage" means a voyage between extreme points of not less than 500 nautical miles to seaward of:
- (a) on the east coast, West Point, Anticosti Island, provided that one of the extreme ports of call lies outside the Gulf of St. Lawrence and the Strait of Belle Isle; and
  - (b) on the west coast, the inside passages of the coast of British Columbia and Alaska.
- 3.11 "Partially smooth water" means minor waters and waters of a home-trade voyage, class IV.

### **Service Classed According to Voyage Performed**

- 3.12 In all cases the type of voyage allowed shall be determined according to the geographical limits to which the ship plied during the period of service concerned. Where any doubt exists, a supplementary testimonial must clearly establish the facts of the case (refer to Appendix K).


### **PART III - SERVICE AGREEMENTS**

- 3.13 (1) Certificates of discharge for service in the foreign-going trade may be accepted without verification. Certificates of discharge for service in other trades shall be verified, when necessary, from the deposited articles of agreement.
- (2) Where any certificate of discharge or other proof of sea service appears to have been tampered with, all documents pertaining to the case will be retained by the examiner until the applicant has validated the submission.

### **Service in Ships Not Maintaining Agreements**

- 3.14 (1) Where service has been performed on ships where no agreements with the crew were maintained, a satisfactory testimonial must be produced, signed by a credible person with personal knowledge of the facts to be established.
- (2) This testimonial required by (1) must certify:
- (a) the ship's name, port of registry and gross tonnage;
  - (b) the dates between which the service took place;
  - (c) the capacity served in or the nature of duties performed;
  - (d) the description of the voyage or the geographical limits to which the ship plied during the period of service; and
  - (e) the number of days the ship was underway.
- (3) The production of these testimonials need not necessarily be deemed sufficient. Each case must be decided on its own merits. All doubtful cases must be referred to Headquarters for decision.



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### **Evidence of Service in Foreign Ships**

- 3.15 (1) Testimonials of service of officers and seamen serving on ships registered abroad that cannot be verified from Transport Canada records may require confirmation by the appropriate consul, some other recognized authority of the country in which the vessel is registered, or the testimony of some credible person knowing the facts to be established. Such testimonials may be certificates of discharge authenticated by the consul or other official before whom the seaman was discharged, or by letters from the owners.
- (2) The production of these testimonials need not be deemed sufficient. Each case must be decided on its own merits.

## **PART IV - POSITIONS HELD DURING SERVICE**

### **Service Performed for Navigation Certificate**

- 3.16 Except as stated in the following sections, sea service must have been performed in the deck department.

### **Rank or Rating**

- 3.17 (1) The rank or rating held during a voyage must always be taken as that appearing in the agreement with the crew for the voyage concerned.
- (2) Where service has been performed on ships where no agreement with the crew is maintained, the rank or rating must be established according to section 3.14.

### **Promotion During Voyage**

- 3.18 Whenever an officer or seaman has been promoted during the course of a voyage, and this promotion and the grounds on which it was made have been properly entered in the official logbook, credit is given for the period of service in the higher rank.

### **Service Performed Under an Approved Co-operative Training Scheme**


- 3.19 Officer trainees who have performed their service in accordance with the provisions of an approved cadet scheme may be accepted for examination after serving at sea for a lesser period than that specified in Chapters 12 and 13.

### **Promotion of Apprentice**

- 3.20 Where an officer trainee, whether bound by indentures or not, is promoted to un-certificated junior officer, the officer's service is accepted as apprentice or cadet service.

### **Service as Pilot**

- 3.21 Time served on board ship as pilot cannot be accepted as qualifying service for a certificate except as stated in section 3.8 (1) and 3.37.
- 3.22 Not in use.
- 3.23 Not in use.
- 3.24 Not in use.

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## PART V - OTHER SERVICE

### Non-Trading Service

- 3.25 (1) Except as stated in the following sections, sea service must be performed in ships engaged in ordinary trading.
- (2) So long as it is otherwise acceptable, service performed in cable ships, supply ships, government ships, tugs, ferries and fishing craft is accepted on the same basis as service in ships engaged in ordinary trading.
- 3.26 Not in use.

### Service in Training Ships

- 3.27 Service in training ships not engaged in ordinary trading cannot be accepted as qualifying service where such service forms part of a training course for which remission of sea service is granted.
- 3.28 Not in use.

### Nondescript Craft

- 3.29 Service in dredges other than self-propelled sea-going dredges, and service in lightships, pilot boats, barges, scows and similar nondescript craft—whether self-propelled or not—cannot be accepted as qualifying service.

### Service in Smaller Ships

- 3.30 Where service is performed in ships of less than 200 tons gross, a supplementary testimonial must always be produced.


### Doubtful Service

- 3.31 Where, due to the size or nature of employment of a ship, an examiner of masters, mates and engineers considers that the service in that ship is not acceptable as qualifying service for the certificate for which application has been made, the examiner shall require evidence of additional qualifying sea service.

## PART VI - SERVICE IN THE CANADIAN ARMED FORCES

### Service in Naval Ships for Nautical Certificates

- 3.32 Time served on board Her Majesty's sea-going ships as an officer or a rating may be accepted for nautical certificates if the time is spent on upper-deck duties, provided that:
- (a) the statement of qualifying service in Her Majesty's ships is authenticated by Canadian Forces Headquarters, Ottawa, and specifies days at sea during the period served;
  - (b) the applicant produces a testimonial signed by his/her commanding officer or naval officer-in-charge attesting to the proportion of time generally spent each day performing regular deck duties in addition to other duties; and

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- (c) where application is made for an examination for a certificate of competency requiring watchkeeping service, a watchkeeping certificate must be produced, signed by the commanding officer if the service was performed in a ship with a complement of 150 or more, or by the naval officer-in-charge or commanding officer of a flotilla or parent ship if the service was performed on a small craft. In addition, evidence must be produced to show that the service was performed while holding the certificate of competency required.

Where an applicant is not employed in bridge or seamanship duties, an allowance may be made in accordance with the provisions of this chapter. In the case of applicants employed in trades with a percentage of time spent on deck duties, information provided by the Department of National Defence must be used to assess service.

### **Service in Naval Ships for Engineering Certificates**

- 3.33 Recognition accorded to Canadian Armed Forces (CAF) sea personnel for marine engineer examination purposes can be determined from Table B-29A. All CAF personnel applying for an examination must supply the following information, duly substantiated with the proper documentation: (Reference, Form CFP 245)
- (a) date of joining and leaving the Canadian Armed Forces;
  - (b) technical certificates issued and their date of issue; and
  - (c) testimonials of sea service, giving details of the main propulsion machinery, nature of duties performed and actual number of days spent at sea.

### **C.A.F. Naval Marine Engineering Qualifications**

Certificate 1	Auxiliary Machinery Operator
Certificate 2A	Boiler Room Watchkeeper
Certificate 2B	Diesel Engine Room Watchkeeper
Certificate 2C	Submarine Engine Room Watchkeeper (Diesel Electric Propulsion)
Certificate 2D	Combined Gas or Gas Turbine (COGOG) Control Console Watchkeeper
Certificate 2E	Combined Diesel or Gas Turbine (CODOG) Control Console Watchkeeper
Certificate 3A	Steam Turbine Watchkeeper
Certificate 3C	Submarine Machinery Certificate (Diesel Electric Propulsion)
Certificate 3D	Combined Gas or Gas Turbine (COGOG) Watchkeeper
Certificate 3E	Combined Diesel or Gas Turbine (CODOG) Watchkeeper
Certificate 4	Marine Engineering Charge Certificate

**Table B-29A**

C.A.F. QUALIFICATIONS	CREDIT UNDER MARINE CERTIFICATION REGULATIONS
Certificate 1	Remission of 15 months qualifying time toward Fourth-Class examination. Qualifies for recognition as having completed the requirements of the TP 13721 "Training Record Book Requirements for Watchkeeping Engineer Candidates" (ACES Code: TRBE)
Certificate 1 + 21 months sea service after obtaining Certificate 1	Qualifies to write Fourth-Class Motor or Steam Examination, depending on sea service.
Certificate 1 + 24 months sea service after obtaining Certificate 1	Qualifies to write Fourth-Class Combined Examination, provided that a minimum of three months sea service was acquired on board a motor ship and three months on a steam-driven ship.
Certificate 2A	Qualifies to write Fourth-Class Steam Examination
Certificate 2B or 2C or 2D or 2E	Qualifies to write Fourth-Class Motor Examination
Certificate 2A + 12 months sea service, on a steamship, after obtaining Certificate 2A	Qualifies to write Third-Class Steam Examination
Certificate 2B or 2C or 2D or 2E + 12 months sea service on a motor ship or gas turbine ship, after obtaining any of these certificates	Qualifies to write Third-Class Motor Examination
Certificate 2A + 2B, 2C, 2D or 2E + 15 months sea service after obtaining any of these certificates	Qualifies to write Third-Class Combined Examination, provided a minimum of six months sea service was acquired on board a motor or gas turbine ship, and six months on board a steam-driven ship.
Certificate 3A	Qualifies to write Third-Class Steam Examination
Certificate 3B or 3C or 3D or 3E	Qualifies to write Third-Class Motor Examination
Certificate 3A + 12 months sea service on a steamship after obtaining Certificate 3A	Qualifies to write Second-Class Steam Examination
Certificate 3B or 3C or 3D or 3E +12 months sea service on a motor or gas turbine ship after obtaining any of these certificates	Qualifies to write Second-Class Motor Examination
Certificate 3A + 3B or 3C or 3D or 3E + 15 months sea service after obtaining any of these certificates	Qualifies to write Second-Class Combined Examination, provided a minimum of six months sea service was acquired on board a motor or gas turbine ship, and six months on board a steam-driven ship.
Certificate 4	Qualifies to write Second-Class Combined Examination provided a minimum of six months sea service was acquired on board a motor or gas turbine ship, and six months on board a steam driven ship.

**Acceptance of Qualification in the C. A. F. and Exemptions Allowed.**

- 3.34 C. A. F. Applicants may be exempted from certain subjects on the basis of qualification level in the Marine Engineering Technician (M.E.T.) and Marine Engineering Artificer (M.E.A.) Occupations 312 (Apprentice) 313 (Journeyman) and 314 (Supervisor/Manager).

Candidates who have a Certificate 2 qualification, (or who can prove completion of the QL5 academic training programme, together with the workshop skills application course) are exempt from the Skills Training Requirement. TP 13720 “Practical Skills for Marine Engineers Training Course” (ACES Code: - PSME).


**Qualifications and Exemptions Table B-30A**

QUALIFICATION LEVEL	EXEMPTED FROM
Occupational Qualification (Q.L.) 5 or Occupational Qualification (Q.L.) 6	Mathematics, Applied Mechanics; Thermodynamics and Electrotechnology of the Third and Second-Class Examinations
Occupational Qualification (Q.L.) 7	Mathematics, Applied Mechanics, Thermodynamics, Electrotechnology and Naval Architecture of the Third and Second-Class Examinations

*Note:* (1) Naval qualifications as above do not exempt any candidate from the Engineering Drawing, (or the Blueprint interpretation and Free Hand Sketching option), of the Second-Class Engineer examination.

*Note:* (2) Exemption from the Second-class Engineer examination in Naval Architecture is granted only to holders of the QL7 qualification.

- 3.35 Applicants from commissioned engineering officers of the Royal Canadian Navy must submit full documentation relevant to qualifying service ashore and at sea and transcripts of marks obtained in naval examination subjects. All such documentation is to be forwarded to headquarters in Ottawa for evaluation and ruling. Each case will be treated on its own merits.
- 3.36 Applicants from the Reserve or regular forces who do not have any of the certificates listed in the document CFP-245 should be accorded credits strictly in accordance with the Marine Certification Regulations.

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**CFP-245 (APPENDIX 1, ANNEX B, CHAPTER 17)**

<b>STATEMENT OF QUALIFICATION AS A MARINE ENGINEERING TECHNICIAN 313 AND MARINE ENGINEERING ARTIFICER 314 IN THE CANADIAN FORCES</b>				
1	<b>SIN:</b>	<b>Surname:</b>	<b>Given Names:</b>	
2	<b>Date of Enrollment:</b>			
3	<b>Date of Release (if applicable):</b>			
4	<b>Qualification Level Attained to Date (if still serving):</b>			
5	<b>Highest Pay Level Equivalent Attained (if released under former Navy):</b>			
6	<b>Highest Pay Level Qualified to (in items 4 or 5):</b>			
7	<b>Number of Months Sea Service in the Trade, Steam (S) /Diesel (D)</b>			
8	<b>Marine Engineering Certificates Held:</b>			
	a) Certificate 1	Yes	No	Date of Issue
	b) Certificate 2A	Yes	No	Date of Issue
	c) Certificate 2B	Yes	No	Date of Issue
	d) Certificate 2C	Yes	No	Date of Issue
	e) Certificate 2D	Yes	No	Date of Issue
	f) Certificate 2E	Yes	No	Date of Issue
	g) Certificate 3A	Yes	No	Date of Issue
	h) Certificate 3C	Yes	No	Date of Issue
	i) Certificate 3D	Yes	No	Date of Issue
	j) Certificate 3E	Yes	No	Date of Issue
	k) Certificate 4	Yes	No	Date of Issue
9	<b>Number of Months Served in Submarines Subsequent to Issue of Certificate 2C (answer only if highest certificate held is/was Certificate 2C or equivalent):</b>			
10	<b>Signature of Examination Candidate (for identification purposes):</b>			
11	<b>Remarks of Signing Officer (including category of release):</b>			

\_\_\_\_\_  
(Commanding Officer or NDNQ/DPGPCOR)

Note: This form shall be reproduced locally

### Service in an Approved Pilotage Training Scheme

3.37 Service as a trainee pilot may be accepted as watchkeeping service at two-thirds rate for properly-documented time at sea, up to a maximum of three months.

### Qualifying Service in Offshore Resource Industry

3.38 (1) FOR MOU/MODU CERTIFICATES

Service on mobile offshore units shall be accepted at full sea-time for MOU/MODU certificates subject to the one-and-a-half rule for regular 12 hour shifts.

(2) FOR DECK CERTIFICATES

(a) Service on self-propelled MOU/MODUs underway on passage and self-propelled MOU/MODUs maintaining station on location by means of dynamic positioning will accrue full sea-time at the applicable rate. In these cases conventional description of the position served in will normally be used.  
note: (add DP and FPSO positions)

(b) Service performed on surface MOU/MODUs not maintaining station on location by means of dynamic positioning and on non-self-propelled units on location or underway will be assessed according to the following table:

Certificate Applied For	Capacity Served In (or any position having equivalent responsibility)	Qualifying Sea Service Rate (see note 2)	Maximum Qualifying Sea Service
AB	Deckhand, Roustabout, Roughneck, Crane Operator, Crane Operator Assistant or any positions listed below.	Full	No Limit
WKMS/WKMR	Toolpusher, Nightpusher, Driller, Assistant Driller, Derrickman, Derrickman Assistant, Crane Operator, Crane Operator Assistant, Deckhand, Roughneck, Roustabout, Ballast Control Operator, Radio Operator, DP Operator, Barge Supervisor, Barge Supervisor Trainee, Tourpusher	2/3	No Limit
WKMS/WKMR	Engineer, Motorman, Mechanic, Ice Observer	Full	12 months
1st Mate Intermediate/Local Voyage	The following Watchkeeping Officers: Ballast Control Operator, DP Operator, Barge Supervisor, Stability Technician while holding watchkeeping certificate	2/3	No Limit
Master Intermediate/Local Voyage	The following Watchkeeping Officers: Ballast Control Operator, DP Operator, Barge Supervisor, Stability Technician while holding 1st mate intermediate/local voyage certificate	2/3	No Limit
Master Mariner	The following Watchkeeping Officers: Ballast Control Operator, DP Operator, Barge Supervisor, Stability Technician while holding Master Intermediate Voyage Certificate	2/3	No Limit

Note (1): All sea-time to be verified by testimonials endorsed by the Master/Offshore Installation Manager

Note (2): Recognizing the diminished opportunity for watchkeeping experience due to the specialized nature of the operation, only 2/3 credits have been given for certificates above watchkeeping mate.

- (c) Service performed on self-elevating MOU/MODUs will be assessed according to the following table:

Certificate Applied For	Capacity Served In (or any position having equivalent responsibility)	Qualifying Sea Service Rate (see note 2)	Maximum Qualifying Sea Service
AB	Deckhand, Roustabout, Roughneck, Crane Operator, Crane Operator Assistant or any positions listed below.	Full	No Limit
WKMS/WKMR	Toolpusher, Nightpusher, Derrickman, Derrickman Assistant, Crane Operator, Crane Operator Assistant, Deckhand, Roughneck, Roustabout, Radio Operator, Driller, Assistant Driller, Barge Supervisor Trainee, tourpusher	2/3	12 months
WKMS/WKMR	Barge Supervisor	Full	18 months
WKMS/WKMR	Engineer, Motorman, Mechanic	Full	12 months

Note (1): All sea-time to be verified by testimonials endorsed by the Master/Offshore Installation Manager

Note (2): Recognizing the diminished opportunity for watchkeeping experience due to the specialized nature of the operation, only 2/3 credits have been given for certificates above watchkeeping mate.

(3) FOR ENGINEERING CERTIFICATES

- (a) Service on self-propelled MOU/MODUs underway on passage and MOU/MODUs maintaining station on location by means of thruster assistance or dynamic positioning or by means of anchors will accrue full sea-time at the applicable rate in accordance with the following table. In these cases conventional description of the position served in will normally be used.  
note: (add DP and FPSO positions)

Certificate Applied For	Capacity Served In (or any position having equivalent responsibility)	Qualifying Sea Service Rate	Maximum Qualifying Sea Service
ERR	Motorman, Mechanic, Oiler, Wiper, Electrician/ET, Roustabout	Full	No Limit
4th Class	Roustabout, Roughneck, Crane Operator	Full	12 Months
4th Class	Electrician/ET, Motorman, Mechanic, Oiler	Full	30 Months
4th Class	Sub-Sea Engineer, Assistant Sub-Sea Engineer	Full	24 Months
3rd Class	Engineer/Motorman in charge of the Watch and holding a 4th Class Certificate	Full	No Limit
2nd Class	Engineer/Motorman in charge of the Watch and holding a 4th Class Certificate or better	Full	No Limit
1st Class	Engineer holding a 2nd Class Certificate and in charge of Watch	Full	No Limit

Note (1): All applicants for their first certificate of competency as a marine engineer are required to produce evidence of skills training and training record book.

- (2): Minimum power ratings for qualifying sea service to be as per existing marine certification regulations



- (b) Service performed on self-elevating MOU/MODUs, and Surface Units with no form of propulsion will be assessed according to the following table:

Certificate Applied For	Capacity Served In (or any position having equivalent responsibility)	Qualifying Sea Service Rate	Maximum Qualifying Sea Service
ERR	Motorman, Mechanic, Oiler, Wiper, Electrician/ET, Roustabout	Full	No Limit
4th Class	Roustabout, Roughneck, Crane Operator	Full	12 Months see note
4th Class	Electrician/ET, Motorman, Mechanic, Oiler, Hydraulic Technician	Full	30 Months see note
3rd Class	Engineer/Motorman in charge of the Watch and holding a 4th Class Certificate	Full	No Limit see note
2nd Class	Engineer/Motorman in charge of the Watch and holding a 4th Class Certificate or better	Full	No Limit see note
1st Class	Engineer holding a 2nd Class Certificate and in charge of Watch	Full	6 Months

Note : All applicants for their certificate of competency as a marine engineer are required to produce evidence of skills training and training record book.


#### **Service in Dynamically-Supported Craft**

3.39 Time served on board dynamically-supported craft, as attested in a certified pilot logbook or in writing by the unit commander, may be accepted according to the provisions of this part.

- (1) When the certificate applied for is WKM, Ship, or WKMS, Restricted, the vessel must be of not less than 7000 kg all-up weight.
- (2) When watchkeeping service is required, the vessel must be of not less than 10000 kg all-up weight.
- (3) When the certificate applied for is Master, Local Voyage; Master, Intermediate Voyage; or Master Mariner; service on dynamically-supported craft of less than 90 000 kg all-up weight will be accepted at two-thirds rate.

Note:

- (1) Only actual time at sea, plus loading/discharging time alongside or on a ramp will be accepted, and will be calculated at the rate of eight hours being equivalent to one day of sea service.
- (2) Supplementary testimonials of sea service or other evidence satisfactory to the examiner must be submitted in support of sea service claimed on form EXN-2.
- (3) Other provisions of this section will apply in the same manner as to persons serving on displacement vessels.

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## PART VII - WATCHKEEPING SERVICE

### Watchkeeping Certificates

- 3.40 Where watchkeeping service is required a watchkeeping certificate or watchkeeping certificates covering the entire period claimed must be produced, signed by the master or, if in respect of service as master, by a credible person having knowledge of the facts.

### Content of Watchkeeping Certificates

- 3.41 Watchkeeping certificates signed by the master and chief engineer, if required, under whom the service was performed must clearly establish:
- (a) the number of watchkeeping officers carried and whether the service was performed as first, second or third watchkeeping officer;
  - (b) the rank of the officer, in order of seniority, to the master or chief engineer;
  - (c) whether the officer was in effective charge of, or served as junior officer of a watch;
  - (d) that the officer served at least eight hours out of each 24-hour period at sea or 12 hours out of each 24-hour period at sea;
  - (e) whether or not watches were doubled at any time during the voyage;
  - (f) the periods during which watches were regularly doubled and whether the service was performed as senior or junior officer of the watch;
  - (g) the extreme ports called at during the period of service concerned and whether or not the ship made a deep-sea passage during this period (refer to appendices A and J); and
  - (h) number of days at sea and number of days on board.

### Doubled Watches


- 3.42 (1) To be in effective charge of a watch, an officer must be responsible for the watch. Occasional supervision may be given by a senior officer provided that the senior officer does not at any time take charge of the watch.
- (2) In cases where a senior officer does take charge, the watch is regarded as a doubled watch.

### Watchkeeping Service on Doubled Watches

- 3.43 Two-thirds of the time served as junior nautical officer of a doubled watch may be accepted as equivalent to service in effective charge of a watch up to a maximum of nine months qualifying service for any certificate requiring watchkeeping service.

### Service as Master or Chief Officer

- 3.44 (1) Service as master, while holding the required certificate, may be accepted as watchkeeping service.

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- (2) Service as a non-watchkeeping chief officer, staff captain or in a similar capacity, while holding the required certificate, may be accepted as watchkeeping service provided that:
- (a) the officer regularly participated in the actual navigation of the ship;
  - (b) during such continuous service the officer supervised a watch for a total of at least 30 hours a month, including periods of difficult navigation;
  - (c) a statement signed by the master to the above effect is produced covering the entire period of service claimed; and
  - (d) sight books, satisfactory to the examiner, are produced where deep-sea service is claimed.

## **PART VIII - SCHOOLS AND TRAINING FOR NAUTICAL CERTIFICATES**

### **Remission of Sea Service**

#### *Pre-Sea Courses*


- 3.45 (1) Remission of sea service may be allowed where a person attends a nautical school and receives a course of instruction in technical subjects after the age of 15 years and before going to sea. The maximum remission of sea service to be allowed will be fixed at the time of acceptance.
- (2) The remission of sea service allowed under this section may be granted in addition to remissions permitted under other sections, but the total remission shall never exceed six months.

#### *Co-operative Training Courses*

- 3.46 (1) Where the Director, Marine Personnel Standards and Pilotage is satisfied that a post secondary, co-operative training scheme provides high-quality integrated training, both on board ship and ashore, successful completion of this training to the approved level for a particular certificate may be accepted in lieu of the service required for that certificate. The co-operative training program must include the amount of shipboard training specified by the Board.
- (2) Where the training specified in subsection (1) has only been partially completed, sea time will be allowed toward a certificate as per standard practice. No reduction is allowed for partial completion of the program.

## **PART IX - SERVICE, UNUSUAL CIRCUMSTANCES**

- 3.47 Consideration may be given to the recognition of service performed under unusual circumstances not provided for in this chapter if the Director, Marine Personnel Standards and Pilotage is satisfied that such service complies in a practical sense with the requirements laid out for the certificate examination

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## **CHAPTER 4 - CONDUCT OF THE EXAMINATION**

### **EXAMINATION TO BE TAKEN**

- 4.1 When the application has been properly submitted with the fee, and all supporting documents produced to the satisfaction of the examiner, the applicant may then be examined in the appropriate subjects on the specified date and time.

### **REPORT OF ELIGIBILITY**

- 4.2 No person may be reported as eligible for a certificate unless the applicant:
- (a) has the required service qualification as set out in the appropriate chapter;
  - (b) holds a valid First Aid Certificate as set out in section 2.19;
  - (c) holds a valid Radiotelephone Certificate as set out in the chapter for the certificate applied for, if applicable;
  - (d) holds the level of Marine Emergency Duties Certificate as set out in section 2.18;
  - (e) holds a certificate of completion for training courses as set out in the chapter for the certificate applied for;
  - (f) has been certified medically fit, as set out in the Crewing Regulations, to carry out the duties of a master or seafarer;
  - (g) has paid the prescribed fee;
  - (h) has passed all the required examinations; and
  - (i) has met all other qualification and examination requirements.

### **PUNCTUALITY**


- 4.3 Applicants must appear at the examination room punctually.

### **UNAUTHORIZED BOOKS AND PAPERS**

- 4.4 Books or papers of any kind may not be taken into the examination room except on instruction by the examiner.

### **USE OF OWN BOOKS, TABLES AND INSTRUMENTS**

- 4.5 Those who wish to use their own books, tables or drawing instruments may bring them into the examination room, but shall submit them to the supervisor for scrutiny and approval before the examination begins.

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#### **COPYING**

- 4.6 During the examination no person shall copy, give any assistance, give or receive any information, or communicate in any way with another.

#### **ADMISSION TO EXAMINATION ROOM**

- 4.7 No unauthorized person is allowed in the room during an examination.

#### **LEAVING THE EXAMINATION ROOM**

- 4.8 No applicant may leave the room during the examination without the permission of the supervisor.

#### **METHOD OF WORK**

- 4.9 Examination problems may be solved by any method, provided it is correct in principle and all steps are shown.

#### **ALL WORK TO BE SHOWN**

- 4.10 All work must be shown on the sheets provided by the examiner. No work whatsoever may be done on waste paper or blotting paper.

#### **USE OF SLIDE RULES AND OTHER CALCULATORS**

- 4.11 Slide rules or non-programmable calculators may be used in solving any problem, except in the Applied Mathematics examination. All steps leading to the actual calculations, however, must be shown clearly. The fact that a slide rule or calculator has been used must be indicated on the answer sheet. In general, this means that applicants using these devices must state (or, if required by the question, derive) the basic formula or expression to be calculated and the quantities to be substituted in that formula or expression. Where no other information is given, incorrect answers obtained by slide rules or calculators cannot attract any marks.

#### **SILENCE**


- 4.12 Silence must be maintained in the examination room. The examiner should take care to ensure that there are no extraneous noises of such volume as to distract the applicant during the examination.

#### **WRITTEN ANSWERS**

- 4.13 (1) During any oral examination the examiner may require the applicant to express his/her answers by means of writing or through diagrams.
- (2) Multiple-choice or other limited-response or written tests may be used in lieu of (or in addition to) any oral examination.

#### **PENALTY**

- 4.14 A person violating any of the regulations, or guilty of insolence to the supervisor or of other improper conduct in or about the examination room, shall forfeit the examination. The applicant may not be re-examined up to a period of six months unless the examiner sees fit to reduce this time.

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## **CHAPTER 5 - SUCCESS AND FAILURE IN THE EXAMINATION**

### **PASSES IN COMMUNICATIONS PART**

- 5.1 To pass the communications part of an examination, the applicant must:
- (1) obtain 90 percent of the marks allotted in the Morse code receiving part of the examination;
  - (2) obtain 70 percent of the marks allotted in the objective test; and
  - (3) satisfy the examiner as to his/her ability to send Morse code by flashing light.

### **PASSES IN GENERAL SEAMANSHIP**


- 5.2 To pass the final oral part of an examination, the applicant must demonstrate to the examiner the level of knowledge and skills necessary for the particular grade.

### **PASSES IN WRITTEN PARTS**

- 5.3 The rules governing pass and failure in the examinations are as follows:
- (a) The pass grade for each of the following examinations is 70 percent:
    - (i) Astro Navigation;
    - (ii) Astro and Electronic Navigation;
    - (iii) Cargo;
    - (iv) Chartwork and Pilotage;
    - (v) General Seamanship;
    - (vi) Meteorology;
    - (vii) Navigation Instruments;
    - (viii) Navigation Safety;
    - (ix) Simulated Electronic Navigation;
    - (x) Ship Management; and
    - (xi) Stability.
  - (b) The pass grade for any other examination referred to in the Marine Certification Regulations is 60 percent.

### **ORDER OF TAKING EXAMINATION PARTS (NAUTICAL)**

- 5.4
- (1) Subject to subsection (2), an applicant may elect to take the examination parts either separately or together.
  - (2) In all cases, a pass must be obtained in all written subjects before application for examination in the oral subject may be accepted.

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### ORDER OF TAKING EXAMINATION PARTS (ENGINEERING)

- 5.5 (1) An applicant must pass the engineering knowledge, general, part of the first- and second-class examinations before being credited with a pass in Engineering Knowledge, Steam, or Engineering Knowledge, Motor.
- (2) Not used.
- 5.6 Not used.
- 5.7 Not used.

### EXAMINATION MUST BE TAKEN AT TIME APPOINTED

- 5.8 Where a person does not appear for examination at the appointed time, he/she shall forfeit the examination fee.

### ACCURACY REQUIRED


- 5.9 (1) In calculating a ship's position, the degree of accuracy required is plus or minus 0.5 minutes of arc, distances within 0.5 miles and times of meridian passage to the nearest minute.
- (2) The method of calculation used to obtain any position line must be capable of giving an answer within 0.5 miles of the true result.
- (3) In calculating compass errors, bearings and courses, the accuracy required is plus or minus 0.5 degrees.
- (4) In calculating ETA and speed, the accuracy required is plus or minus one minute and 0.5 knots, respectively.
- (5) In calculations involving tidal prediction, the accuracy required is plus or minus 15 cm or half a foot.
- (6) In stability calculations, the accuracy required is plus or minus 2.5 cm and two tons, as appropriate.

### RESULTS OF EXAMINATION

- 5.10 Results of the examination may be obtained from the examiner.

### EXAMINER'S AUTHORITY

- 5.11 (1) When the examiner is satisfied that all qualification and examination requirements have been met as required by section 4.2, an Examiner's Certificate will be issued.
- (2) The Examiner's Certificate is valid for all purposes until its expiry date has passed.

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## CHAPTER 6 - REFUSAL OF ADMITTANCE TO EXAMINATION, APPEAL PROCESS AND RE-EXAMINATION

### FAILURE TO PASS AN EXAMINATION

- 6.1 (1) Where an applicant fails to pass an examination, the examiner may refuse the applicant admittance to a subsequent examination in the same subject for such period as, in the opinion of the examiner, is reasonable for the acquisition of the knowledge that the applicant requires to pass the examination. Such a period shall not exceed six months.
- (2) Where an applicant fails to pass an examination by reason of misconduct in or about the examination room the examiner may refuse the applicant admission to any subsequent examination for such period, not exceeding six months, as appears reasonable to the examiner under the circumstances.


### FALSIFIED OR TAMPERED DOCUMENTS

- 6.2 Where any submitted document appears to have been falsified or tampered with, the examiner shall retain the document until the applicant proves its authenticity to his/her satisfaction.

### FORGERY AND FRAUD

- 6.3 (1) Section 129 of the *Canada Shipping Act* provides that every person who:
- (a) makes, procures to be made, or assists in making any false representation for the purpose of obtaining, for himself/herself or for any other person, any certificate of competency or service as master, mate or engineer;
  - (b) forges, assists in forging, procures to be forged, fraudulently alters, assists in fraudulently altering, or procures to be fraudulently altered any such certificate or any copy thereof;
  - (c) fraudulently makes use of a certificate that is forged, altered, cancelled, suspended, or to which he/she is not justly entitled; or
  - (d) fraudulently lends such a certificate to, or allows the same to be used by, any other person; is guilty of an indictable offence.
- (2) Where any document submitted in support of an application has been falsified or tampered with, the examiner may retain the document pending proof of its authenticity. He/she will refuse the applicant admittance to examination until that person proves the authenticity of the document (refer to section 6.7).
- 6.4 Not in use.
- 6.5 Not in use.



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#### **FAILURE TO JOIN SHIP OR DESERTION**

6.6 An applicant who, having signed an agreement with the crew in respect of a voyage or period of time:

- (a) has failed to join ship; or
- (b) has deserted his/her ship;

may not be permitted to count any sea service performed pursuant to that agreement as qualifying service.

#### **APPEALS**

6.7 Where an examiner refuses a person admittance to an examination according to the provisions of sections 4.14, 6.1, 6.2, 6.3 (2), 6.4, or 6.5, the applicant may request, by letter, that the examiner report the matter to the Minister.


6.8 Not in use.

#### **EXAMINATION REVIEW**

6.9 (1) Applicants taking marine examinations may request a review of their examination papers by complying with the following guidelines:

- (a) the comments/review sheet will be provided with the examination paper; and
- (b) the applicant may make comments about the examination or opt for a review of one or more examination papers on the day of the examination or within five working days after receiving the results of the examinations taken.

(2) If the applicant is not satisfied with the examiner's review, a formal written appeal may be submitted to any Marine Safety office.

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## CHAPTER 7 - FEES

- 7.1 (1) An applicant for examination and re-examination shall pay the following fees:
- (a) oral examination for a limited or restricted certificate..... \$27.50
  - (b) oral examination for a certificate other than a limited or restricted certificate ..... \$55.00
  - (c) a simulator-based examination ..... \$55.00
  - (d) written examination for a certificate other than a rating certificate ..... \$27.50
  - (e) examination for an Able Seaman, Bridge Watchman, Engine-Room Rating, Engine-Room Assistant, or Ship’s Cook certificate ..... \$27.50
  - (f) practical examination for a Certificate of Proficiency in Survival Craft ..... \$27.50
  - (g) special eyesight test ..... \$27.50
- (2) The fees for an examination shall be forfeited where the applicant fails to appear for the examination at the appointed time and shall not be applied in respect of any other fees that may be or become payable by the applicant.
- (3) An applicant shall pay the following fees for documents:
- (a) replacement of a Master, Mate or Engineer certificate , except for a certificate lost owing to shipwreck ..... \$27.50
  - (b) certificate not requiring examination ..... \$27.50
  - (c) replacement of an Able Seaman, Bridge Watchman, Engine-Room Rating, Engine-Room Assistant, or Ship’s Cook certificate, except for a certificate lost owing to shipwreck..... \$27.50
  - (d) replacement of a record of qualifications and examination for a certificate. .... \$20.00
  - (e) certificate cover, replacement ..... \$20.00
- 7.2 (1) Fees must be paid to the examiner when application is made. They are not returnable.
- (2) Fees shall be paid in accordance with TP 117.

## CHAPTER 8 - EXAMINATION DATES

### EXAMINATION DATES

8.1 The table below shows the Mondays starting each week that written examinations for various grades of nautical certificates are held.

#### AT SEA PORTS

#### AT INLAND PORTS


All months except August		January and May to December, except August	February	March	April
First Mate, Intermediate/ Local Voyage Master Mariner *Limited Mate	2nd	2nd	1st & 3rd	1st & 3rd	1st
WKMS, WKMS(R), WKM (MODU) Master, Local/Intermediate Voyage Master, 350 Tons LV *Limited Master	4th	4th	2nd & 4th	2nd & 4th	2nd
FC 1, 2, 3 and 4*	4th	4th	4th	4th	4th
OIM, Barge Super.	4th	4th	1st & 3rd	1st & 3rd	1st & 3rd

Note: \* only those papers applicable to current week.  
Communications, Fishing Master, Class 4, and Ratings certificates, and SIM 1, SIM 2 and oral examinations are held by appointment only.

8.2 The examination parts for the various certificates are:

#### MASTER MARINER CERTIFICATE

First Day	A.M.	093	Ship Management
	P.M.	023	Radio and Electronic Aids to Navigation
Second Day	A.M.	114	Stability/Naval Architecture
	P.M.	141	Electricity
Third Day	A.M.	134	Engineering Knowledge

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**MASTER INTERMEDIATE VOYAGE AND MASTER LOCAL VOYAGE CERTIFICATES**

First Day	A.M.	092	Ship Management
	P.M.	052	Astro and Electronic Navigation
Second Day	A.M.	072/073	Meteorology
	P.M.	123	Cargo
Third Day	A.M.	132/133	Engineering Knowledge
	P.M.	062	Navigation Safety

**FIRST MATE INTERMEDIATE VOYAGE AND FIRST MATE LOCAL VOYAGE CERTIFICATES**

First Day	A.M.	091	Industrial Safety, Ship Management
	P.M.	122	Ship Construction and Cargo
Second Day	A.M.	112/113	Stability
	P.M.	051	Astro Navigation
Third Day	A.M.	132	Engineering Knowledge

**WATCHKEEPING MATE, SHIP; RESTRICTED WATCHKEEPING MATE, SHIP; AND  
WATCHKEEPING MATE, MODU**


First Day	A.M.	041	Chartwork and Pilotage
	P.M.	151 M	Rig Knowledge
Second Day	A.M.	151	General Ship Knowledge
	P.M.	051	Astro Navigation
Third Day	A.M.	061	Navigation Safety

**MASTER, SHIP OF NOT MORE THAN 350 TONS GROSS TONNAGE, OR TUG, LOCAL VOYAGE**

First Day	A.M.	090	Ship Management
	P.M.	110	Stability
Second Day	A.M.	072	Meteorology

**MASTER LIMITED (TO EXTENT APPROPRIATE - SEE SECTION 15.9)**

First Day	A.M.		Ship Management
Second Day	A.M.		Stability
	P.M.		Chartwork and Pilotage
Third Day	A.M.		Engineering Knowledge
	P.M.		Navigation Safety

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**FIRST MATE LIMITED (TO EXTENT APPROPRIATE - SEE SECTION 16.9)**

First Day	A.M.		Ship Management
	P.M.		Ship Construction and Cargo
Second Day	A.M.		Stability
	P.M.		Chartwork and Pilotage
Third Day	A.M.		Engineering Knowledge
	P.M.		Navigation Safety

**FISHING MASTER CLASS 1**

First Day	A.M.	158	General Ship Knowledge
	P.M.	111	Stability
Second Day	A.M.	073	Meteorology
	P.M.	061	Navigation Safety
Third Day	A.M.	050	Navigation

**FISHING MASTER CLASS 2**

First Day	A.M.	041	Chartwork and Pilotage
	P.M.	111	Stability
Second Day	A.M.	072	Meteorology
	P.M.	061	Navigation Safety
Third Day	A.M.	157	General Ship Knowledge
	P.M.	099	Ship Management

**FISHING MASTER CLASS 3**

First Day	A.M.	041	Chartwork and Pilotage
	P.M.	111	Stability
Second Day	P.M.	061	Navigation Safety
Third Day	A.M.	157	General Ship Knowledge

**OFFSHORE INSTALLATION MANAGER**

First Day	A.M.	095	MODU Management
	P.M.	125M	Rig Construction
Second Day	A.M.	062	Navigation Safety
Third Day	A.M.	135M	Engineering Knowledge

## ENGINEERS

8.3 Applicants for engineering examinations are expected to present themselves at the office of the Marine Engineer Examiner according to the following time table:

Certificate & Day	Morning	Afternoon
Fourth-Class		
Monday	*Engineering Knowledge, General	
Tuesday	*Engineering Knowledge, Steam	*Engineering Knowledge, Motor
Third-Class and *CEMDFV		
Monday	*Engineering Knowledge, General	
Tuesday	*Engineering Knowledge, Steam	*Engineering Knowledge, Motor
Wednesday	Applied Mathematics	Applied Mechanics
Thursday	Thermodynamics	Electrotechnology
First- and Second-Class		
Monday	Applied Mathematics	Engineering Knowledge, General
Tuesday	Engineering Knowledge, Steam	Engineering Knowledge, Motor
Wednesday	Applied Mechanics	Thermodynamics
Thursday	Naval Architecture	Electrotechnology
Friday	Drawing or Sketching	

Note: The examination for a \*WKE/MDFV and for ERR/ERA certificates may be held at any time and in any port. The examiners may choose any of the sets of questions contained in ERR/ERA papers and should restrict themselves to the questions on the papers selected.

## CHAPTER 9 - APPENDICES A-K

### APPENDIX A - TESTIMONIAL FOR SEA SERVICE

NAME AND ADDRESS OF SHIP OWNER - NOM ET ADRESSE DU PROPRIÉTAIRE DU NAVIRE

---

I CERTIFY THAT THE FOLLOWING IS A FULL AND TRUE STATEMENT OF THE SEA SERVICE PERFORMED UNDER MY SUPERVISION BY:

JE CERTIFIE QUE CE QUI SUIT EST UN EXPOSE COMPLET ET EXACT DU SERVICE EN MER SOUS MA SURVEILLANCE PAR:

NAME - NOM	
ON BOARD (NAME OF SHIP) - À BORD (NOM DU NAVIRE)	OFFICIAL NUMBER - NUMÉRO OFFICIEL
NUMBER OF PROPELLERS - NOMBRE D'HELICES	TYPE OF SHIP - TYPE DE NAVIRE
<b>IF STEAM-DRIVEN - S'IL S'AGIT D'UN NAVIRE À VAPEUR</b>	<b>IF MOTOR-DRIVEN - S'IL S'AGIT D'UN NAVIRE À MOTEUR</b>
I.H.P. (OR S.H.P. FOR TURBINES) - PUISSANCE INDIQUÉE (OU PUISSANCE À L'ARBRE DES TURBINES)	B.H.P. - PUISSANCE AU FREIN
TOTAL HEATING SURFACE OF MAIN BOILERS - SURFACE DE CHAUFFE TOTALE DES CHAUDIÈRES PRINCIPALES	BORE AND NUMBER OF CYLINDERS - ALÉSAGE ET NOMBRE DE CYLINDRES
NUMBER AND DIAMETER OF CYLINDERS - NOMBRE ET DIAMÈTRE DES CYLINDRES	BORE AND NUMBER OF CYLINDERS - ALÉSAGE ET NOMBRE DE CYLINDRES
LENGTH OF STROKE - COURSE DU PISTON	LENGTH OF STROKE AND R.P.M. - COURSE DU PISTON ET NOMBRE DE T/M
RATED GENERATOR CAPACITY - PUISSANCE NOMINALE DE LA GÉNÉRATRICE	WHETHER 2 OR 4 STROKE - MOTEUR À 2 OU À 4 TEMPS

DATE SIGNED ON DATE D'ENGAGEMENT	DATE SIGNED OFF DATE DE CONGÉDIEMENT	ACTUAL NUMBER OF DAYS SPENT UNDERWAY NOMBRE DE JOURS EFFECTIVEMENT PASSÉS EN ROUTE	RANK AND SENIORITY GRADE ET RANG	TYPE OF WATCH 8 OR 12 HOURS GENRE DE QUART 8H OU 12H	TYPE OF SERVICE WATCH A.B.C. ETC. TYPE DE SERVICE A.B.C. ETC
<b>FITTING-OUT, LAYING UP, OR OVERHAULING</b>			<b>REMISE EN FONCTION, MISE AU REPOS OU RÉVISION</b>		
OVERHAULING - RÉVISION		LAYING UP - MISE AU REPOS			
COMPLETED TERMINÉE LE					

NOTE: A SEPARATE TESTIMONIAL SHOULD BE USED FOR EACH TYPE OF SERVICE  
 NOTA: REMPLIR UNE FORMULE D'ATTESTATION DISTINCTE POUR CHAQUE TYPE DE SERVICE


REPORT AS TO ABILITY RENSEIGNEMENTS SUR LES COMPÉTENCES
--

\_\_\_\_\_  
 MASTER, COMMANDING OFFICER, SUPERINTENDENT, OR OWNER'S REPRESENTATIVE  
 CAPITAINE, COMMANDANT, SURINTENDANT OU MANDATAIRE DU PROPRIÉTAIRE

\_\_\_\_\_  
 CHIEF ENGINEER - OFFICIER MÉCANICIEN

-----  
 DATE


-----  
 DATE

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### TYPE OF SERVICE


Engineer in charge of watch, boilers and machinery.....	A
Engineer in charge of watch, machinery only .....	B
Engineer in charge of watch, boilers only .....	C
Senior assistant-engineer to engineer in charge of watch.....	D
Junior assistant-engineer to engineer in charge of watch .....	E
Assistant-engineer officer on watch .....	F
Engine-room assistant on watch .....	G
Engine-room rating on watch .....	H
Engineer on day work at sea (engine and boiler repairs in engine room) .....	I
Pumpman on oil tankers (operating, overhauling, or repairing cargo pumps and miscellaneous deck machinery, and performing generally the duties of mechanic on board ship).....	J
Water tender (three or more boilers) .....	K
Electrician .....	L
Unmanned engine-room routine .....	M



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## **APPENDIX B - RULES TO BE OBSERVED BY APPLICANTS BEING EXAMINED**

1. Any books, notes, memorandums, etc., that an applicant may have brought to the examination must be handed to the examiner for inspection upon entering the examination room.
2. An applicant using books or information other than that supplied or permitted by the examiner will be failed.
3. An applicant who receives information from or imparts information to another applicant, or communicates with another applicant in any way while the examination is in progress will be failed.
4. An applicant must not leave the examination room without the examiner's permission.
5. Silence is to be observed during the examination.
6. Each problem must be worked on a separate page. The question need not be copied, but the question number must be given.
7. Answers have to be in ink, except for sketches or multiple-choice questions.
8. An applicant's rough work must be shown. An applicant may, however, make a fair copy on the answer papers, showing the rough calculations on a separate sheet.
9. An applicant must not take any question papers, work sheets, or other notes on the questions or work from the examination room.
10. The question cards/papers must not be marked or defaced.
11. An applicant must sign each sheet of completed work before handing the work to the examiner.
12. When an applicant has been failed for not observing rule 2 or 3, he/she may not be allowed to sit for examination again for a period of from three to six months, as decided by the examiner.
13. Examination paper, for both rough and finished work, is provided by the examiner.
14. A copy of these rules is supplied to applicants at the time of examination..
15. The number of questions to be attempted is stated in each examination.
16. Mathematical tables and steam tables will be supplied to engineer applicants.
17. If more than the required number of questions in any paper are attempted, all answers shall be marked and only the required number of questions awarded the lowest marks shall be taken to determine the overall result.

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## APPENDIX C - NOTES FOR THE GUIDANCE OF APPLICANTS PREPARING FOR MARINE ENGINEER EXAMINATIONS

### Introduction

These notes have been prepared to assist you in making an application for Marine Engineer examinations, completing the necessary application forms, and presenting your sea service and workshop testimonials prior to attempting the examination. The notes also include the "Rules to be Observed by the Applicants being Examined," which are supplied as necessary to all applicants in the examination rooms.

These notes are not intended to replace the *Marine Certification Regulations*, but rather to explain the pre-examination procedures in a simplified manner.

### Before Making Application for Examination

The first step toward obtaining a certificate is to make sure that you are familiar with the regulations relating to the examination you wish to attempt. Read the general regulations as well as those for the grade of certificate you wish to apply for. Make sure you know how much qualifying machine-shop service and/or sea service is required for the certificate.

As stated in the regulations, each applicant for examination must be able to produce discharges and/or testimonials to verify his/her machine-shop or sea service. Machine-shop testimonials must state the types of work and machinery on which you were employed (e.g., fitter, machinist, erecting or repairing marine steam and diesel engines) and the periods and dates you were employed in each section, as well as testify to your ability. Such testimonials must be signed by the employer or his/her representative.

Testimonials for sea service must be of a form similar to that shown in the regulations, and state in what capacity you were employed (e.g., engineer, mechanical assistant) and give time periods and dates. These testimonials must be signed by the chief engineer, the master of the ship, and also the superintendent or the owner's representative.

Make sure that these testimonials are complete when you leave a ship in order that there will be no unnecessary delay at a later date. Sea service as engineer will require verification by testimonials. Make sure that your discharge book is properly signed and completed, and that the discharge-book dates check with testimonial dates. Remember that no service will be accepted unless it is covered by a properly completed and signed document.


### When, Where and How to Apply for Examination

Having completed the necessary period of service, the next step is to make an application to be examined.

Application forms and service forms can be obtained from any Transport Canada, Marine Safety Branch Office. These forms must be completed in duplicate, and returned to the Marine Safety Office where you wish to attempt the examination, together with all the necessary testimonials and discharges (if required) to cover the service claimed on the service form.

Make your application for examination early, if possible. If this is done, there will be plenty of time to obtain any missing documents or to correct any errors in existing documents.

You must notify the examiner at least two weeks before you intend to attempt an examination, otherwise he/she may not be able to examine you because of other duties.

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## Fees

When making application for an examination, it will be necessary for you to pay the examination fee.

1. The fee for each examination is listed in the regulations.
2. An examination for a certificate and an endorsement of a lower grade taken at the same time as the examination shall be deemed to be, for purposes of this section, an examination for a combined certificate.
3. A part examination for a certificate, and an endorsement of a lower grade taken at the same as the examination shall be deemed to be, for purposes of this section, a part examination.

## Calculation of Service

When calculating the periods of service, the time must be counted as 30 days to the month with either the joining day or the discharging day being counted toward sea service. For details relating to calculation of service, see Chapter 3.

## Rules for Examination

When you make your application for examination, the examiner will give you a copy of *Rules to be Observed by Applicants Being Examined*. Read these carefully to make sure that you know the rules and are aware of the formulae used in the examinations.

At the time of examination you will also be loaned the following tables:


- Four-Figure Mathematical Tables,
- Engineering Formulae, and
- ASME Steam Tables, SI units.

The Steam Tables are for use by first- and second-class applicants only and the Mathematical Tables and Engineering Formulae for first-, second- and third-class applicants.

## Instruments

Applicants must equip themselves with the following instruments:

- |                          |   |
|--------------------------|---|
| Fourth-Class Examination | - pen, pencils  |
| Third-Class Examination  | - pen, pencils, eraser, 12" ruler, 45° and 30° to 60° set squares                                   |
| Second-Class Examination | - same as for Third-Class Examination, plus drawing instruments, scale ruler and protractor         |
| Drawing Examination      | - drawing instruments, compasses, set squares, scale ruler, etc. (sketching paper will be supplied) |

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### **Specimen Examination Papers**


Specimen examination papers for all grades of certificates can be obtained from any Transport Canada, Marine Safety office.

### **Mandatory and Failing Questions**

In fourth-class examinations, the following questions must be answered correctly in the written paper in order to pass:

- (a) testing the water gauge, including the hollow column;
- (b) precautions to be taken blowing down a boiler;
- (c) the danger involved in re-lighting an oil-fired furnace where unburned gases may have accumulated;
- (d) precautions to be taken to prevent the contents of a boiler backing into another boiler through blow-down or scum valves; and
- (e) precautions to be taken when connecting one boiler to another (e.g., danger of water hammer).

In all examinations, these questions may be given orally.

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## APPENDIX D - LIST OF MARINE SAFETY OFFICES

Marine Safety  
Transport Canada  
NATIONAL HEADQUARTERS  
Tower C, Place de Ville, 11th floor  
330 Sparks St., Ottawa, ON

For Nautical Enquiries: (613) 993-9706  
For Engineering Enquiries: (613) 998-0640  
Fax: (613) 990-1538

Marine Safety  
Transport Canada  
800 Burrard Street, suite 810  
Vancouver, BC V6Z 2J8  
Tel: (604) 666-0834  
Fax: (604) 666-9177

Marine Safety  
Transport Canada  
P. O. Box 247  
44 Hurontario Street, 2<sup>nd</sup>. Floor  
Collingwood, ON L9Y 3Z5  
Tel: (705) 445-3320  
Fax: (705) 445-9531

Marine Safety  
Transport Canada  
501-1230 Government Street  
Victoria, BC V8W 1Y3  
Tel: (250) 363-0394  
Fax: (250) 363-0330

Marine Safety  
Transport Canada  
Landmark Building  
43 Church Street, 7th Floor  
St. Catharines, ON L2R 7E1  
Tel: (905) 688-4360  
Fax: (905) 688-6285

Marine Safety  
Transport Canada  
60 Front Street  
Room 208, Federal Building  
Nanaimo, BC V9R 5H7  
Tel: (250) 754-0244  
Fax: (250) 754-0245


Marine Safety  
Transport Canada  
31 Hyperion Court, 2<sup>nd</sup> Floor  
Kingston, ON K7K 7G3  
Tel: (613) 545-8676  
Fax: (613) 545-8714

Marine Safety  
Transport Canada  
400-309 2<sup>nd</sup> Ave. West  
Prince Rupert, BC V8J 3T1  
Tel: (250) 627-3045  
Fax: (250) 624-9305

Marine Safety  
Transport Canada  
100 Front St. South  
Sarnia, ON N7T 2M4  
Tel: (519) 383-1826  
Fax: (519) 383-1997

Marine Safety  
Transport Canada  
103-33 S. Court Street  
Thunder Bay, ON P7B 2W6  
Tel: (807) 345-6953  
Fax: (807) 345-0521

Marine Safety  
Transport Canada  
901, Cap Diamant, 4e Étage  
Quebec, QC G1K 4K1  
Tel: (418) 648-3234  
Fax: (418) 648-5106

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Marine Safety  
Transport Canada  
56 Aberfoyle Cres., 2nd Floor  
Toronto, ON M8X 2W4  
Tel: (416) 954-8890  
Fax: (416) 954-5265

Marine Safety  
Transport Canada  
800, Boul. René Levesque Ouest  
Suite 620  
Montreal, QC H3B 1X9  
Tel: (514) 283-7056  
Fax: (514) 283-6595

Marine Safety  
Transport Canada  
180, de la Cathédrale  
Rimouski, QC G5L 5H9  
Tel: (418) 722-3040  
Fax: (418) 722-3332

Marine Safety  
Transport Canada  
275 Main Street, 5th Floor  
Bathurst, NB E2A 4J1  
Tel: (506) 548-7491  
Fax: (506) 548-7180

Marine Safety  
Transport Canada  
P.O. Box 1013  
45 Alderney Drive  
Queen Square, 14th Floor  
Dartmouth, NS B2Y 4K2  
Tel: (902) 426-9321  
Fax: (902) 426-6657

Marine Safety  
Transport Canada  
P.O. Box 7730, Station A  
Ward St., CCG Building, 4th Floor  
Saint John, NB E2L 4X6  
Tel: (506) 636-4748  
Fax: (506) 636-4756

Marine Safety  
Transport Canada  
P. O. Box 850  
248 Pleasant Street  
Yarmouth, NS B5A 4K5  
Tel: (902) 742-6860  
Fax: (902) 742-6866


Marine Safety  
Transport Canada  
97 Queen Street, 2nd Floor,  
Dominion Building Box 1270  
Charlottetown, PE C1A 7M8  
Tel: (902) 566-7987  
Fax: (902) 566-7991

Marine Safety  
Transport Canada  
Federal Arts Building, 2<sup>nd</sup>. Floor  
196 George Street  
Sydney, NS B1P 1J3  
Tel: (902) 564-7002  
Fax: (902) 564-7648

Marine Safety  
Transport Canada  
P. O. Box 237  
122 Main Street  
Chipman Complex  
Lewisporte, NF AOG 3A0  
Tel: (709) 535-2503  
Fax: (709) 535-8297

Marine Safety  
Transport Canada  
811 Reeves Street Unit 1  
Shediac Plaza,  
Port Hawkesbury, NS B9A 2S4  
Tel: (902) 625-0803  
Fax: (902) 625-1722

Marine Safety  
Transport Canada  
Herald Towers  
P. O. Box 22  
Corner Brook, NF A2H 6C9  
Tel: (709) 637-4390  
Fax: (709) 637-4391

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Marine Safety  
Transport Canada  
P. O. Box 1300  
10 Barter's Hill, 9<sup>th</sup>. Floor  
Cabot Bldng, Tower 2  
St. John's, NF A1C 6H8  
Tel: (709) 772-5166  
Fax: (709) 772-0210

Marine Safety  
Transport Canada  
P. O. Box 1143  
208 Federal Building  
Marystown, NF A0E 2M0  
Tel: (709) 279-2201  
Fax: (709) 279-1188

Marine Safety  
Transport Canada  
Canada Place, 11th Floor  
1100-9700 Jasper Avenue  
Edmonton, AB T5J 4E6  
Tel: (780) 495-4023  
Fax: (780) 495-6472

Marine Safety  
Transport Canada  
Prairie & Northern Region  
344 Edmonton St.  
Winnipeg, MA R3P 0P6  
Tel: (204) 983-7498  
Fax: (204) 984-8417

Marine Safety  
Transport Canada  
C.P. 596  
701, Boul. Laure, Suite 205  
Sept-Iles, QC  
G4R 4K7  
Tel: (418) 968-4991\968-4126  
Fax: (418) 968-5516

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## APPENDIX E - LIST OF MARINE SCHOOLS

### LIST OF MARINE SCHOOLS

### TELEPHONE AND FAX

#### **BRITISH COLUMBIA**

Refer to TP 10655 for the current list of Marine Schools in British Columbia.

#### **NEW BRUNSWICK**

Refer to TP 10655 for the current list of Marine Schools in New Brunswick.

#### **NEWFOUNDLAND**

Refer to TP 10655 for the current list of Marine Schools in Newfoundland.

#### **NOVA SCOTIA**

Refer to TP 10655 for the current list of Marine Schools in Nova Scotia.

#### **ONTARIO**

Refer to TP 10655 for the current list of Marine Schools in Ontario.


#### **PRINCE EDWARD ISLAND**

Refer to TP 10655 for the current list of Marine Schools in Prince Edward Island.

#### **QUEBEC**

Refer to TP 10655 for the current list of Marine Schools in Quebec.




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#### APPENDIX F - CERTIFICATES AND CREDITS

CERTIFICATE	CREDITS
2MIW	012, 041, 151 & 161
1MIW	012, 041, 091, 112, 122, 151, 161 & 162
CIW	012, 041, 091, 092, 112, 122, 123, 151, 161, 162, & 163
CIW (350)	012, 041, 090, 151, 160, & 161
2MHT	012, 041, 151 & 161
1MHT	012, 041, 051, 091, 112, 122, 132, 151, 161 & 162
CHT	012, 041, 051, 052(A), 072, 091, 092, 112, 113, 122, 123, 132, 133, 151, 161, 162, & 163
CHT (350)	012, 041, 090, 151, 160 & 161
2MFG	012, 041, 051, 112, 122, 132, 151, 161 & 162
1MFG	012, 041, 051, 052(A), 072, 073, 091, 112, 113, 122, 123, 132, 133, 151, 161 & 162
CFG	ALL (except 062 if passed before March 1983)
WK (F)	020, 040 & 060
FM	011, 020, 040, 060
FC (R)	011, 020, 041, 060, 072, 099, 157 & 168
FC	011, 020, 041, 061, 073, 099, 158 & 169

NOTE: All credits for 061 & 062 are contingent upon the qualifying examination being written after March 1983.

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**APPENDIX G - TESTIMONIAL AS TO CHARACTER, CONDUCT, ABILITY AND SOBRIETY FOR EXAMINATION PURPOSES AND STEERING TESTIMONIAL (EXN-27)**

This is to certify that \_\_\_\_\_  
(FULL NAME OF SEAFARER)

Discharge Book Number \_\_\_\_\_ served under my command on board the

ss/mv \_\_\_\_\_ of \_\_\_\_\_, gross tonnage  
(SHIP'S NAME) (PORT OF REGISTRY)

\_\_\_\_\_ tons, from \_\_\_\_\_ to  
(DATE OF START OF EMPLOYMENT)

\_\_\_\_\_. During this period of service on board, he/she conducted  
(DATE OF END OF EMPLOYMENT)

himself/herself:  
(MASTER'S REMARKS ON THE CHARACTER, CONDUCT, ABILITY AND SOBRIETY OF THE SEAFARER)

---



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---



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\_\_\_\_\_  
SIGNATURE OF MASTER

\_\_\_\_\_  
CERTIFICATE NUMBER

I also certify that the above-named seafarer stood regular watches at the wheel during his/her service under my command and I am satisfied that he/she is a competent wheelsman.

\_\_\_\_\_  
SIGNATURE OF MASTER

COPIES OF THIS FORM MAY BE OBTAINED FREE OF CHARGE FROM ANY EXAMINATION CENTRE AT ANY MAJOR PORT

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## APPENDIX H - HOW TO BECOME AN ENGINEER OFFICER

1. Good physical fitness, including hearing and normal eyesight, are necessary for a career as a ship's officer in the engineering department. The first step, therefore, should be a sight test conducted to standards as stated in the Crewing Regulations.

While success in the sight test is no guarantee that difficulties will not be encountered at later stages, it will assure the new entrant that an insurmountable problem does not exist at the outset.

2. Proof of Canadian citizenship or permanent resident status are requirements for all Transport Canada examinations. Applicants must produce proof at the time of examination.

Two routes are open to the aspiring marine engineer.

### (1) AN APPROVED MARINE ENGINEERING DIPLOMA TRAINING SCHEME

Application should be made to one of the colleges listed in TP 10655 offering this type of program. Entrance qualifications and financial support vary from school to school, therefore no complete information is given here.

All existing, approved courses last from 36 to 45 months, and include studies pursued ashore and afloat.

During periods on board ship, the trainee must complete assignments set by the college and keep a record of the work and studies. This will be scrutinized by the examiner after each sea period and when the trainee first applies for a certificate as a marine engineer.

These periods at sea are intended to expose the cadet to the full range of the marine engineer's responsibilities, shipboard systems and personnel relationships. For this reason, the trainee must be prepared to perform all types of manual labour as well as skilled tasks. The trainee should not be expected to engage in repetitive work without further educational value.


The trainee is sometimes relatively poorly paid, but this route puts the graduate in the most favourable position to obtain the highest qualifications.

### (2) PART-TIME STUDY COMBINED WITH SERVICE AS AN ENGINE-ROOM RATING

The prospective officer must first obtain employment in the engine department or in a related field. Then, after completing three years of sea service and related training, the trainee will become eligible to be examined for the Watchkeeping Engineer Certificate, Fourth-Class (see Chapter 33).

The three years of service must include the successful completion of a course in Practical Skills for marine engineers at a recognized institution (refer to TP 10655), which will be considered as the equivalent of six months of service, and the satisfactory completion of a Marine Safety approved Training Record Book before being examined for the first certificate of competency.


The Fourth-, Third- and Second-Class Certificate are direct-entry examinations, and the applicant who has obtained the qualification for that certificate may attempt that level of certificate without obtaining a lower level. For the First-Class Certificate, the Second-Class Certificate must be obtained before sea service will qualify.

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Method of study is optional except for the prescribed courses in first aid, marine emergency duties and simulated engine-room/control-room training. Several nautical schools offer short upgrading courses to assist part-time students in reaching certification standards (refer to TP 10655).

Shipboard employment can be obtained by applying to the Seamen's International Union, Canada Manpower offices in the principal sea or lake ports, or directly to employers. When employment has been secured, a Canadian Seamen's Discharge Book should be obtained from any Transport Canada, Marine Safety office. Thereafter, an accurately-documented record of all discharges must be kept by the applicant. Testimonial of Sea Service forms, which outline the service, hours of work or watch, and particulars of the ship on board which the service was performed, must be obtained from the chief engineer before being discharged from the ship.

3. Marine engineer officer certificates are issued on behalf of the Minister of Transport by the Marine Safety Branch of Transport Canada. Examination for engine-room rating, engine-room assistant and marine engineer officer certificates are held at any of the Marine Safety offices across Canada.

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## APPENDIX I - HOW TO BECOME A NAVIGATING OFFICER

1. Good physical fitness is necessary for a career as a ship's officer in the deck department. The first step should be a medical examination, including eyesight and hearing, as stated in the Crewing Regulations.
2. Proof of Canadian citizenship or landed immigrant status under the *Immigration Act* are requirements for all Transport Canada examinations. Applicants must produce proof at the time of examination.

Two career paths are open to aspiring mates and masters.

### (1) AN APPROVED CADET CO-OPERATIVE TRAINING SCHEME

Application should be made to one of the colleges listed in TP 10655 offering this type of program. Entrance qualifications and financial support vary from school to school.

All existing, approved courses last from 36 to 42 months, and include studies pursued ashore and aboard.

During periods on board ship, the cadet must complete assignments set by the college and keep a record of work and studies. This will be scrutinized by the examiner after each sea period and when the cadet first applies for a certificate of competency.

These periods at sea are intended to expose the cadet to the full range of master and mate responsibilities. A cadet must be prepared to perform all types of manual labour, as well as navigation and executive tasks.


### (2) PART-TIME STUDY COMBINED WITH SERVICE AS A DECK RATING

The prospective officer must first obtain employment in the deck department. After completing two years of sea service, the seafarer is eligible to be examined for the Watchkeeping Mate, Ship, Certificate (chapter 13).

The method of study is optional except for prescribed courses in first aid, marine emergency duties and simulated electronic navigation. Several nautical schools offer short upgrading courses to assist part-time students in reaching certification standards (refer to TP 10655).

Shipboard employment can be obtained by applying to the Seamen's International Union, Canada Manpower offices in the principal sea or lake ports, or directly to employers. When employment has been secured, a Canadian Seamen's Discharge Book should be obtained from any shipping office. Thereafter, an accurately-documented record of all discharges must be maintained.

3. Navigating officer certificates are issued on behalf of the Minister of Transport by the Marine Safety Branch of Transport Canada. Examination for deck rating and navigating officer certificates are held at Marine Safety offices across Canada.

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**APPENDIX J - CERTIFICATE OF WATCHKEEPING SERVICE (EXN-25)**

FOR A CERTIFICATE AS FIRST MATE OR MASTER  
(EXN-25)

This is to certify that ..... served under my command on the SS/MV ..... gross tonnage ..... from ..... to ..... in the capacity of<sup>(i)</sup> (1st) (2nd) (3rd) (4th) of<sup>(ii)</sup> ..... watchkeeping officer. During this time this officer was in effective charge of a watch for eight hours out of every 24 hours at sea, except as stated below.

<sup>(i)</sup> Between the following dates this officer served as junior officer of the watch:

.....

<sup>(ii)</sup> During this time this vessel was employed in the transportation of the following bulk liquid cargoes:

.....  
.....

The extreme ports called at during his/her period of service on board on continuous articles were <sup>(iii)</sup> ..... and ..... and the voyage between such ports <sup>(i) included</sup> a deep-sea passage as defined below.   
did not include

During this period this officer ranked <sup>(iv)</sup> ..... in seniority to the master and he/she conducted himself/herself<sup>(v)</sup>

.....  
.....

.....  
Certificate Number Signature of Master


- (i) Delete that which does not apply.
- (ii) Insert total number of watchkeeping officers.
- (iii) Insert names of the two furthest separated ports.
- (v) Master is to insert remarks on the conduct, ability and sobriety of the officer.

**DEEP-SEA PASSAGE**

"Deep-sea passage" means a voyage that includes, during the officer's period of service on board, a passage between extreme points called at of not less than 500 nautical miles to seaward,

- (a) on the East coast, of West Point, Anticosti, and
  - (b) on the West coast, of the inside passages of the coast of British Columbia and Alaska.
- In case (a), one of the extreme points called at lying outside the Gulf of St. Lawrence and the Strait of Belle Isle.

**COPIES OF THIS FORM MAY BE OBTAINED FREE OF CHARGE FROM ANY NAUTICAL EXAMINATION CENTER AT ANY MAJOR PORT**

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**APPENDIX K - SUPPLEMENTARY TESTIMONIAL OF SERVICE SHOWING ADDITIONAL DETAILS FOR EXAMINATION PURPOSES (EXN-26)**

This is to certify that \_\_\_\_\_  
(FULL NAME OF SEAFARER)

served on board the ss/mv \_\_\_\_\_ of \_\_\_\_\_,  
(SHIP'S NAME) (PORT OF REGISTRY)

gross tonnage \_\_\_\_\_ tons, from \_\_\_\_\_  
(DATE OF START OF EMPLOYMENT)

to \_\_\_\_\_ in the capacity of \_\_\_\_\_  
(DATE OF END OF EMPLOYMENT) (SEAFARER'S RANK OR RATING)

and during such time he/she worked (i) \_\_\_\_\_ days on board ship on a day-on-day-off or equivalent basis involving regular shifts of (ii) \_\_\_\_\_ hours per day.

While serving on board ship in the above capacity under my command he/she performed regular deck duties for part of the time each day and during such time the vessel sailed on the waters of

\_\_\_\_\_ between \_\_\_\_\_  
(NAME OF SEA, GULF, BAY, LAKE OR RIVER FOLLOWED BY THE NAMES OF THE EXTREME PLACES PROCEEDED

and \_\_\_\_\_  
TO BETWEEN DATE OF ENGAGEMENT AND DATE OF DISCHARGE)

The ship's log shows \_\_\_\_\_ days were spent at sea during the above period.

- (I) INSERT NUMBER OF DAYS ACTUALLY WORKED ON BOARD SHIP.
- (II) INSERT DAILY HOURS OF WORK (EXCLUDING OVERTIME) PROVIDED BY THE CONTRACT.

(TESTIMONIAL MAY BE SIGNED BY THE OWNER IF HE/SHE HAS IMMEDIATE KNOWLEDGE OF THE FACTS ATTESTED TO)  
**WARNING: IT IS AN OFFENCE TO SIGN A FALSE TESTIMONIAL**

SIGNATURE OF MASTER OR OWNER

**THE EXAMINATION AND CERTIFICATION  
OF  
SEAFARERS  
SECTION TWO OF FIVE  
REVISION 04**


<b>Responsible Authority</b>  The Director, Marine Personnel Standards and Pilotage is responsible for this document, including any change, correction, or update.	<b>Approval</b>  <hr/> <p style="text-align: center;">Donald Roussel Director, Marine Personnel Standards and Pilotage Marine Safety</p> <b>Date signed:</b> _____
--	--

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**Important :**

**This publication is subject to periodical reviews and it is updated accordingly /  
Cette publication est sujette à des revues périodiques et elle est mise-à-jour en conséquence**

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## INTRODUCTION

This publication was prepared with input from various federal, provincial and industry organizations including:

- Canadian Marine Advisory Council
- Canadian Marine Training Institutions
- Canadian Ship Owners Association
- Canadian Petroleum Association
- Canadian Association of Oil Well Drilling Contractors
- Canadian Offshore Vessel Operators Association
- Canadian Institute of Marine Engineers
- Company of Master Mariners of Canada
- Canada-Newfoundland Offshore Petroleum Board
- Canada-Nova Scotia Offshore Petroleum Board
- Government of Newfoundland -Department of Mines and Energy
- Government of Nova Scotia -Department of Mines and Energy
- Government of Canada -Department of Energy, Mines and Resources
- National Energy Board


This publication is intended as a guide for the certification of officers and crews of ships and marine offshore drilling units.

**The contents of this publication reflect the requirements of the Marine Certification and Crewing Regulations. In case of conflict, the regulations take precedence.**

This publication is subject to ongoing review and amendment as a result of consultation with the Canadian Marine Advisory Council.

For ease of reference and to reduce printing costs this publication has been divided into five sections pertaining to specific areas of specialization as follows:

- Section 1: General Information
- Section 2: Deck Certificates
- Section 3: Engineering Certificates
- Section 4: Rating Certificates
- Section 5: Mobile Offshore Unit (MODU) Certificates.

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- TP 8129: Tanker Safety courses.
- TP 8911: Three-year Marine Engineer course.
- TP 10655: Transport Canada-approved marine training courses.
- TP 10933: Engine-Room Rating training courses.
- TP 10934: Course for Certificate of Service, Master of Vessels of Not More Than 1600 Tons.
- TP 10935: Simulated Engine Room and Control Room course.
- TP 10936: Bridge Watchman training courses.
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## CHAPTER 10 - MASTER MARINER

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

10.1 (1) Every applicant for a certificate as Master Mariner shall:

(a) either

(i) obtain:

(A) a certificate of completion for the three-year course set out in TP 5562 at a school listed in TP 10655; and

(B) a minimum of 30 months service when approval for graduation is granted to First Mate, Intermediate Voyage, as officer in charge of the watch as follows:

(aa) a minimum of 12 months service after obtaining a certificate as Master, Intermediate Voyage, as officer in charge of the watch on ships of at least 200 tons gross tonnage making voyages extending beyond partially smooth water limits;

(bb) a minimum of 12 months sea service after obtaining a certificate as First Mate, Intermediate Voyage, as officer in charge of the watch on ships of at least 200 tons gross tonnage making foreign voyages or voyages including a deep-sea passage; and

(cc) the remaining service made up of service after obtaining a certificate as Watchkeeping Mate, Ship, as officer in charge of the watch on ships of at least 25 tons gross tonnage making voyages extending beyond partially smooth waters;

or


(ii) complete 36 months service as follows:

(A) a minimum of 12 months service after obtaining a certificate as Master, Intermediate Voyage, as officer in charge of the watch on ships of at least 200 tons gross tonnage making voyages extending beyond partially smooth water limits;

(B) a minimum of 12 months sea service after obtaining a certificate as First Mate, Intermediate Voyage, as officer in charge of the watch on ships of at least 200 tons gross tonnage making foreign voyages or voyages including a deep-sea passage; and

(C) the remaining service made up of service after obtaining a certificate as Restricted Watchkeeping Mate, Ship, or Watchkeeping Mate, Ship, as officer in charge of the watch on ships of at least 25 tons gross tonnage making voyages extending beyond partially smooth waters;

(b) obtain a medical certificate prescribed by the Crewing Regulations;

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- (c) obtain a certificate of completion for each of the following courses from a school or organization listed in TP 10655:
    - (i) Marine Emergency Duties Course, Senior Officer (D) set out in TP 4957;
    - (ii) Simulated Electronic Navigation Course Level II, set out in TP 4958; and
    - (iii) Marine First Aid Advanced Course, set out in TP 13008;
  - (d) pass a written examination in each of the following subjects:
    - (i) Navigation Instruments;
    - (ii) Engineering Knowledge;
    - (iii) Ship Management; and
    - (iv) Naval Architecture/Stability;
  - (e) pass a practical examination on Simulated Electronic Navigation Level II; and
  - (f) pass an oral examination in General Seamanship.
- (2) Service with a First Mate, Foreign-Going, or Master, Home-Trade certificate will be accepted in lieu of service with a Master, Intermediate Voyage, certificate.
- (3) Except as stated in subsection (1)(a)(i)(B) an applicant for oral examination 164 for a Master Mariner certificate shall have completed a total of at least 36 months service as officer in charge of the watch, of which at least 12 months shall have been served on vessels making foreign-going voyages or voyages including deep-sea passage as described in section 3.10. This 12-month period shall have been served while holding a First Mate, Intermediate Voyage; First Mate, Home-Trade; or Second Mate, Foreign-Going; certificate on vessels of at least 200 tons gross tonnage. The remaining 24 months service shall have been served in two periods of not less than 12 months each as officer in charge of the watch while holding a certificate not lower than First Mate, Foreign-Going, or Master, Home-Trade and Restricted Watchkeeping Mate, Ship, or Second Mate, Home-Trade, on vessels of at least 200 tons and 25 tons gross tonnage, respectively, making voyages beyond partially smooth water limits.

## PART II - EXAMINATIONS

10.2 (1) The following table lists the examinations for the Master Mariner Certificate, the qualifying service required before each may be attempted, and other requirements. Subjects 023, 134 and 141 are academic, and demand no prerequisites.

<b>Examination</b>	<b>Qualifying WK Service While Holding Master, Intermediate Voyage</b>	<b>Other Requirements</b>
023 Navigation Instruments	Nil	Nil
093 Ship Management	Nil	Passed 092
114 Naval Architecture/Stability	Nil	Passed 113
134 Engineering Knowledge	Nil	Nil
164 General Seamanship	12 months	All other exams must have been passed before attempting 164.

- 10.3 (1) The examination system is modular, therefore the examinations associated with necessary lower-grade certificates are as much a part of the requirements for a Master Mariner certificate. The holders of Master, Intermediate Voyage, certificates are straightforward cases covered by Section 10.2. For holders of 1MFG and CHT, the appropriate examinations listed in sections 13.4, 12.2 and 11.2 also must have been passed or credited.
- (2) Applicants for the Master Mariner Certificate under subsection 10.1 (2) who hold 1MFG or CHT certificates will receive credits as set out in Appendix F of this publication against the examinations associated with the lower-grade certificates.
- (3) If qualifying certificates were passed before March 1983, applicants for Master Mariner will be examined in the Collision Regulations with Canadian Modifications 1983.

### PART III - VALIDITY OF CERTIFICATE

10.4 The Master Mariner Certificate is valid as master of a foreign-going ship.


### PART IV - SYLLABUSES OF EXAMINATIONS

10.5 **Navigation Instruments**  
**Examination number 023**

ITEM	COLUMN
1.	Electricity Correct identification of faults and knowledge of precautions to guard against the hazards associated with electrical equipment.
2.	Signal Manipulation Knowledge of the techniques used to generate, modulate, detect and amplify radio frequency electromagnetic signals; the effect of modulation technique, band and band width on signal quality and detectability; the need for and characteristics of common marine antenna types.
3.	Radio-Communication Equipment Knowledge of specific principles, practical application and operation of typical radio-communication equipment in current service.
4.	Radio-Communication Systems Thorough knowledge of the regulatory requirements for marine radio-communications systems; VTMS and distress and safety systems; organization and operating protocols of satellite and terrestrial marine communication systems for ship stations, satellite systems and terrestrial systems.
5.	Time Knowledge of the nature of time measurement systems in use by electronic position fixing systems; relationship between time measurement systems and the effect of the measurement systems used on positional data.


6.	<p>Global Coordinates and World Geodetic System (WGS)</p> <p>Knowledge of coordinate system data in use by electronic position fixing systems; relationship between coordinate systems and the effect of coordinate system choices on positional data.</p>
7.	<p>Navigation Appliances</p> <p>Thorough knowledge of the regulatory, physical, operational and operator requirements of marine electronic navigation systems.</p>
8.	<p>Electronic Aids to Navigation</p> <p>Knowledge of principles of operation of marine electronic navigation aids, including depth-measuring systems (Sonar); Doppler position-fixing systems; elementary knowledge of Doppler, its use in position fixing, distance and velocity measurement; characteristics, applications, errors, coverage areas and limitations of GPS, DGPS, GLONASS and Global Navigation Satellite System.</p>
9.	<p>High-Precision Position-Fixing Systems</p> <p>Knowledge of principles, practical application and operation of high-precision position-fixing systems, including Trisponder, Mini-Ranger, Decca Hi -Fix/6, Syledis B, Raydist, Argo, MRD-1, and Trident III.</p>
10.	<p>Integrated Bridge Systems</p> <p>Ability to assess the benefits of integrated systems of navigation to particular vessel operations and identify the integrity of the information provided from the data inputs available, with particular reference to data requirements and quality.</p>
11.	<p>Electronic Charting</p> <p>Knowledge of the principles, practical application and operation of electronic charting and display systems.</p>
12.	<p>Voyage Management Systems</p> <p>Knowledge of the principles, practical application and operation of management systems.</p>
13.	<p>Dynamic Positioning Systems</p> <p>Knowledge of the principles, practical application and operations of dynamic positioning using taut wire, acoustic, heading reference, radar, HPNS, INS and GPS methods.</p>

Note: The student should recognize the fallibility of all electronic aids, and the importance of combining different methods and possessing a continuing ability and preparedness to fall back on basic, non-electronic navigation methods at any time.  
The examination consists of descriptive and calculation exercises.  
Duration is three hours.

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**10.6 Ship Management**  
**Examination number 093**

<b>ITEM</b>	<b>COLUMN</b>
1.	Marine Insurance Extended knowledge of marine insurance and its inter-relationship with charter parties, bills of lading and the <i>Marine Liability Act</i> ; insurance and salvage agreements; and mutual insurance (P & I Clubs), including risks covered by P & I Clubs.
2.	General and Particular Average, York Antwerp Rules Extended knowledge of general average, particular average and York Antwerp rules; port of refuge, including justifiable deviation; responsibility of master in case of deviation; differences between particular average and general average.
3.	Charter Parties and Bills of Lading Extended knowledge of charter parties and bills of lading with respect to international marine laws, and a general appreciation of the interpretation of agreements.
4.	Statutory and Contractual Requirements Regarding Seaworthiness Knowledge of seaworthiness as contained in the <i>Canada Shipping Act</i> ; appreciation of SOLAS and related regulations; recognition of international convention on loadlines and Load Line Regulations; appreciation of ILO/ SOLAS minimum standards for merchant ships; awareness of STCW continuous-proficiency requirements; right of national administrations to prevent the sailing of an unsafe vessel; port state control; knowledge of provisional certificates of registry, interim certificates of class, allowances for limited voyages, and associated inspection procedures.
5.	Deviation and its Effects on Various Contracts Putting into port of refuge or returning to loading port; justifiable deviation; common law warranties.
6.	Functions and Jurisdiction of IMO, ILO and SOLAS Conventions Outline of IMO; convention procedures; signatory requirements; examples of international conventions; outline of SOLAS; outline of ILO; <i>International Seafarers Guide</i> and Joint Maritime Commission.
7.	National Jurisdictions, Local Legislation and Labour Relations Working appreciation of the <i>Canadian Labour Code</i> ; awareness of the <i>Canadian Criminal Code</i> as it relates to vessel operation and safety; appreciation of the collective bargaining process for unions and associations; ability to observe/interpret collective agreements; awareness of right and/or limitation of access of unions and associations to vessel within or without collective agreements; appreciation of the effective expedition of a progressive disciplinary procedure and the associated documentation; awareness of the <i>Ports and Harbours Act</i> and recognition of port by-laws as they relate to vessel operation.
8.	General Organization of Ship Management Working appreciation of concepts, theories and practices of organizational management; complete knowledge of various types of articles of agreement; procedures related to signing-on and signing-off crew; station bills and emergency procedure plans; appreciation of documentation and record keeping; knowledge of loadline regulations; maintenance of safety equipment and machinery; systematic approaches to vessel safety and environmental protection; complete knowledge of the functions of classification societies; customs and immigration procedures and legislation; appreciation of the use of passports and visas in foreign ports; awareness of IMO standard vessel forms for stores, crew and passenger list; review of Safe Working Practices Regulations and Tackle Regulations with emphasis on inspection, testing and documentation practices; knowledge of implications and procedures associated with change of flag and/or ownership; understanding of the <i>Coasting Trade Act</i> and an appreciation of procedures for a vessel purchased abroad, flagged to Canada and operated in the Canadian coasting trade; awareness of the master's duties and responsibilities under the Quarantine Regulations and the Ship Fumigation Regulations; working knowledge of practices and protocols regarding disputes, claims, liens and arrests as they relate to the vessel, charter and cargo; knowledge concerning procurement of legal advice for conflict of interest.

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9.	<p>Port State Control Appreciation of the scope of authority of Port State Control and recognition of the right of national administrations to inspect and detain vessels for infractions.</p>
10.	<p>Crew Welfare and Training Knowledge of marine-safety approved training schemes; licensed and non-licensed crew certificate requirements; marine occupational safety and health (OSH) legislation; controlled-substance legislation and proposed American regulations; employee assistance programs, conditions of employment, rights of employees and testing; appreciation of the <i>Worker's Compensation Act</i>; the Workplace Hazardous Materials Information System (WHMIS); and appreciation of the <i>Merchant Seamen's Compensation Act</i>.</p>
11.	<p>Crew Representation and Rights of Seamen Under CSA Knowledge of right to have copy of agreement posted; right to be consulted if an alteration is made in an agreement; various types of agreement; right to have wages paid; master's obligation to provide seafarer facilities to remit wages; compensation where improperly discharged; right to sue for wages; master's obligation to permit seafarer ashore to lodge complaints; awareness of the <i>Canadian Charter of Rights</i>.</p>
12.	<p>Accounting and Charter Party Appreciation of wage calculations and profit/loss considerations concerning lay days, demurrage, dispatch, freight.</p>
13.	<p>Vessel Traffic Services (VTS) and Reporting System Knowledge of Canadian VTS and information systems; reporting systems, national/international; ECAREG, NORDREG, AMVER, MAREP; master's obligation to report dangers to navigation; traffic schemes and IMO approval procedure; limitations of vessel traffic services; limitations concerning use of inshore lane.</p>
14.	<p>Industrial and Environmental Safety Working knowledge of Oil Pollution Prevention Regulations; recognition of International Convention for Prevention of Oil Pollution from ships, MARPOL; appreciation of master's responsibilities and liabilities under the Garbage Pollution Prevention Regulations, <i>Arctic Waters Pollution Prevention Act</i>, Dangerous Goods Shipping Regulations, <i>Navigable Waters Protection Act</i>, Arctic Shipping Pollution Prevention Regulations, and the <i>Canadian Environmental Protection Act</i>.</p>
15.	<p>Compulsory and Non-Compulsory Pilotage Legal aspects of compulsory and non-compulsory pilotage; pilot's responsibility to master; when a pilot shall not pilot; pilotage exemptions; working knowledge of the practical aspects of transit through the Panama and Suez canals.</p>
16.	<p>Functions of Consular Offices Working knowledge of the purpose and functions of consular offices; appreciation of the conduct of a vessel under a foreign jurisdiction.</p>
17.	<p>Shipping Casualties Knowledge of responsibilities and procedures under the Shipping Casualties Reporting Regulations; awareness of shipping inquiries and investigation rules; the Transportation Safety Board and its authority; appreciation of the composition of technical reports, damage reports, repair specifications; noting and extending protest, and procurement of an attorney.</p>

Note: The examination consists of seven essay and calculation questions of which five must be answered.  
Duration is three hours.



**10.7 Naval Architecture**  
**Examination number 114**

<b>ITEM</b>	<b>COLUMN</b>
1.	Inclining Experiment Purpose of the experiment; practical details of the procedure and resulting calculations; precautions to be observed to ensure a reliable and accurate result.
2.	Effect of Free Surface of Liquids Importance of this effect; development of the formula determining this effect, and the use of the formula in a given instance; practical limitations of the formula dependent on the unchanging extent of the free surface.
3.	Dynamical Stability Definition and understanding of the relationship between dynamical and static stability; the development of Moseley's formula for dynamical stability and calculations of dynamical stability at a specified angle of inclination by using the stability curve; understanding of cross curves and hydrostatic curves.
4.	Static Stability Stability and trim when grounding, docking, undocking or refloating; suitable conditions of stability and trim prior to docking; critical period and critical instant of docking; calculation of effective GM; calculation of the effect on a vessel's GM as a result of grounding on a falling tide.
5.	Shift in or Loss of Cargo Calculations of alteration of draft, trim and stability from shift in or loss of cargo.
6.	Stability in Negative GM Condition Development of wall-sided formula and its use in a given instance to determine the angle of loll and the value of associated GM.
7.	Effect of Beam and Freeboard on Stability Effect of increase or decrease of beam, considered in isolation, on initial value, maximum value, range and shape of the stability curve; effect of increase or decrease of freeboard, considered in isolation, on initial value, maximum value, range and shape of stability curve; effect of beam, block coefficient and speed on squat.
8.	Waves and Ship Motion Application of simple harmonic motion (SHM) analysis to the rolling of a ship with recognition of the limitation of this theoretical approach; application of the formula of this method for the rolling period with calculations; trochoidal wave theory as a close approximation of the behaviour of deep sea waves; virtual gravity and virtual upright and their relationship to true gravity and upright; application of formulas relating wave lengths to wave period and speed, as derived by the theory, motion and characteristics in shallow water and canal transits.
9.	Stability in Damaged Condition Meaning of the following terms used in the subdivision rules and their application: margin line, permeability, bulkhead deck, maximum permissible length, floodable length, curves of floodable length, and criterion of service. Knowledge of the general method employed in these rules, and calculations of trim and stability following an accidental flooding.
10.	Pressure in Liquids Calculation of total pressure on an immersed plane surface of a regular geometric form that is oriented parallel to, vertical to, or at an angle to the surface of the liquid; and the development of the formula locating the centre of pressure of the surface, with related calculations.
11.	Stress Diagrams Ability to understand and make use of the stress diagrams, as supplied, and to perform loading calculations including alternate hatch-loading shear stresses.

Note: The examination consists of descriptive questions and calculation exercises that permit the applicant some options.  
Duration is three hours.

**10.8 Engineering Knowledge**  
**Examination number 134**

<b>ITEM</b>	<b>COLUMN</b>
1.	Steam Boilers Knowledge of conditions for ideal combustion; fuel-oil burning arrangements; closed-feed system; boiler construction; and auxiliaries.
2.	Steam Turbines Knowledge of impulse and reaction turbines; requirements, precautions and procedures for warming through; applications for impulse and reaction turbines; axial thrust, including how axial thrust is taken up in reaction turbines; materials used for the major components of steam turbines; purpose of nozzles used in steam turbines.
3.	Gas Turbines Knowledge of principles of operation of a gas turbine; materials used in the major components of a gas turbine; marine-based applications of the gas turbine.
4.	Internal Combustion Engines Knowledge of the operation of a diesel engine and spark-ignition engine; differences between diesel and spark-ignition engines; fuel system including the fuel supply from the DB to the engine; indicator cards in IC engines and information that can be obtained from draw cards and timing diagrams in IC engines; turbocharging two- and four-stroke cycle diesel engines; cooling systems and lubricating systems; sea-water cooling systems, including problems associated with seawater when operating a vessel in ice; method of recirculating seawater and precautions to be taken; recommended sequence for starting, stopping and reversing of a large main diesel engine; turbo and diesel electric propulsion.
5.	Pumps Knowledge of the action, operation and application of centrifugal, displacement, gear pumps and positive-displacement reciprocating-piston type pumps in the machinery space or pump room of a modern ship.
6.	Drive Systems Knowledge of thrust and trailing blocks; reduction gearing; electromagnetic or hydraulic coupling for two or more main engines on One Shaft; flexible couplings; and dry clutch system.
7.	Refrigeration Knowledge of the fundamental principles of heat transfer with respect to vapour compression systems; the operating cycle of a vapour compression system; the operating cycle of an absorption type refrigeration unit; characteristics of refrigerants found in marine applications; arrangement details for insulation.
8.	Remote-Control Systems Knowledge of machinery space control systems (pneumatic, electric, hydraulic, electro-hydraulic); data logging utilizing digital systems; alarm and fail-safe systems in a machinery space and bridge instrumentation; bridge control systems (local and remote) with remote systems for application in navigation; computer-control loading systems on VLCC/chemical product carrier, self-unloading bulk carrier, LNG/LPG vessels.
9.	Hydraulic Systems Knowledge of the operation and application of pumps and motors and hydraulic drives commonly used in marine applications.

10.	<b>Vibration</b> Knowledge of major sources of vibration in ships; natural vibration, forced vibration and resonance; generation of harmonic motion and details of their compensation; effect of draft and speed; vibration monitors; critical speed and techniques used to counter critical speed in rotating machinery.
11.	<b>Air Receivers</b> Knowledge of the function, limitations and purpose of air receivers and fittings; dangers associated with and precautions that must be taken when using an air receiver.
12.	<b>Engine Power</b> Knowledge of the equation for power development, including the relationship between indicated power (IP), frictional power (FP) and brake power (BP); determine how mechanical efficiency is found for a diesel engine.
13.	<b>Propellers</b> Knowledge of the method of checking the pitch of a propeller; how the propeller transfers shaft power into thrust; relationship between pitch and power; operation of a typical CPP system.
14.	<b>Materials</b> Knowledge of effects of temperature on metals; principles of galvanic corrosion on a vessel; method of cathodic protection; method of impressed current system; how design and maintenance can alleviate considerable corrosion on marine vessels.
15.	<b>Vessels Operating in Ice</b> Knowledge of machinery operation considerations when navigating in ice; methods of freeing a vessel from ice utilizing pumping of tanks or flume system.


Note: The examination consists of descriptive questions that permit the applicant some options.  
Duration is three hours.

**10.9 Not in use.**

**10.10 General Seamanship**  
**Examination number 164**

<b>ITEM</b>	<b>COLUMN</b>
1.	<p>Ship Handling and Manoeuvring</p> <p>Practical knowledge of handling and manoeuvring a ship in unusual circumstances; retrieval of man overboard; procedures in ice, alone or in a convoy and movements to be expected by an ice breaker with reference to Transport Canada (TC) publication <i>Ice Navigation in Canadian Waters</i>; search and rescue procedures, responsibilities of the on-scene commander, with reference to MERSAR, CANMERSAR and TC publications; precautions to be taken in bad weather; tables of stopping distances, turning circle diagrams and derivation of appropriate information on ship characteristics; controlled-pitch propeller or propellers, transverse thrust, turning ahead or astern; vessel pivoting point when manoeuvring with headway and sternway; head reach and stern reach; the effect of cavitation and wake current; rudder force and the manoeuvring of twin screws; sail effect of vessel superstructure; berthing, unberthing and use of the water wedge in ship handling; locking and unlocking a vessel; anchoring to a single bower anchor; anchoring to a stern anchor; mooring to two anchors; mooring to buoy; turning a vessel short round; bank suction and cushion effect in narrow channels; the effect of shallow water resistance on ship behaviour; mooring lines and ground tackle in all circumstances; the use of tugs in manoeuvring.</p>
2.	<p>Handling and Managing a Ship Under Exceptional Circumstances</p> <p>Loss of or damage to rudder and the use of auxiliary means of steering; steering by screws; rigging jury rudder or jury steering gear, damage control in case of collision, grounding, fire, explosion or other accident; procedure when grounded and methods of refloating; procedure when beaching a vessel, procedure in case of wreck with emphasis on preservation of life; methods of abandoning a wrecked vessel; steps to be taken when disabled and in distress; taking and being taken in tow; rescuing crew of a disabled vessel or person in the water; manoeuvring in bad weather; heaving to and running before a sea; the dangers of being pooped; keeping head to sea; the use of oil in bad weather and rescue operations; keeping a disabled vessel out of trough and lessening lee drift.</p>
3.	<p>Dry-docking</p> <p>Procedures and precautions observed when dry-docking; effect of distribution of weight, dry-docking with a full cargo, and the use of bilge blocks, shores and cradles; dry-dock inspections, fire prevention, ship services, security and precautions to be observed in dry-dock; procedure to be followed prior and during refloating.</p>
4.	<p>Management and Law</p> <p>Duties, obligations and responsibilities of the master on vessels making international voyages in compliance with national and international rules and regulations including port state control; on first joining a vessel; official documents on board a vessel; issuance and understanding of standing, general, night and special orders; berthing and unberthing under all conditions; manoeuvring a vessel and assessing risks involved; under way, in port or at anchor under all circumstances and conditions; shipboard, local and general emergencies of any nature; verifying information on the ship's manoeuvring characteristics, determining approximation manoeuvring data and recording the vessel's manoeuvring peculiarities; setting and manning the watches according to regulations, ordinary practice of seafarers and during exceptional circumstances; organizing the crew and other persons for routine operation and emergencies of all kinds; maintaining equipment in good operating condition; dealing with non-Canadian ports and authorities.</p>
5.	<p>Regulations and Codes</p> <p>Collision Regulations with Canadian Modifications 1983; navigating procedures, practices, regulations and codes; safe working practices; the <i>Canada Labour Code</i>.</p>

Note: The examination is taken from the syllabuses for Watchkeeping Mate, Ship; First Mate, Intermediate Voyage; and Master, Intermediate Voyage orals, and the answers must reflect the additional experience, responsibilities and studies at the Master Mariner level.  
The examination is oral and practical.  
Duration as necessary.

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## CHAPTER 11 - MASTER, INTERMEDIATE VOYAGE, AND MASTER, LOCAL VOYAGE

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

11.1 (1) Every applicant for a certificate as Master, Intermediate Voyage, or Master, Local Voyage, shall

(a) **either**

(i) obtain:

- (A) a certificate of completion for the three-year course set out in TP 5562 from a school listed in TP 10655; and
- (B) a minimum of 18 months service when approval for graduation is granted to First Mate, Intermediate Voyage, as officer in charge of the watch as follows:
  - (aa) a minimum of 12 months service after obtaining a certificate as First Mate, Intermediate Voyage, as officer in charge of the watch on ships of least 200 tons gross tonnage making foreign voyages or voyages including a deep-sea passage, and
  - (bb) the remaining service made up of service after obtaining a certificate as Watchkeeping Mate, Ship, as officer in charge of the watch on ships of at least 25 tons gross tonnage making voyages extending beyond partially smooth water limits;

**or**


(ii) complete 24 months service as follows:

- (A) a minimum of 12 months sea service after obtaining a certificate as First Mate, Intermediate Voyage, as officer in charge of the watch on ships of at least 200 tons gross tonnage on foreign voyages or on voyages including a deep-sea passage where an applicant applies for a certificate as Master, Intermediate Voyage;
- (B) a minimum of 12 months sea service after obtaining a certificate as First Mate, Intermediate Voyage, or First Mate, Local Voyage, as officer in charge of the watch on ships of at least 200 tons gross tonnage on voyages extending beyond partially smooth water limit where an applicant applies for a certificate as Master, Local Voyage; and
- (C) the remaining service made up after obtaining a certificate as Restricted Watchkeeping Mate, Ship, or Watchkeeping Mate, Ship, on ships of not less than 25 tons gross tonnage making voyages extending beyond partially smooth water limits;

(b) obtain a medical certificate prescribed by the Crewing Regulations;

(c) obtain a certificate of completion for each of the following courses from a school or organization listed in TP 10655:

- (i) Marine Emergency Duties Course, Senior Officer (D) set out in TP 4957;
- (ii) Simulated Electronic Navigation Course Level II, set out in TP 4958; and
- (iii) Marine First Aid Advanced Course, set out in TP 13008;

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- (d) pass an examinations in each of the following subjects:
- (i) Navigation Safety;
  - (ii) Ship Management; and
  - (iii) Cargo;
- (e) pass a practical examination in Simulated Electronic Navigation Level II; and
- (f) pass an oral examination in General Seamanship.
- (2) Every applicant for a certificate as Master, Intermediate Voyage, shall
- (a) complete the requirements of paragraphs (1) (a) to (f); and
  - (b) pass an examination in each of the following subjects:
    - (i) Astro and Electronic Navigation;
    - (iii) Ship Construction and Engineering Knowledge; and
    - (iii) Meteorology.
- (3) Every applicant for a certificate as Master, Local Voyage, shall
- (a) complete the requirements of paragraphs (1) (a) to (f); and
  - (b) pass an examination in each of the following subjects:
    - (i) Ship Construction and Engineering Knowledge; and
    - (ii) Meteorology.
- (4) The holder of a certificate as Master, Home-Trade, or as First Mate, Foreign-Going, may be accepted for any examination for a Master, Intermediate Voyage, or Master, Local Voyage, certificate without further proof of service. The lawful holder of a certificate as Master, Inland Waters, may be accepted for any examination for a Master, Local Voyage, certificate without further proof of service.
- (5) Service with a First Mate, Home-Trade, or Second Mate, Foreign-Going, certificate will be accepted in lieu of service with a First Mate, Intermediate Voyage, certificate. Service with a First Mate, Inland Waters, certificate will be accepted in lieu of service with a First Mate, Local Voyage, certificate. In no case will less than 24 months of watchkeeping service while holding a certificate be accepted except in the case of graduates of an approved co-operative training scheme to First Mate, Intermediate Voyage, when not less than 18 months of watchkeeping service while holding a certificate will be accepted.
- (6) Service while holding a Master, Home-Trade, 350 Tons, or Master, Inland Waters, 350 Tons, certificate will be accepted in lieu of service with a First Mate, Intermediate Voyage, or First Mate, Local Voyage, certificate for a Master, Intermediate Voyage, or Master, Local Voyage, certificate, respectively. In all other respects, the service must meet the requirements of subsection (5), and the applicant must hold or be eligible to receive a First Mate, Intermediate Voyage, or First Mate, Local Voyage, certificate as appropriate.

11.2 (1) Not in use.

(2) Not in use.

## PART II - EXAMINATIONS

11.3 The following table lists the examinations for Master, Intermediate Voyage, and Master, Local Voyage, certificates, the watchkeeping service required before each may be attempted, and other requirements.

A. Required for both Master, Intermediate Voyage, and Master, Local Voyage, certificates.

<b>Examination</b>	<b>Qualifying Watchkeeping Service While Holding First Mate, Intermediate Voyage, or First Mate, Local Voyage, Certificate</b>	<b>Other Requirements</b>
SIM 2 Chartwork and Pilotage	NIL	Must have passed SIM 1
062 Navigation Safety	12 months	Unless otherwise approved, this exam shall be taken during the same week and in the same examination centre as 163.
092 Ship Management	Nil	WKMSR or WKMS certificate
123 Cargo	Nil	WKMSR or WKMS certificate
163 General Seamanship	12 months	All other exams must have been passed before attempting 163.

B. Additional examinations for Master, Intermediate Voyage, only.

<b>Examination</b>	<b>Qualifying Watchkeeping Service While Holding First Mate, Intermediate Voyage, Certificate</b>	<b>Other Requirements</b>
052 Astro & Electronic Navigation	Nil	WKMS Certificate
073 Meteorology	Nil	WKMS Certificate
133 Ship Construction and Engineering Knowledge	Nil	WKMSR or WKMS Certificate

C. Additional Examinations for Master, Local Voyage, only

<b>Examination</b>	<b>Qualifying Watchkeeping Service While Holding First Mate, Intermediate Voyage, or First Mate, Local Voyage, Certificate</b>	<b>Other Requirements</b>
073 Meteorology	Nil	WKMSR or WKMS Certificate
132 Ship Construction and Engineering Knowledge	Nil	WKMSR or WKMS Certificate

11.4 Certificate as First Mate, Foreign-Going; Master, Home-Trade; and Master, Inland Waters, will be credited as passes against examinations for Master, Intermediate Voyage, and Master, Local Voyage certificates as listed in Appendix F.

### **PART III - VALIDITY OF CERTIFICATES**

11.5 (1) The Master, Intermediate Voyage, Certificate is valid as:

- (a) first mate of a foreign-going vessel;
- (b) master of an intermediate voyage vessel;
- (c) master of a local voyage vessel; and
- (d) master of a minor waters vessel.

(2) The Master, Local Voyage, Certificate is valid as:

- (a) master of a local voyage vessel; and
- (b) master of a minor waters vessel.



**PART IV - SYLLABUSES OF EXAMINATIONS**

**11.6 Simulated Electronic Navigation**

**Examination number SIM 2**

Companion to Sections 14.5 and 18.5

ITEM	COLUMN
1.	The syllabus of the examination is presented in TP 4958, Simulated Electronic Navigation Courses.
2.	Preparation of Passage To be completed ahead of simulator examination.
3.	Simulator Exercise (duration two hours) Includes items 2, 3, and 4; passage about 20 nautical miles; parallel indexing, including wheel over; complex collision avoidance; course alteration for navigational purposes; all available electronic navigation.
4.	Navigator Notebook Navigator notebook to include chart number and courses for voyage, course alteration and wheel over positions, position of danger areas in the proximity of the intended track, traffic CIPs and distance to next CIP; position where a change of machinery status will be required; parallel indexing information or information on the elements used to construct an ARPA graphic map; radar datum chosen for PI; time of HW/LW and information on tidal currents; pilotage information, if applicable; total distance and steaming time at proposed speed.
5.	Manoeuvre a Ship Manoeuvring a ship, stopping, mooring, and anchoring.
6.	Emergencies Emergencies may be introduced but not at a critical moment during the exercise.

Note: The examination consists of simulated exercises conducted by Marine Safety.  
Time for passage planning one and a half to three hours.  
Total duration four to five hours.

**11.7 Navigation Safety**

**Examination number 062**


Companion to Section 15.10

ITEM	COLUMN
1.	Navigation Safety Practical application of rules from an interpretation in multi-ship navigational situations; Regulations for the Prevention of Collisions with Canadian Modifications; multi-ship or multi-factor navigational situations involving more than one rule, more than one factor of radar annex; Ship Routing Regulations; inconsistencies between regulations, ordinary practices of seafarer; application of STCW Code section A-VIII/2; Notice to Mariners – Annual Edition.

Note: The examination consists of a screening test and oral examination.  
Duration approximately one and a half hours, as necessary.

**11.8 Ship Management**  
**Examination number 092**

<b>ITEM</b>	<b>COLUMN</b>
1.	<i>Canada Shipping Act (CSA)</i> Knowledge of CSA relating to engagement and discharge of seafarers; rights of seafarers; maintenance of discipline; registration of ships; duties and powers of port wardens; wrecks; salvage and casualties; provisions; health and accommodation; distressed seafarers; fatal accidents; steamship inspectors; VTS regulations.
2.	<b>Pilotage</b> Knowledge of the <i>Pilotage Act</i> , including compulsory pilotage; pilot's responsibility to master; master relieving pilot; when a pilot shall not pilot; pilotage exemption or waiver; transit through major canals such as Suez and Panama, including tonnage measurements and boarding arrangements.
3.	<b>Customs House and Immigration</b> Knowledge of customs house and immigration procedures including: inward report; non duty paid goods; short landed or overloaded merchandise; crew declaration forms; outward report; Shipping Master's Certificate; producing certificates of competency; passports, visas and their use in foreign ports; the <i>Coasting Trade Act</i> , including coasting licenses, requirements and procedures for receiving a coasting license; revoking of coasting license; implications of change of ownership, change of flag or both; procedure on change of command.
4.	<b>Quarantine Regulations</b> Knowledge of the <i>Quarantine Act</i> , including purpose and application of quarantine regulations to shipping; Ship Fumigation Regulations; need for and precautions for vessel fumigation; role of Agriculture Canada; De-Rat Certificate and De-Rat Exemption Certificate.
5.	<i>Marine Liability Act</i> Knowledge of the implications of a seaworthy ship; rules relating to bills of lading, risks, responsibilities and liabilities, rights and immunities, special conditions, limitations on the application of rules, limitation of liabilities, electronic documentation and carriage contracts; Hague Rules and Cesser Clause.
6.	<b>Tonnage</b> Knowledge of rules for measurement of tonnage under CSA and IMO; requirement of tonnage certificate for registering a vessel; requirement for Panama and Suez tonnage measurements.
7.	<b>Charter Parties and Bills of Lading</b> Knowledge of types of bills of lading, contents and their functions; functions of a mate's receipt, cargo manifest/shipper's receipts; implications of electronic documentation ; the master's right to insert marginal clauses; letters of indemnity; the master's authority to sign bills of lading; Charter Clause, New Jason Clause, and <i>Jones Act</i> . Knowledge of charter parties, including interpretation of various agreements; on-hire and off-hire procedures; common-law warranties; cancelling date; notice of readiness; lay days, running days, Sundays, holidays and weather working days; demurrage and despatch; freight; deviation; disputes and claims as they relate to laytime and demurrage.
8.	<b>Noting and Extending Protest</b> Knowledge of the master's obligations, and circumstances when it is advisable to note and extent protest.
9.	<b>Labour Relations</b> Knowledge of the application of the <i>Canada Labour Code</i> to shipping; collective bargaining process; rights and limitations of access to union and non-union vessels; role of collective agreements in labour relations; ILO.
10.	<b>Marine Insurance</b> Basic knowledge of the marine insurance contract and its relationship to the master's responsibility to owners and underwriters; general and particular averages; policies in marine insurance; P & I clubs, their functions and responsibilities; financial responsibility certificates; limitation of liability; salvage agreements; pollution policies for tankers and non-tankers; function of classification societies; types of surveys; survey procedure related to vessel classification.


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11.	Legislation Affecting Vessel Operation Knowledge of Shipping Casualty Reporting Regulations; Shipping Inquiries Investigation Rules; Potable Water Regulations; Ship's Crew Food and Catering Regulations; Crewing Regulations; Home-Trade, Inland and Minor Water Voyage Regulations; Oil Pollution Prevention Regulations and MARPOL; <i>Arctic Waters Pollution Prevention Act</i> ; <i>Environmental Protection Act</i> ; Navigation Appliance Regulations; Charts and Publication Regulations; Load Line Regulations; Safety and Inspection Certification Regulations; <i>Merchant Seamen's Compensation Act</i> .
12.	Legislation Concerning Controlled Substances Knowledge of employee assistance program; employee rights and testing process; pre-employment testing; documentation of medical treatment and administration of controlled medication.
13.	Topics Relevant to Industry Knowledge of IMO conventions and subsequent legislation; Canadian Marine Advisory Council and its function; Standards of Training Certification and Watchkeeping and continued proficiency; SOLAS and GMDSS and related implementation; role of IMO and International Hydrographic Office (IHO); Electronic Chart Display and Information System (ECDIS); ILO safe manning and impact on Port State Control.
14.	Management of Vessel Knowledge of management of vessel including leadership, decision making, problem solving, communication, goal setting, systematic approach to vessel maintenance, vessel safety and environmental protection, management of personnel, cargo and vessel; conflict of interest and rights of accused; services provided by consuls abroad; IMO, ILO, SOLAS, MARPOL, and contribution of such organizations in establishing Port State Control authority; <i>Ports and Harbours Act</i> and by-laws; conduct of vessels under foreign jurisdictions, including infractions, convictions, liens, vessel detention and arrest, and procurement of legal advice; maintenance regime for inspection, deployment, and testing of safety-related devices, machinery and equipment; maintenance logs; documentation and record keeping; mandate and powers of the TSB; casualty investigation; reports and process for implementation of safety practices; <i>Workers' Compensation Act</i> , including reporting procedure and witnesses; penalty for non-compliance.
15.	Salvage Knowledge of master's responsibilities in the event of salvage and salvage agreements; Lloyd's Standard Form; justifiable deviation; limitation of liability; salvage associations; implications of CP/BL before taking a vessel in tow.
16.	Emergencies Knowledge of masters obligations and responsibilities in the event of emergencies, collision, distress, search and rescue; knowledge of search and rescue procedure as detailed in CANMERSAR.
17.	Vessel Reporting System and Services Awareness of vessel traffic services and reporting system in eastern, western and arctic waters of Canada (ECAREG, NORDREG); master's obligation to report; traffic schemes and IMO approval process; AMVER and MAREP reporting systems.
18.	<i>Criminal Code</i> Knowledge of the provisions of the <i>Criminal Code</i> that affect mariners; Minister's right to cancel or suspend certificate of competency; summary convictions and indictable offences.
19.	Agents Knowledge of appointment of agents; authority and duties of an agent; types of agents; scope of services provided; sub-agent and delegation of authority.
20.	Port of Refuge Knowledge of the business aspects of putting into port with damaged ship or cargo; justifiable deviation; general average; note of protest; right to extend; differences between general and particular average; survey of cargo; certificate of seaworthiness; survey procedure and associated documentation; underwriters; tender clause; conduct of vessel under foreign jurisdiction; procurement of legal advice; process and procedure, including incident investigation and analysis; technical report; damage report and repair specifications.

Note: The following open-book resources will be allowed in the examination room:  
*Canada Shipping Act*  
*Pilotage Act*  
*Carriage of Goods by Water Act*  
The examination consists of a written test.  
Duration is two hours.


**11.9 Cargo**  
**Examination number 123**

ITEM	COLUMN
1.	<p>Bulk Grain and Timber Deck Cargoes</p> <p>Preparation of vessel for Department of Agriculture authorization to commence loading; presentation to port warden; understanding and application of the grain cargo regulations, Canadian grain rule equivalent and Chapter VI of SOLAS 1974 (amended 1983) for the safe stowage, security and carriage of various grain cargoes; ability to draw up a proposed loading plan and complete the stability calculation form for ocean and sheltered waters voyages for port warden's approval prior to commencement of loading.</p> <p>Preparation, stowage and securing of vessel to load timber cargoes including logs, pit props, saw lumber (loose or packaged) below deck, on deck and on deck of vessel having timber loadlines; understanding and application of the timber cargo regulations and Canadian code of safe practices for ships carrying timber deck cargoes for the safe stowage, stability, securing and carriage of timber, height of cargo, protection of the crew, and safe practices; lashings, their tests, markings and certifications; water absorption and ice accretion.</p>
2.	<p>Safety and Precautions</p> <p>Safety aspects of shipment conditions; handling, safe stowage and carriage of bulk cargoes including ores, concentrates and materials as stated in code of safe practices for bulk cargoes; definitions, precautions, hazards, tests, specifications, contamination, corrosion; hazards of improper weight distribution resulting in structural damage; improper stability or reduction of stability during voyage; angle of repose, moisture migration, saturated ores and spontaneous heating.</p> <p>General precautions relating to stability; effects of high density bulk cargo; hold preparation, including bilges, pipes and service lines; ventilation systems, dust intakes; moisture content, transportable moisture limit, sampling conditions; description of tests, certificates and questionnaire.</p> <p>Preparation of proposed loading plan; stability data and submission to port warden for approval prior to loading; clearance from port warden on completion of loading and before sailing.</p>
3.	<p>Loading, Securing and Carriage of Containers</p> <p>Containers, international dimensions, main container types, materials used in their construction, periodic inspections and certification procedure, various container handling methods; loading and securing arrangements on various types of vessels including container ships, ferries, ro-ro ships, oil and bulk ore ships, conventional ships and converted bulk carriers; securing and lashing systems, fittings provided, materials used, special strengthening of decks and permissible height of containers on deck. Safe stowage and securing of containers on decks of vessels that are not specially designed and fitted for the purpose of carrying containers.</p>
4.	<p>Refrigerated Cargoes</p> <p>Trading patterns and use of specialized refrigerated ships, general cargo ships fitted with refrigerated lockers; refrigerated containers and other modes; special carriage requirements of various refrigerated cargoes and separation of non-compatible cargoes; preparation and inspection procedure of compartments, loading, carriage and discharging arrangements, stowage principles and safe carriage requirements; special trade and commodity requirements, shipper's instructions and joint deck and engine department responsibilities for safe carriage; need for maintenance of accurate records of compartment temperatures at all times; palletised and unitised refrigerated cargoes; conditions for loading, stowage, carriage and discharging arrangements, malpractice in handling refrigerated cargoes; care and preparation of refrigerated compartments after discharge; types of refrigeration systems used and advantages and disadvantages of each.</p>

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5.	<p><b>Livestock</b>  Definition of livestock; patterns for the transportation of livestock; specialized ships, ships converted for the purpose, additional manning and ventilation requirements.  Safety and human conditions for carriage of livestock; preparation, inspection, certificates; pens, cages, stalls; loading and discharging method and equipment used; en route care, feeding, water, sanitary facilities, illness, overcrowding, segregation, protection from injury, undue exposure to weather and sea-sickness provisions.  Transportation of animals entering or leaving Canada by sea carriers; disposal of injured animals, carriage of veterinary drugs; maintenance of reports, records, permits, licenses and list of quarantine ports in Canada; reports on completion of voyage.</p>
6.	<p><b>Bulk Liquid and Gas Cargoes</b>  Bulk liquids: ship types; tank types, installation, design and construction; requirements for the carriage of various liquid cargoes; ship arrangement, cargo segregation, accommodation spaces, cargo pump rooms, access to cargo tanks and other spaces in the cargo tank area; cargo transfer piping arrangements, cargo transfer control systems, cargo hoses and pipe lines; tank vent systems, types of tank vent systems; cargo temperature control, additional requirements; material of tank construction and coatings; gauging ullage; vapour detection, requirements for individual substances; ventilation in cargo handling spaces, spaces normally entered, spaces not normally entered; environment control; ballast tank arrangements; bilge pumping arrangements, pumps and pipe line identification; electrical requirements, installations in pump rooms, cargo tanks, open deck, bonding and requirements for individual substances; fire protection, fire safety arrangements, inerting, inerting systems, fire extinguishing systems; tank filling; personal protection requirements; sample taking; maximum allowable quantity per tank; tank washing methods, tank entry; tank heating; personnel training and cargo information; overflow control.  Gases: ship characteristics and cargo containment; gases and their properties; potential hazards to health, toxicity, acute and chronic effects of toxicity, cryogenic and toxic effects on skin, IMO first aid guide; flammability and explosion, sources of ignition, insulating flange; environment hazards; re-liquefaction and boil-off control; instrumentation, liquid level gauges, ultrasonic gauges etc., level alarm and automatic shut down, temperature-monitoring devices; safe practices, procedures and precautions for entry into enclosed spaces; gas monitoring equipment, fixed and portable; personnel safety equipment, clothing and personal protection; shipboard emergency plan, organization and planning; personnel emergencies; cargo spillage; cargo overflow; cargo handling equipment; emergency shut-down; overflow control.</p>
7.	<p><b>Damaged Cargo</b>  Cargo damage associated with the history of the voyage, discovery of such damage at intermediate ports or at final port; damage, shift or loss of cargo discovered at sea with survey being held upon arrival at next port; damage, shift or loss of cargo that is so severe as to endanger or damage the ship, necessitating deviation from voyage and putting into the nearest port to effect necessary corrections or repairs.  Technical aspects of putting into port; appropriate log entries on discovery of cargo damage and steps taken to rectify the situation; advising the owners; deciding on a port of refuge and requesting entry from port authorities; noting of protest with right to extend; informing classification society and their agent and underwriters; declaration of general/particular average; arrangement of survey; correction of the problem and necessary repairs etc; obtaining a certificate of seaworthiness or interim certificate of class after due inspection; maintenance of all records of times, positions and quantities of fuel, fresh water and stores at the time of deviation; expenses to the account of all parties involved, details of expenses to be noted; informing owners, obtaining clearance and departing in the usual manner.  Survey of cargo if no recognized surveyor available and purpose of survey.</p>

8.	<p>Practical</p> <p>Practical considerations in loading, carrying and discharging cargo on container ships, self-unloaders, ro-ro vessels, liquid gas carriers, oil and chemical tankers, and passenger vessels.</p> <p>Container ships: loading of standard-size containers handled by methods that, in turn, depend upon the operation and method by which the container is strengthened; protection of cargo, reduction in pilferage, speed of loading and discharging increased for a quicker turn around; effect of length of bulky cargo in container. Self-unloaders: tackle requirements, application to self-unloaders; code of safe working practices for self-unloading vessels.</p> <p>Ro-ros: tackle requirements, application to ro-ro ships, specially-designed terminal to load and unload; advantages, greater net cargo capacity and greater ship utilization. Liquid gas carriers: design dependent upon the type of cargo to be carried, conditions of carriage, fully-pressurized semi- refrigerated or fully-refrigerated, type of trade and terminal facilities; cargo containment systems, independent, membrane, semi-membrane, integral or independent tank type; liquid natural gas (LNG) carriers generally transport LNG at its atmospheric pressure boiling point of -162° C; gas carriers not permitted to have a pump room, submersible cargo pumps used for cargo discharge; cargo tanks not used for ballast purposes, separate ballast tanks; gas tankers, fixed water spray system for fire protection, covering cargo tank domes, fitted dry powder installation for cargo area fires.</p> <p>Oil and chemical tankers: loading practices; physical and chemical properties of crude oil, stabilized crude, sour crude and spiked crude; saturated vapour-pressure, vapour/temperature relationship, boiling point, influence of pressure on boiling point temperature, Reid vapour-pressure, flash point, flammable range, upper and lower flammable limit, relationship between flash point, and lower flammable limit; principle of controlled cargo tank atmosphere; static electricity during loading, discharging, tank washing, gas freeing, clearing lines, electrical storm, flammability and explosion hazards, gas concentration at deck level, tank coating in relation to gas retention; piping arrangement, ring main and free flow systems; practical operation of cargo pumps, drop line, eductors; control equipment for drainage; pre-planned loading/discharging procedure; safety considerations, checklists, ship/shore liaison; communication; general precautions; inerting and purging operations; ship to ship transfer procedure; tank cleaning, static generation, tank cleaning in controllable atmospheres; precautions, procedures, tank cleaning in inerted atmospheres, action to be taken in case of inert gas system failure, fixed tank cleaning systems; crude oil washing system, cargo pump, eductors, checks required before crude oil washing, aborting crude oil washing; oil pollution sea and air, chemical dispersing agents and their use; load on top and crude oil washing; ballast after crude oil washing, tank inspection after crude oil washing; pumping arrangements, remote controls for pumping equipment; action in event of fire, grounding spillage and failure of services essential to cargo; portable and fixed measuring instruments, their function, interpretation and calibration of combustible gas indicators and oxygen analyzers, toxic gas determination, procedures for entry into pumprooms, tanks and gas dangerous spaces, enclosed space entry permits and check lists; tank rescue equipment; protective clothing and equipment, resuscitation equipment; Toxic Limit Value, acute and chronic effects of toxicity, health hazards, effects of crude oil, distillates, sulphuric acid (H<sub>2</sub>SO<sub>4</sub>), aromatic and leaded fuels; mooring operations, ship/shore and pollution prevention check list.</p> <p>Passenger Ships: regulatory requirements for the carriage of radioactive substances, corrosive, poisonous, dangerous goods, (solids or liquids), gases (compressed, liquefied or dissolved under pressure), inflammable (solids or liquids), oxidizing substances; refrigerated goods, automobiles and livestock in small or large quantities in bulk or container on ships carrying berthed or unberthed passengers; classification, documentation, packaging, marking, labelling, segregation and stowage requirements; requirements for ventilation, fire prevention, fire fighting and safety of passengers and crew.</p>
9.	<p>Voyage Planning:</p> <p>Loadlines and seasonal loadline zones act as a safety factor for seafarers and ships to protect against overloading at the time of planning a voyage, at its commencement, during the voyage and on arrival at the destination port.</p>

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10.	<p>Law</p> <p>Grain Loading Regulations, Timber Deck Cargo Code and Regulations, Code of Safe Practices for Solid Bulk Cargoes, Deck Cargo Safety Code, <i>Safe Container Convention Act</i>, International Maritime Organization Dangerous Goods Code; International Maritime Organization Oil Pollution Convention 1954 and amendments 1961, 1969, 1971; Marine Pollution Convention (MARPOL) 1973, 1979 and Protocol; Clean Seas Code, Dangerous Goods Shipping Regulations; <i>Animal Disease and Protection Act and Regulations</i>; Chapter VI of Safety of Life At Sea Convention (SOLAS) 1974 (amended 1983); <i>International Chamber of Shipping Oil Tanker Safety Guide</i>; <i>International Chamber of Shipping Guide to Helicopter Operations</i>; classification societies; independent insurance surveys, acceptance, safe loading, stowage and carriage of dangerous goods; safety and emergency procedure for ships carrying dangerous goods.</p> <p><i>Canada Shipping Act</i>; port wardens, duties and powers, services, inspection, documentation; cargo surveys, disputes, damaged cargo.</p>
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Note: The examination consists of a written test.  
Duration is two hours.

**11.10 General Seamanship**  
**Examination number 163**  
Companion to Section 15.13

ITEM	COLUMN
1.	<p>Manoeuvring Information</p> <p>Tables of stopping distances; turning circle diagrams and derivation of appropriate information of ship characteristics.</p>
2.	<p>Ship-Handling, Routine</p> <p>Fixed- or controlled-pitch propeller or propellers, transverse thrust, turning ahead or astern; vessel pivoting point when manoeuvring with headway and sternway; head reach and stern reach; effect of cavitation and wake current; rudder force and manoeuvring of twin screws; sail effect of vessel superstructure; berthing, unberthing and use of the water wedge in ship handling; locking and unlocking a vessel; anchoring to a single bower anchor; anchoring to a stern anchor, mooring to two anchors; mooring to buoy; turning a vessel short round; bank suction and cushion effect in narrow channels; the effect of shallow water resistance on ship's behaviour; use of mooring lines and ground tackle in all circumstances; the use of tugs in manoeuvring.</p>
3.	<p>Ship-Handling, Exceptional</p> <p>Practical handling and managing a ship in exceptional circumstances, loss of or damage to rudder and the use of auxiliary means of steering; steering by screws; rigging jury rudder or jury steering gear; damage control in case of collision, grounding, fire, explosion or other accident; procedure when grounded and methods of refloating; procedure when beaching a vessel; procedure in case of wreck with emphasis on preservation of life, methods of abandoning a wrecked vessel; steps to be taken when disabled and in distress; taking and being taken in tow; rescuing crew of a disabled vessel or person in the water; manoeuvring in bad weather, heaving to and running before a sea; dangers of being pooped; keeping head to sea; the use of oil in bad weather and rescue operations; keeping a disabled vessel out of trough and lessening lee drift.</p>
4.	<p>Ship-Handling, Unusual</p> <p>Practical handling and manoeuvring a ship in unusual circumstances; retrieval of man overboard; procedures in ice, alone or in convoy, and movements to be expected by an ice breaker with reference to Transport Canada publication <i>Ice Navigation in Canadian Waters</i>; search and rescue procedures, including the responsibilities of the on-scene commander, with reference to MERSAR, CANMERSAR and Transport Canada publications; precautions to be taken in bad weather.</p>

5.	Dry-Docking Procedures and precautions observed when dry-docking, effect of distribution of weight, dry-docking with a full cargo, use of bilge blocks; dry-dock inspections and precautions to be observed in dry-dock; procedure to be followed prior to and during refloating.
6.	Duties and Responsibilities of the Master On first joining a vessel; official documents on board a vessel; issuance and understanding of standing, general, night and special orders; berthing and unberthing under all conditions; manoeuvring a vessel and assessing risks involved; under way, in port, or at anchor under all circumstances and conditions, shipboard, local and general emergencies of any nature; verifying information on the ship's manoeuvring characteristics, determining approximate manoeuvring data and recording the ship's manoeuvring peculiarities; setting and manning the watches according to regulation and during exceptional circumstances; organizing the crew and other persons for routine operation and emergencies of all kinds; maintaining equipment in good condition.
7.	Regulations Collision Regulations with Canadian Modifications 1983; Canadian Buoyage System; Code of Nautical Procedures and Practices; <i>Canada Labour Code, Part II</i> ; WHIMIS.

Note: This examination is oral.  
Duration as necessary.

#### 11.11 Astro and Electronic Navigation Examination number 052

ITEM	COLUMN
1.	Position Fixing Systems Principles of position fixing by Decca and Loran; measurement of difference of distance from two or more fixed points; the use of radio waves to obtain difference of distance by measurement of time and phase difference; generation of hyperbolic curves, families of curves and lattices on charts, curves when fixed points are a short distance apart; causes and nature of fixed and variable errors of the Decca and Loran systems.
2.	Radar Description of the principles of radar; outline of a radar system using a block diagram to illustrate the essential functional units required in radar equipment, and a description of the functions of those units; characteristics of a radar set that determine the quality and accuracy of navigational information, and measurement at sea of the set's relative standards of performance; effects of operational controls that affect performance; effects and recognition of sub-standard performance; effects of improperly adjusted controls; capabilities and limitations of radar, factors and their effects that may limit the detection of objects and the display of echoes.
3.	Echo Sounders Description, with aid of block diagrams, of a typical navigational echo-sounding system indicating functions and characteristics of units; visual indicators and recorders, phased scales, transmitters and receivers; sounding repetition rates, accuracy of soundings, maximum and minimum depths in navigational sounders; interference on display; internal and water noises.
4.	Direction Finders Description, with the aid of a block diagram, of the rotating- and fixed-loop systems; advantages and disadvantages of the rotating- and fixed-loop systems and the manual and automatic systems; compass stabilization; instrument errors that affect the accuracy of direction finding (D/F) equipment; effects of ship super structure and aerials on bearing accuracy, quadrantal and semi-circular errors and their compensation; relationship between frequency and effect of rigging and aerials; calibration; capabilities of D/F equipment as an aid to navigation; use of independent and synchronized beacons; classification of bearings; propagational errors.



5.	<b>Magnetic Compass</b> The laws of magnetism; terrestrial magnetism and the magnetic elements of the earth's field; construction of the magnetic compass and binnacle; effect of the ship's magnetic field on a magnetic compass; the components P, Q and R, their separate effects and their application to compensation of a ship's magnetic field; approximate coefficients A, B, C, D and E and their use; methods of obtaining a table of deviations, analysis of the table to obtain approximate coefficients; general principle of compass correction and methods of correcting for coefficients B, C and D; cause and effect of retentive magnetism and Gaussing error; siting of compasses, with emphasis on the proximity of magnetic material and appliances; causes, effects and corrections of heeling error; effect of heeling error magnets on soft-iron correctors; use of vertical force instruments; principles of magnetic transmitting compasses and repeaters; compensation and adjustment of magnetic compass using the deviascope or instructional binnacle.
6.	<b>Gyro Compass</b> Properties of the free gyroscope; relationship between applied force and precession; effect of the earth's rotation on a free gyroscope, drift and tilt; errors associated with gyro compasses; latitude, course and speed error, ballistic deflection, rolling error; latitude, course and speed correction; fundamental classes of gyro compass according to control and dampening, operation of common modern types of gyro compasses; principles of operation of repeater systems, course recorders and automatic pilots, limitation and use.
7.	<b>Navigation Space</b> Voyage planning with respect to: available aids, radar, conspicuous objects, low and ice-masked coast lines; fuel consumption, economical speeds, estimate of minimum fuel consumption to complete a given voyage; propeller slip problems and effect on fuel consumption; principle used in HO/NP401 short method and ex-meridian tables; errors, most probable position; errors in position lines; navigation in high latitudes; rapid convergence of meridians; extreme refraction and false horizons; low horizontal intensity of the earth's magnetic field; chart projections, including non-triangulated chart and lack of detail; loss of accuracy in plotting; gyro compass limitations; extended twilight; majority of observations being low altitude; importance of maintaining DR; decreasing importance of error in time; front and back altitudes to offset refraction; extreme tidal conditions in high latitudes; slow rate of change of altitude in relation to azimuth; general consideration; maintaining track and estimated position; determination of the most suitable heavenly bodies; approximate setting on a sextant to observe any heavenly body; calculation of EP in heavy weather; Doppler and Inertial methods of measuring DR; and global positioning system (GPS).

Note: The examination consists of a written test, including calculations.  
 Duration is three hours.  
 A practical test on the deviascope during which the applicant will be examined orally on item 5, duration as necessary.

## 11.12 Meteorology

### Examination number 073

Companion to Sections 14.6, 18.8, 19.9 and 20.10

ITEM	COLUMN
1.	<b>Chemical Composition of the Atmosphere</b> Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust, hygroscopic particles, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).
2.	<b>Vertical Structure of the Atmosphere</b> Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parhelion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.
3.	<b>Transfer of Heat</b> Radiation, conduction, convection, and turbulence.

4.	Temperature Related to the atmosphere and the earth; calorie, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.
5.	Atmospheric Moisture and Changes of State Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.
6.	Atmospheric Stability Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke; causes of subsidence; effects of substances, compression heating, evaporation.
7.	Fog Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.
8.	Clouds Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.
9.	Precipitation Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convective, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.
10.	Lightning Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.
11.	Pressure and Pressure Systems Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isobars, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depression, polar front low, thermal depression, vertical instability depression (e.g., tropical revolving storm); straight isobars, effect of straight isobars on wind, on weather.
12.	Winds Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, pressure and weather characteristics associated with monsoons in the Indian Ocean and monsoons in the Chins Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevals, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.
13.	Air Masses Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical, equatorial.
14.	Fronts Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).

15.	Families of Depressions or Extra-Tropical Cyclones Formation between two air masses, life cycle and movement cross section, associated weather, frontogenesis, frontolysis, secondary depressions.
16.	Waves and Swells Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, description, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.
17.	Oceanic Currents and Effect on the Climate Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; knowledge of the various currents of the world.
18.	Tropical Revolving Storms Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: the North Atlantic, the western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.
19.	Ice Formation and Decay Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs; presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.
20.	Ice Detection and Reporting Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Canadian Waters and Manice</i> , ice climatology and ice operations, ice navigation in Canadian waters; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, seawater temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.
21.	Weather Messages and Codes International analysis in code, definition, interpret messages; plot pressure systems, fronts, isobars; forecast 12-24 hours, pressure, wind, sea state, visibility, clouds, weather changes; knowledge of services available; <i>Radio Aids to Marine Navigation, Atlantic and Great Lakes Pacific</i> ; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weatherfax, weather, satellite, sea state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weatherfax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts; ability to forecast the following for 12-24 hours: pressure, wind, sea state, visibility, clouds, weather changes.
22.	Optimum Weather Routing Advantages, reduce storm damage, save time, meet special requirements; methods, on board ship, through shore-based firm, through government departments; climatological routing, in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long-range progs are available.

23.	<p>Requirements</p> <p>Application of ship's performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship performance curves and locus positions; factors that require a continuous updating and revision of weather routing procedures.</p>
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Note: The examination consists of a written test comprising multiple-choice and descriptive questions.  
Duration is three hours.

### 11.13 Not used

### 11.14 Ship Construction and Engineering Knowledge Examination Number 133

ITEM	COLUMN
1.	<p>Loadline Conditions of Assignments</p> <p>Knowledge of conditions of assignments to vessels; requirements for vessels to undergo periodical surveys for compliance with the conditions.</p>
2.	<p>Tonnage Rules</p> <p>Knowledge of the method of calculating GRT and NRT under the old and new tonnage regulations.</p>
3.	<p>Ship repairs</p> <p>Knowledge of repair specifications and preparations to facilitate repairs to ship's structure.</p>
4.	<p>Navigation in Ice</p> <p>Knowledge of vessel features that provide adequate strengthening for navigation in ice; problems encountered by cooling system and precautions to be taken to prevent occurrence of cooling problems.</p>
5.	<p>Structures and Construction Methods</p> <p>Knowledge of structural stresses; difference between stress and strain; sheer force and bending moments and interpretation of graphical solutions; types of welded joints; faults; methods of inspection and testing for detection of faults; types of bow and stern construction from profiles; components that make up the fore and after end of a vessel; double-bottoms construction and naming of parts; reasons for extra strengthening; tests conducted before putting into service; watertight and fire resistant deck and bulkheads; requirements for decks and bulkheads to be classed as watertight and/or fire resistant; requirements for doors to be classed as watertight; importance of subdivision in ships for fire protection; closing and sealing appliances used in decks and bulkhead penetrations to maintain watertight/fire tight integrity; special construction features of deep tanks; special closing arrangements for deep tanks to maintain watertight integrity; fittings on hatchways designed to maintain watertightness; special construction features of deck fittings to maintain weather and watertightness of decks; difference between superstructure and deck house; special construction requirements of superstructures and deckhouses; distinguishing construction features of ro-ro vessels and methods to maintain their hull strength and watertightness; classes of icebreakers, special construction features of icebreakers and construction requirements for a vessel to be classed as an icebreaker; special construction features of catamarans and construction methods employed to ensure adequate strength is maintained; special construction features of container and hatchless container ships, special strengthening arrangements to provide longitudinal strength, additional strengthening in double bottoms to compensate for point loading of tiers of containers; special construction features of passenger/vehicle ferries, special arrangements in passenger ferries to limit flooding and the spread of fire as required by SOLAS; special construction features of liquefied gas carriers and identification of various codes related to their construction and equipment; special construction features of VLCCs and special methods employed to ensure adequate longitudinal and transverse strength; special construction features of OBOs.</p>
6.	<p>Shipyards</p> <p>Knowledge of the procedures and practices used by shipyards for the construction and repair of vessels; necessity of dock and sea trials for vessels.</p>

7.	<b>Stresses in Ships</b> Knowledge of predominant stresses when unloading bulk carriers with grabs and by uneven off-loading; predominant stresses on bulk carriers when loading concentrates or other bulk products at a high rate; uneven distribution of cargo; heavy weights on deck or tank tops; stresses on hull caused by motion of a vessel at sea, including panting, pounding, hogging, sagging and racking; structural stresses when grounded.
8.	<b>Hull</b> Knowledge of internal and external damage assessment resulting from structural damage, corrosion and waste; assessment of damage and preparation of reports using general arrangement or other related vessel drawings; effect of special steel on design and structure; advantages and disadvantages of using specialized steel in ship construction.
9.	<b>Engine Room Arrangement</b> Knowledge of layout of main engines and auxiliaries in steam-turbine propulsion; diesel-engine propulsion; and diesel-electric propulsion.
10.	<b>Shaft Train</b> Knowledge of construction and arrangement of a water-lubricated and oil-lubricated type stern tube; major components of transmission systems; construction and working principles of a thrust block; construction and working principles of a shaft bearing; construction and fitting arrangement of a fixed propeller to the tail shaft; working principles of a controllable pitch propeller.
11.	<b>Remote Control</b> Knowledge of the sequence of operation of bridge control for main diesel engines; imposed conditions and essentials for critical speed and reversing of main engines; essential elements of a control system with reference to proportional action, integral action, derivative action and multiple-term controllers; arrangements for a manual override.
12.	<b>Steering Systems</b> Knowledge of the operating principles of a kort nozzle; advantages and disadvantages of a kort nozzle; operations of the jet or hydraulic thrust Bow Thruster System; operating principles of twin rudders; advantages and disadvantages of twin rudders utilizing independent control; operation of an azimuthing CP thruster arrangement.
13.	<b>Fuel Oil</b> Knowledge of the importance of the fuel characteristics including density, viscosity, flash point, cloud point, pour point, water content, sulphur content; safety precautions during bunkering; fuel oil calculations using provided information to calculate consumption, most economic speed, estimating fuel consumption to complete a voyage, slip percentage.

Note: The examination consists of a written test.  
Duration is three hours.


**11.15 Not in use.**

**11.16 Engineering Knowledge**

**Examination Number 132**


Companion to Section 12.9

<b>ITEM</b>	<b>COLUMN</b>
1.	<b>Ship Piping Systems</b> Knowledge of bilge system , ballast system, cargo piping system, and oily-water separator.
2.	<b>Steering Arrangements and Controls</b> Knowledge of steering gear rules and design, rudder types, hydraulic steering gears, electro-hydraulic steering gears, duplex steering arrangement, quadrant and tiller system, emergency steering, hydraulic rotary-vane steering gears, automatic steering systems, auto pilot system, and steering gear testing.

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3.	Deck Machinery Knowledge of general arrangement of deck machinery, main drivers used on deck auxiliaries, anchor handling equipment, windlass arrangement, mooring equipment, automatic and manual mooring winches; cargo handling arrangements including derrick rig systems, heavy lifting system, deck cranes, cargo cranes, grabbing cranes, self-unloading systems, hatches including types of mechanically-operated hatch covers; and lifeboat davits.
4.	Fire Detection and Extinguishing Systems Knowledge of smoke and heat detectors; fire extinguishing systems; inert-gas smothering system; self-contained inert-gas generator; inert-gas system taken from boiler uptake; CO <sub>2</sub> as a fire smothering agent, rules and regulations for operation of CO <sub>2</sub> system, CO <sub>2</sub> flooding system for cargo holds, CO <sub>2</sub> total flooding system for machinery space, CO <sub>2</sub> activation alarm system, bulk CO <sub>2</sub> system under refrigeration; fire extinguishing mediums, when and how to use them; fire alarms, manually operated, fire alarm switches, shut off machinery spaces, remote stations; emergency shut off device on fuel tanks; vaporizing fluids, halon 1301 and 1211; main fire pump, emergency fire pump; fire mains, valve used on a hydrant; purpose of international shore connection; hydrants and hoses; reasons why hoses are tested.
5.	Control Systems Knowledge of local and remote-control systems; alarm systems, bilge-level alarm, main engines, pneumatic controls; controllable pitch propeller; remote starting-up and shutting off; manoeuvring of single- and multi-engines; thrust units; hydraulic control system; panel instruments; computer control of pumping systems.
6.	Depth Measuring Instruments Knowledge of pneumatic gauge, float tank gauge, distant reading tank float gauge; effects of trim and heel; limitations of each gauge when measuring tank depth or draught measuring.
7.	Emergency Batteries Knowledge of lead acid batteries on ship; installation procedure for series and parallel operation; rating of batteries; function of a hydrometer; causes of battery failure; reasons for slow charging; safety precautions and maintenance required; visual inspection procedure.
8.	Main Engines Precautions taken before starting a direct drive propulsion unit in lubricating oil, fuel oil, jacket water, starting air systems.
9.	Pumps Knowledge of centrifugal pumps, single-stage pump; multi-stage pump; rotary displacement pump; gear pump; screw displacement pump; double-acting piston pump; piston displacement pump.
10.	Uninterruptable Power Supply (UPS) Knowledge of UPS for computer and control system, operation; preventative maintenance.
11.	DC and AC Propulsion Systems Knowledge of characteristics, major differences in circuits; advantages and disadvantages of electric-drive propulsion systems; difference in drives in terms of required components for turbo-electric drive and diesel-electric drive, respectively.
12.	Self-Unloading Vessels Knowledge of cargo-handling tunnels; gate structure types; self-unloading booms; advantages and disadvantages of each type; belt/bucket system; attachments to booms, precautions for safe operation.

Note: The examination consists of multiple-choice questions, calculations and simple drawing questions.  
Duration is two hours.

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**CHAPTER 12 - FIRST MATE, INTERMEDIATE VOYAGE, AND FIRST MATE,  
LOCAL VOYAGE  
PART I - GENERAL REQUIREMENTS OF APPLICANTS**

- 12.1 (1) Every applicant for a certificate as First Mate, Intermediate Voyage, or First Mate, Local Voyage, shall:
- (a) either
    - (i) obtain:
      - (A) a certificate of completion for the three-year course set out in TP 5562 from a school listed in TP 10655; and
      - (B) a minimum of six months service when approval for graduation is granted to First Mate, Intermediate Voyage, as officer in charge of the watch after obtaining a Watchkeeping Mate, Ship, certificate on ships of at least 25 tons gross tonnage making voyages extending beyond partially smooth waters;
    - or
    - (ii) obtain a minimum of 12 months service as an officer in charge of the deck watch on a ship of not less than 25 tons gross tonnage while holding a certificate as a Watchkeeping Mate, Ship, or a Restricted Watchkeeping Mate, Ship, on voyages extending beyond partially smooth waters;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a certificate of completion for each of the following courses from a school or organization listed in TP 10655:
    - (i) Marine Emergency Duties Courses, Basic Safety (A1), Survival Craft (B1), Marine Fire Fighting (B2), for Officers (C) and Senior Officer (D), as set out in TP 4957;
    - (ii) Simulated Electronic Navigation Level I, as set out in TP 4958;
    - (iii) Marine First Aid Advanced Course, as set out in TP 13008;
  - (d) pass a written examination in each of the following subjects:
    - (i) Ship Management; and
    - (ii) Ship Construction and Cargo;
  - (e) pass a practical examination in Simulated Electronic Navigation Level I; and
  - (f) pass an oral examination in General Seamanship.
- (2) Every applicant for a certificate as First Mate, Intermediate Voyage, shall:
- (a) complete the requirements of paragraphs (1) (a) to (f); and
  - (b) pass a written examination in each of the following subjects:
    - (i) Astro-navigation;

- (ii) Engineering Knowledge; and
  - (iii) Ship Stability.
- (3) Every applicant for a certificate as First Mate, Local Voyage, shall:
- (a) complete the requirements of paragraphs (1) (a) to (f);
  - (b) pass a written examination in Ship Stability; and
  - (c) pass a written examination in Ship Construction and Engineering knowledge.
- (4) The holder of a certificate of competency as Second Mate, Foreign-Going; First Mate, Home-Trade; or First Mate, Inland Waters, may be accepted for examination without further proof of service.
- (5) Service while holding a Master, Home-Trade, 350 Tons, or a Master, Inland Waters, 350 Tons, certificate will be accepted in lieu of service with a Watchkeeping Mate certificate for the First Mate, Intermediate Voyage, and First Mate, Local Voyage, certificates. In all other respects, the service must fully comply with the requirements of subsection (1)(a)(ii).
- (6) A period of three years in an approved co-operative cadet training scheme is acceptable (refer to section 3.19).

## PART II - EXAMINATIONS

12.2 (1) The following table indicates the examinations for the First Mate, Intermediate voyage and First Mate, Local voyage certificates, the qualifying watchkeeping service required before each may be attempted, and other requirements.

A. Required for both First Mate, Intermediate Voyage, and First Mate, Local Voyage, certificates.


Examination	Watchkeeping Qualifying Service	Other Requirements
091 Ship Management	Nil	WKMSR or WKMS Certificate
113 Ship Stability	Nil	WKMSR or WKMS Certificate
122 Ship Construction and Cargo	Nil	WKMSR or WKMS Certificate
162 General Seamanship	12 months	All credits obtained before attempting this examination.
132 Engineering Knowledge.	Nil	WKMSR or WKMS Certificate

B. Additional examinations for First Mate, Intermediate Voyage, certificate.

051 Astro-Navigation	Nil	Must have completed 18 months service at sea.
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- (2) Whenever the above table requires an applicant to hold a Watchkeeping Mate, Ship, or Restricted Watchkeeping Mate, Ship, certificate, the provisions of subsections 12.1 (4) and 12.1 (5) may be substituted.
- (3) Except in the case of Second Mate, Foreign-Going; First Mate, Home-Trade; and Second Mate, Home-Trade, these special cases will be required to pass an examination on the calculation of azimuth to determine compass deviation.




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- (4) When an applicant transfers an application between intermediate and local voyage streams, 113 Stability will be credited as a pass in 112 Stability. Applicants opting for 113 Stability instead of 112 Stability at the First Mate, Local Voyage, level who either hold or are eligible to receive that certificate of competency, when applying for the First Mate, Intermediate Voyage, examination will be credited a pass in 113 Stability.

### **PART III - VALIDITY OF CERTIFICATES**

- 12.3 (1) The First Mate, Intermediate Voyage, Certificate has validity as:
- (a) second mate of a foreign-going vessel;
  - (b) first mate of an intermediate or local voyage vessel; and
  - (c) first mate of a minor waters vessel.
- (2) The First Mate, Local Voyage, Certificate has validity as:
- (a) first mate of a local voyage vessel; and
  - (b) first mate of a minor waters vessel.

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## PART IV - SYLLABUSES OF EXAMINATIONS

### 12.4 Ship Management Examination number 091

ITEM	COLUMN
1.	Tackle Regulations Knowledge of the regulations and associated documentation, including inspection and testing of machinery and gear; maintenance of machinery register; test certificates.
2.	Safe Working Practices Regulations Knowledge of the regulations, including recognition and correction of unsafe practices.
3.	Lifting Machinery and Cranes Knowledge of safe operation of lifting machinery and cranes, including stresses in the various parts of a single boom and union rig; knowledge and practical use of hand signals.
4.	Documentation and Record Keeping Knowledge of procedure and process of documentation and record keeping relating to navigation and safety equipment; oil transfer; medical treatment/controlled drugs; incident investigation and analysis; technical reports; damage reports and repair specifications.
5.	Code of Safe Working Practices for Self-Unloading Vessels Knowledge of inspection process and documenting procedures, including safe working practices and emergency duties as contained in TP 1269.
6.	Grain Loading Regulations Knowledge of the regulations and rules; role of Agriculture Canada regarding the carriage of grain.
7.	Safety Codes and Associated Practices Operational knowledge of the Canadian Code of Safe Practice for Ships Carrying Timber Deck Cargoes; Code of Safe Practices for Solid Bulk Cargoes; Deck Cargo Safety Code; Safe Container Convention Regulations; Dangerous Goods Shipping Regulations.
8.	Quarantine Regulations Knowledge of regulations; vessel fumigation requirements and precautions to be observed for vessels under fumigation.
9.	Oil Pollution Prevention Regulations Knowledge of the regulations including appreciation of MARPOL and a complete knowledge of the ship's responsibilities under these regulations.
10.	Emergencies and Drills Knowledge of the organization and training of crews for emergencies and related drills; emergency procedure plans and station bills for tankers, passenger and cargo vessels.
11.	Carriage of Goods Knowledge of the process associated with the <i>Marine Liability Act</i> and provisions under the Act to facilitate electronic documentation; charter parties/contracts for affreightment; bills of lading and acceptable/unacceptable goods; waybills and bills of lading; disputes, claims, arrests, liens; on-hire/off-hire procedures; contracts for repair, support services, supplies; despatch, demurrage and laytime.
12.	Organizational Management Knowledge of the concepts, theories and practices of leadership, decision making, communications, goal setting, general management of personnel, cargo and vessel; systematic approaches to maintenance; systematic approaches to safety and environmental protection; standard practices and procedure for documentation.
13.	Transportation Safety Board Knowledge of the mandate and role of the board in the promotion of marine safety.
14.	<i>Worker's Compensation Act</i> Knowledge of the Act and the documentation and protocol associated with the reporting process.
15.	Safety, Health, Labour Relations and Disciplinary Procedure Knowledge of the regulations for Marine Occupation Safety and Health; <i>Canada Labour Code</i> ; International Labour Organization (ILO); collective bargaining process, associations, unions.
16.	IMO, SOLAS Awareness of the role of these organizations in the establishment of uniform standards.

17.	Controlled Substance Legislation Awareness of the legislation, including employee assistance program, testing and conditions of employment.
18.	IMO and STCW Knowledge of the International Maritime Organization (IMO) and the role of marine safety in the implementation of national requirements.
19.	Marine Insurance Understanding of marine insurance and related processes, including: pollution policies; function of classification societies; survey procedure; mutual insurance (P & I policies); financial responsibility certificates; documentation and record keeping; incident reports and survey certificates.
20.	<i>Canada Shipping Act</i> Knowledge of CSA with respect to grades and classes of certificates of competency, rights of holders of certificates, offences relating to certificates, loss of certificates and maintenance of discipline.
21.	Logbooks Knowledge of official logbook and other ship's logbooks, including entries made under all conditions.
22.	Passengers Knowledge of safety requirements for vessels carrying passengers.
23.	Port State Control Knowledge of the functions of the Port State Control; right of national administrations to detain vessels for non-compliance.
24.	Vessel Operations and Maintenance Practical knowledge of organization and training of the crew for routine operations and maintenance.
25.	Ship's Responsibilities Knowledge of ship's responsibilities under the following regulations: Boat and Fire Drill Regulations; Crewing Regulations; Life Saving Equipment Regulations; Fire Detection and Extinguishing Regulations; Charts and Publication Regulations.

Note: The examination consists of a multiple-choice test, calculations and descriptive questions.

Duration is three hours.

The following open-book resources will be allowed in the examination room:

- Tackle Regulations
- Safe Working Practices Regulations
- Code of Safe Working Practices for Self-Unloading Bulk Carriers
- Grain Loading Regulations
- Quarantine Regulations
- Oil Pollution Prevention Regulations
- Canadian Code of Safe Practice for Ships Carrying Timber Deck Cargo
- Code of Safe Practice for Solid Bulk Cargoes
- Deck Cargo Safety Code
- Safe Container Convention Regulations
- Dangerous Goods Shipping Regulations
- Boat and Fire Drill Regulations
- Crewing Regulations
- Life-Saving Equipment Regulations
- Fire Detection and Extinguishing Equipment Regulations
- Charts and Publication Regulations

## 12.5 Ship Construction and Cargo

### Examination number 122

Companion to Section 16.11

ITEM	COLUMN
1.	Ship Stresses Stresses to which a ship is subject, structural strengthening to compensate for them, and where to anticipate structural failure.
2.	Reports Compile reports of defects and damage sustained by ship.
3.	Repairs and Tests Superintend minor repairs and tests of tanks and other watertight work; emergency repairs to maintain watertightness; maintenance of watertightness and fire integrity on ferries and ro-ro vessels.
4.	Construction Midship section and the basic construction of the principal ship types; bilge and ballast pumping arrangements; welding and riveting, their advantages and shortcomings; construction and members of bow and stern sections, rudders and steering gear, propeller shafts, stern tubes, thrust units, deck hatches, and side, bow and stern doors; read and interpret ships' plans; construction of masts, sampson posts, derricks, cranes and conveyors.
5.	Inspections Preparation of vessels for statutory surveys and inspections; classification societies, purposes and advantages of classification; dry-docking and dry-dock procedure.
6.	Regulations Use of Loan Line Regulations, IMO Dangerous Goods Code, and Deck Cargo Safety Code.
7.	Cargo Practices in loading, carrying and discharging cargo with reference to general cargo, bulk carriers, oil tankers, ro-ro (vehicle and rail-car) vessels, self-unloading and package freighters; ventilation and ventilation systems; preparation and care of refrigeration systems; preparation and use of cargo plans; stowage of cargo with respect to ease of discharge, space occupied, damage, contamination and ventilation; palletization of cargo; responsibilities of cargo officer; document and arrange for repair of stevedore damage with heavy equipment.

Note: Regulations and necessary data will be provide for item 6.  
The examination consists of a section of descriptive, calculation and simple drawing exercises and a section of multiple-choice questions.  
Duration is three hours.

## 12.6 Not in use

## 12.7 Astro Navigation

### Examination Number 051

Companion to Section 13.11

ITEM	COLUMN
1.	Basic Basic nautical astronomy, shape of the earth, poles, latitude, longitude; celestial sphere; solar system, including relative movement of bodies; hour angles; time; rising and setting of bodies and their true bearing at these times.
2.	Calculations Correction of sextant altitudes; geographical position of a body, including circle of position line.
3.	Charts Principles of construction of Mercator, polyconic and gnomonic charts, and their use.
4.	Time-Keeping
5.	Plane and Mercator Sailing

6.	Astro-Sights Latitude by meridian altitude of any body (sun, moon, planets and star, including Polaris); use of one or more observations of heavenly bodies, in or out of the meridian, simultaneous or otherwise; combination of celestial and terrestrial observations; finding the true bearing of any body.
7.	Tracks Determining great circle tracks on gnomonic charts and transferring to relevant Mercator charts, including composite great circle; determination of great circle distances; tidal phenomenon, varying effects of the influences of the sun and moon.

Note: The examination consists of a multiple-choice test on basic principles and practical navigation calculations:  
Duration is three hours.

## 12.8 Stability

### Examination number 113

ITEM	COLUMN
1.	Ship's Draft Draft, including effect of water density and fresh water allowance; use of displacement and ton per inch/tonne per centimetre (TPI/TPC) scales to determine displacement from draft and vice versa; statutory freeboard and loadlines; general loadline rules and loadline rules for lakes and rivers.
2.	Terms Meaning of block coefficient, displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights; righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability, danger of slack tanks; centre of flotation (F) and trim, and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL).
3.	Stability Data Use of stability data supplied to typical bulk-oil and oil-and-ore carriers, general cargo vessels and package freighters to perform these operations, allowing for effect of water density on draft and displacement; interpreting curves of statical stability, achieving satisfactory transverse stability, achieving desired trim, loading and discharging problems, list created during loading or discharging, counteracting trim and list together, allowing for free surface effect of tanks, change of stability during voyage.
4.	Mensuration Areas and volumes of common figures, squares, rectangles, triangles, cubes, cones, wedges, cylinders, spheres; centre of gravity of common areas and volume; Simpson's rules to calculate area, volumes, moments of inertia.
5.	Stability Data Data for container stability data and bulk-grain stability data.
6.	Flooding Effect of flooding compartments intentionally, including permeability; effect of bilging compartments, including permeability.

Note: The examination consist of multiple-choice questions and practical calculations based on ships' stability data booklet.  
Duration is three hours.

**12.9 Engineering Knowledge**  
**Examination Number 132**  
Companion to Section 11.16

ITEM	COLUMN
1.	Ship Piping Systems Knowledge of bilge system, ballast system, cargo piping system, and oily-water separator.
2.	Steering Arrangements and Controls Knowledge of steering gear rules and design, rudder types, hydraulic steering gears, electro-hydraulic steering gears, duplex steering arrangement, quadrant and tiller system, emergency steering, hydraulic rotary-vane steering gears, automatic steering systems, auto pilot system, and steering gear testing.
3.	Deck Machinery Knowledge of general arrangement of deck machinery, main drivers used on deck auxiliaries, anchor handling equipment, windlass arrangement, mooring equipment, automatic and manual mooring winches; cargo handling arrangements including derrick rig systems, heavy lifting system, deck cranes, cargo cranes, grabbing cranes, self-unloading systems, hatches (including types of mechanically- operated hatch covers); and lifeboat davits.
4.	Fire Detection and Extinguishing Systems Knowledge of smoke and heat detectors; fire extinguishing systems; inert-gas smothering system; self-contained inert-gas generator; inert-gas system taken from boiler uptake; CO <sub>2</sub> as a fire smothering agent, rules and regulations for operation of CO <sub>2</sub> system, CO <sub>2</sub> flooding system for cargo holds, CO <sub>2</sub> total flooding system for machinery space, CO <sub>2</sub> activation alarm system, bulk CO <sub>2</sub> system under refrigeration; fire extinguishing mediums, when and how to use them; fire alarms, manually operated, fire alarm switches, shut off machinery spaces, remote stations; emergency shut-off device on fuel tanks; vaporizing fluids, halon 1301 and 1211; main fire pump, emergency fire pump; fire mains, valve used on a hydrant; purpose of international shore connection; hydrants and hoses; why hoses are tested.
5.	Control Systems Knowledge of local and remote-control systems; alarm systems, bilge-level alarm, main engines, pneumatic controls; controllable-pitch propeller; remote starting-up and shutting off; manoeuvring of single- and multi-engines; thrust units; hydraulic control system; panel instruments; computer control of pumping systems.
6.	Depth Measuring Instruments Knowledge of pneumercator gauge, float tank gauge, distant-reading tank float gauge; effects of trim and heel; limitations of each gauge when measuring tank depth or draught.
7.	Emergency Batteries Knowledge of lead acid batteries on ship; installation procedure for series and parallel operation; rating of batteries; function of a hydrometer; causes of battery failure; reasons for slow charging; safety precautions and maintenance required; visual inspection procedure.
8.	Main Engines Precautions taken before starting a direct drive propulsion unit in lubricating oil, fuel oil, jacket water, starting air systems.
9.	Pumps Knowledge of centrifugal pumps, single-stage pump; multi-stage pump; rotary displacement pump; gear pump; screw displacement pump; double-acting piston pump; piston displacement pump.
10.	Uninterruptable Power Supply (UPS) Knowledge of UPS for computer and control system, operation; preventative maintenance.
11.	DC and AC Propulsion Systems Knowledge of characteristics, major differences in circuits; advantages and disadvantages of electric-drive propulsion systems; difference in drives in terms of required components for turbo-electric drive and diesel-electric drive, respectively.
12.	Self-Unloading Vessels Knowledge of cargo handling tunnels; gate structure types; self-unloading booms; advantages and disadvantages of each type; belt/bucket system; attachments to booms, precautions for safe operation.

Note: The examination consists of multiple-choice questions, calculations and simple drawing questions. Duration is two hours.


**12.10 General Seamanship**  
**Examination number 162**  
Companion to Section 16.13

<b>ITEM</b>	<b>COLUMN</b>
1.	Deck Machinery Practical use and care in the use of: electric, hydraulic and steam winches, ordinary and self-tensioning; windlasses and capstans; main and emergency steering gears; electric control and telemotor systems; electric derrick-topping lift winches; electric and hydraulic deck cranes; elevators and hatch opening systems; telegraphs.
2.	Ship Handling Conning ship; manoeuvring single and twin-screw ships in open and narrow waters with or without wind, tide or current; preparations for getting underway and proceeding to sea; making harbour and entering a dock, lock or canal in any type of vessel; passing another vessel closely in any circumstances; coming alongside or securing to a buoy with or without wind, tide or current, and the use of an anchor under similar conditions; turning short round twin-screw and single-screw vessels, with or without the use of an anchor; letting go bow or stern anchors in emergencies in shallow or deep water; the use of an anchor buoy; towing and being towed in ships of all types; search and rescue procedures referred to in MERSAR, CANMERSAR and Transport Canada publications.
3.	Anchor and Mooring Manoeuvring and cable handling involved in the use of ground tackle and ancillary equipment including: the use of anchor buoys, anchoring to two anchors and handling two cables simultaneously, mooring by running, ordinary, standing or dropping moors, clearing a foul anchor, clearing a foul hawser (cross, elbow or round turn), hanging off an anchor, mooring to a buoy with anchor cable, weighing anchor with and without a windlass, housing a tripped anchor snubbing round, forming a lee while at anchor, securing anchor gear in preparation for sea passage, use of ground tackle when aground, use of anchors in emergency to take way off, anchor and cable stowage, fittings and cable markings.
4.	Mooring Lines Use, care and stowage of mooring lines, types of line used for mooring and their characteristics; names of the various mooring lines and orders; making fast on-shore bollards being used by another ship; use of moorings on the bight and doubling up; use, handling and securing of towing wires; use, handling and securing of insurance wires; use of lines in securing a vessel and in warping alongside a berth, lock or lay-by; use of mooring wire-rope reels; types of fairlead, their construction, naming and use; use of rat guards.
5.	Working General Cargo Practical working of general cargo, mate's responsibilities when preparing the ship for work, and working general and dry bulk cargo; inspections of holds before loading; testing suction and drainage arrangements before loading; inspection of refrigerated compartments before loading; derrick riggings, types and uses for loading and/or discharging; arrangements and working of heavy lifts by ship or shore equipment, and lifts that cannot be handled by a single runner; overhaul and regular inspections of cargo handling gear.
6.	Working Liquid Cargo Working of liquid bulk cargoes, mate's duties and responsibilities when preparing the ship for working, and when working liquid bulk cargoes; inspections and testing of tanks, valves and lines before loading, discharging or transferring liquid bulk cargoes; handling cargo hoses at shore-side or sea-line terminals; cleaning and gas-freeing tanks and lines (Butterworth and Sellers equipment); use of explosimeters; purpose and operation of pressure vacuum valves and flame traps; pressure-testing of lines, valves and heating coils; methods of and need for grounding/earthing the vessel; precautions for manifold quick release, securing fire wires for emergency tow-off.

7.	<b>Ship Routines and Organization</b> Practical knowledge of shipboard routine and organization, mate's executive and organizational duties when relating to officers and the various crew members, crew watches and the direction of the crew on day work; drawing up emergency muster lists with appropriate duties for crew members; organizational duties for working of cargo, fuelling, storing or ballasting in all conditions; cleaning and maintaining the ship and its gear; mate's duties concerning the official logbook, entries in the deck log and owners' or charterers' records, duties in dry-dock or when repairs, alterations or maintenance work is being carried out; duties when preparing the vessels for sea; duties and responsibilities on joining a vessel; necessary paperwork or documentation to encompass the foregoing items, where applicable.
8.	<b>Emergency Duties</b> Emergency duties and responsibilities for equipment, organization, frequency and routing of fire patrols under routine and exceptional conditions at sea and in port; recognition and assessment of fire hazards; organization of realistic fire drills, training of crew in use of firefighting equipment; taking charge of firefighting operations at sea and in port; inspections, testing and maintenance of portable and fixed firefighting equipment; organization of realistic boat and life-saving appliance drills, training of crew in use of life-saving appliances; stowage, inspections, testing and maintenance of lifeboats, rigid and inflatable liferafts and their equipment, lifejackets, lifebuoys, self-igniting lights and distress signals; taking charge of the launching of boats and rafts; assessing damage and flooding in cases of collision or stranding.
9.	<b>Certificates</b> Practical knowledge of the rights and privileges of the various certificates of competency and documentation required on board ship and issued by Transport Canada.
10.	<b>For First Mate, Intermediate Voyage, Applicants Only</b> Correctly make the three basic adjustments to a sextant, using heavenly body or the horizon, and know the principles of position fixing by means of vertical and horizontal angles.

Note: The examination is oral.  
Duration as necessary.




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## CHAPTER 13 - WATCHKEEPING MATE, SHIP, AND RESTRICTED WATCHKEEPING MATE, SHIP

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 13.1 (1) Every applicant for a certificate as Watchkeeping Mate, Ship, or Restricted Watchkeeping Mate, Ship, shall:
- (a) **either**
- (i) obtain:
- (A) a certificate of completion for the course set out in TP 5562 from a school listed in TP 10655; and
- (B) a minimum of twelve months sea service as a cadet performing deck duties on a ship of not less than 25 tons gross tonnage engaged on voyages extending beyond the limits of partially smooth waters;
- or**
- (ii) complete 24 months service for a Watchkeeping Mate, Ship, Certificate, as follows:
- (A) subject to paragraph (B), as a rating performing deck duties on a ship of not less than 25 tons gross tonnage engaged on voyages extending beyond the limits of partially smooth waters; and
- (B) service as a rating performing deck duties on a ship of not less than 25 tons gross tonnage engaged on voyages on smooth or partially smooth waters performed before February 1, 2002 may be accepted until February 1, 2005 up to a maximum of six months. After this date, all time served, even if it is before February 1, 2002, must be beyond the limits of smooth or partially smooth waters.
- and**
- (iii) complete 24 months service for a restricted Watchkeeping Mate, Ship, Certificate as a rating performing deck duties on a ship of not less than five tons gross tonnage engaged on voyages beyond smooth or partially smooth waters;
- (b) obtain a medical certificate prescribed by the Crewing Regulations;
- (c) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
- (d) obtain a certificate of completion for each of the following courses from a school or organization listed in TP 10655:
- (i) Marine Emergency Duties Courses, as set out in TP 4957:
- (A) Survival Craft (B1);
- (B) Marine Fire Fighting (B2); and
- (C) for Officers (C);
- (ii) Simulated Electronic Navigation Level I Course, as set out in TP 4958; and
- (iii) Marine First Aid Advanced Course, as set out in TP 13008;

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- (e) pass an examination in each of the following subjects:
    - (i) Communications;
    - (ii) Chartwork and Pilotage;
    - (iii) General Ship Knowledge; and
    - (iv) Navigation Safety;
  - (f) pass a practical examination in Simulated Electronic Navigation Level I; and
  - (g) pass an oral examination.
- (2) An applicant for a certificate as Watchkeeping Mate, Ship, is not entitled to attempt the examination referred to in paragraph (1) (g) until the applicant has
- (a) completed the requirements of paragraphs (1) (a)(i) or (ii) and (b) to (f);
  - (b) obtained a certificate of completion in Care and Use of a Marine Sextant from a school listed in TP 10655 or demonstrate to the examiner capability in the use of a sextant; and
  - (c) pass an examination in Astro-Navigation;
- (3) An applicant for a certificate as Restricted Watchkeeping Mate, Ship, is not entitled to attempt the examination referred to in paragraph (1)(g) until the applicant has completed the requirements of paragraphs (1)(a)(iii) and (b) to (f).
- 13.2 (1) Except as provided in subsections (2) and (3), an applicant for oral examination 161 in General Seamanship for a Watchkeeping Mate, Ship, Certificate shall have completed at least two years sea service on voyages extending beyond partially smooth waters on vessels of not less than 25 tons gross tonnage.
- (2) Not in use.
- (3) Graduation from an approved co-operative cadet training scheme is acceptable (refer to section 3.19). The candidate must produce testimonials attesting to completion of 12 months sea service as part of the program and present a sea training manual acceptable to the examiner.
- 13.3 (1) Except as provided in subsection (2), an applicant for oral examination 161 in General Seamanship for the Restricted Watchkeeping Mate, Ship, Certificate shall have completed at least two years service on vessels of not less than five tons gross tonnage.
- (2) Graduation from an approved co-operative cadet training scheme is acceptable (refer to section 3.19). The candidate must produce testimonials attesting to completion of 12 months sea service as part of the program and present a sea training manual acceptable to the examiner.
- 13.4 Not used.

## PART II - EXAMINATIONS

13.5 The following table lists the examinations for the Watchkeeping Mate, Ship, and Restricted Watchkeeping Mate, Ship, certificates, the qualifying sea service required before each may be attempted, and other requirements.

A. Required for both WKMS and WKMSR certificates:

<b>Examination</b>	<b>Qualifying Service</b>	<b>Other Requirements</b>
012 Communications	Nil	Nil
SIM I Navigating Instruments	18 months	Completion of the SEN I course is required before examination can be attempted.
041 Chartwork and Pilotage	18 months	Nil
151 General Ship Knowledge	18 months	Nil
061 Navigation Safety	18 months	Nil
161 General Seamanship	24 months	All above credits obtained before attempting this examination.

B. Additional for WKMS certificate

051 Astro-Navigation	18 months	Nil
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13.6 Credits for other certificates of competency held will be awarded according to the table in Appendix F.

## PART III - VALIDITY OF CERTIFICATES

13.7 (1) The Watchkeeping Mate, Ship, Certificate has validity as:

- (a) third mate of a foreign going vessel;
- (b) second mate of an intermediate voyage vessel;
- (c) second mate of a local voyage or minor waters voyage vessel; and
- (d) first mate of a ship not exceeding 350 tons or a tug on intermediate, local, or minor waters voyages.

(2) The Restricted Watchkeeping Mate, Ship, Certificate has validity as:

- (a) second mate of a local or minor waters voyage vessel; and
- (b) first mate of a ship not exceeding 350 tons or a tug on local or minor waters voyages.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 13.8 Communications

#### Examination number 012

ITEM	COLUMN
1.	The recognition of single letters and numerals sent by Morse flashing light or sound; International Code flags, single-letter meanings under International Code, including icebreaker and assisted-vessel signals; coding and decoding of messages sent by flag, Morse and voice procedures using the International Code of Signals.
2.	The use of <i>Radio Aids to Marine Navigation</i> for ascertaining facilities and services; use of Standard Marine Communication Phrases.

Note: The examination consists of:

- (a) reading Morse flashing light at a speed of four words per minute or producing to the examiner a certificate of completion for an approved course;
- (b) satisfying the examiner of ability to send Morse by flashing light; and
- (c) a multiple-choice test on the remainder of the syllabus.

Duration of the examination is: for subsection (a) 1 hour; for subsection (b) 1 hour; for subsection (c) as necessary.

### 13.9 Navigation Instruments

#### Examination number SIM 1

Companion to Sections 15.21, 16.21 and 19.6

ITEM	COLUMN
1.	The syllabus for the examination is presented in TP 4958, Simulated Electronic Navigation Courses; and simulator exercises include testing on the following: collision avoidance by the application of Collision Regulations, including course and speed alteration; assessment of the rate and direction of current to effect parallel indexing, including wind and tide; ability to deal with emergencies and conduct radio communications effectively.

Note: The examination consists of a check list approved by the instructor after a practical and oral test at an approved school; a multiple-choice examination conducted by an approved school and subject to scrutiny and monitoring by Marine Safety; and an examination conducted by Marine Safety with simulated exercises.

Duration is three and a half hours.

### 13.10 Chartwork and Pilotage

#### Examination number 041

Companion to Sections 16.18, 19.7 and 20.7

ITEM	COLUMN
1.	<p>Pilotage</p> <p>Thorough knowledge regarding preparations for pilotage; possessing and using latest available charts and publications, including large-scale charts of the pilotage area duly corrected to date, latest sailing directions, <i>Notices to Mariners</i>, Lists of Lights, Traffic Zone Regulations (as applicable), tide tables, copy of Charts and Publications Regulations, Code of Navigation Procedures and Practices, <i>Radio Aids to Marine Navigation</i> and chart catalogue .</p>
2.	<p>Steering</p> <p>Knowledge of common steering procedures, their purpose and how to put them into effect; the importance of establishing and adhering to internationally-accepted procedures in issuing helm and steering orders and having them acknowledged and complied with; the instruction of helmsmen in this matter.</p>
3.	<p>Symbols</p> <p>Familiarity with chart symbols and abbreviations as published in Canadian Hydrographic Service Chart No. 1.</p>
4.	<p>Sailing Directions</p> <p>Familiarity with the contents of preface to <i>Sailing Directions</i>, the important general navigational information contained in the preamble and opening chapter of these volumes.</p>
5.	<p>Lists of Lights</p> <p>Familiarity with light characteristics, colours and sound signals used as aids to navigation; use of Lists of Lights, Buoys and Fog Signals; the terms used to define the power of lights (e.g., geographical range, luminous range, charted range computed range, nominal range, computed visibility; use of a luminous range diagram); the effect of abnormal refraction fog signals of different types, anomalies of sound propagation in fog, notices regarding lights lighthouses and buoys etc. published in <i>Notices to Mariners</i>.</p>
6.	<p>Tidal Currents</p> <p>Ability to find the set and rate of tidal current that may be expected at a given point from information given in tide and current table or on the chart; ability to use tables and information on charts of the locality with awareness of the possibly significant effect of weather on the reliability of the information so obtained.</p>
7.	<p>Navigation in Confined Waters</p> <p>Ability to navigate in confined waters: altering course; transits; leading marks and bearings; recording the vessel's progress; making allowance for height of tide; preparatory details to be attended to in entering confined waters (e.g., a review of the relevant sections of the sailing directions, ready availability of large-scale charts of the area with proposed track drawn to indicate distances, courses and near dangers noted); navigational aids with their characteristics to be identified, clearing lines, marks and bearings to be used during the passage to be drawn in, pre-calculation of tidal heights where critical depths of water may be encountered; the maintenance of a record of the vessel's progress on both charts in logbook, including times of passing successive points, course's compass error, speed, weather; fixing the vessel's position by relative and true bearings, transits; dead reckoning position, estimated position and observed position.</p>

8.	<p><b>Navigation Aids</b></p> <p>Knowledge of the use of navigational aids in pilotage situations; the necessity of continuing the customary checks and counts of the vessel's safe progress by the Officer of the Watch (OOW) and ship's personnel with record of the details of duties performed, notwithstanding that the vessel was under the conduct of a pilot; the duty of the OOW to ensure that the pilot's advice is understood and effectively carried out; the extent to which reliance is placed on buoys.</p>
9.	<p><b>Buoyage</b></p> <p>Knowledge of the Canadian System of Buoyage in detail; differences between lateral and cardinal systems; use of <i>Sailing Directions</i> for determining other buoyage systems in use; understanding of the basic principles employed in the lateral and the cardinal buoyage systems; the importance of consulting the applicable volume of <i>Sailing Directions</i> for details of buoyage system in-force locally prior to entering unfamiliar waters of other countries; Aids to Navigation.</p>
10.	<p><b>Bridge Practices</b></p> <p>Familiarity with bridge practices and procedures in pilotage situations; charts, including various projections in common use; the requirement to continue the practice of good navigation procedures by the OOW and ship's personnel generally, and the realization that the presence of a pilot on the bridge does not absolve the ship's personnel from their continuing responsibility for the safe navigation of the ship; the principle employed in construction charts on the Mercator, polyconic, and gnomonic projections, the limitations associated with each of these projections and the purposes of each in practical navigation.</p>
11.	<p><b>Charts</b></p> <p>Knowledge of significant distortion, numbering and the presentation of information; the cause of chart distortion, need for nautical charts on board ship; the replacement of superseded editions; the mode of presentation of information on charts; metrication; chart catalogues and numbering.</p>
12.	<p><b>Chart Usage</b></p> <p>Ability to use charts produced by the major projections in common use by the Canadian Hydrographic Service, including gnomonic charts; the use of charts in the practice of coastal navigation and on ocean passages; the plotting of bearings, position lines clearing lines etc; the transfer of positions from a chart of one projection to another of a different projection; the use of a gnomonic projection chart, Mercator and polyconic charts.</p>
13.	<p><b>Fixing Position</b></p> <p>Ability to fix the ship's position by means at the disposal of the OOW, including electronic navigational aids; considerations to be taken into account, including errors and limitations of equipment; the correction and plotting of bearings taken visually, by radar or direction finder (DF) and the limitations of accuracy inherent in each of these methods; the ship's position established by bearings or ranges taken simultaneously or with an interval and run intervening.</p>
14.	<p><b>Estimating Position</b></p> <p>Knowledge of estimating the vessel's position, including allowing for effects of wind and/or tide; the reliability of the value in both direction and force of wind, current and tidal effect used in arriving at the ship's DR position and the resulting area of doubt.</p>
15.	<p><b>Courses</b></p> <p>Ability to lay off courses; allowing for effects of wind and tide; the problem of combining vectors of wind, current, tidal effect and course to steer to arrive at course made good; scrutiny of chart for off-lying dangers.</p>

16.	<p>Conversion of Course</p> <p>Ability to convert true courses laid-off to magnetic courses, including determination of variation at any place; conversion of true courses to gyro, magnetic and compass courses and vice versa; determining the up-to-date value of variation and interpolating for variation at a given locality from isogonic lines or compass roses; use of transit lines, azimuth and amplitude to determine compass error.</p>
17.	<p>Distance Measurement</p> <p>Knowledge of distance measurement and the determination of speed made good and speed through the water; the measurement of distance on a Mercator or polyconic chart; the factors contributing to speed made good and speed through the water, how the difference between the two is expressed.</p>
18.	<p>Range of Visibility</p> <p>Knowledge of factors controlling the range of visibility; terms associated with visibility of lights on navigational aids.</p>
19.	<p>Reliability of Charts</p> <p>Reliability of charts; indications by which reliability may be judged (e.g., date of original survey and possibility of subsequent surveys, adequacy of recorded soundings, with corrections having been made to date); large-scale charts show a small area in greater detail than small-scale charts; care and upkeep of charts.</p>
20.	<p>Publications</p> <p>Use of publications at the disposal of the coastal navigator, including <i>Notices to Mariners</i>, for the correction of charts and publications; the various publications available to the navigator and the nature of their contents; the importance of chart corrections being kept up-to-date.</p>
21.	<p>Tidal Terms</p> <p>Knowledge of the meaning of tidal terms in common use in CHS and United States tide tables; general understanding of tidal phenomena necessary for the comprehension of tidal terms; tidal atlases.</p>
22.	<p>Calculation of Tides</p> <p>Ability to calculate tides and heights of high and low water at reference and secondary ports, and the calculation of depth of water at those times; use of the calculated depth of water at high and low water to determine the height of water at a given charted position.</p>
23.	<p>Set and Rate of Tides</p> <p>Ability to estimate set and rate of tidal currents by reference to tidal current tables and by actual observation; the tentative nature of tabulated tidal current values and the need for caution in using them; the care required in making tidal current observations and the associated details that must be recorded.</p>
24.	<p>Records</p> <p>Appreciation of the need for keeping an accurate record of the vessel's progress and the keeping of such a record; the duty of the OOW to maintain an accurate, detailed and continuous record of the vessel's progress from which a position may be readily determined at any time; the value of such a record being available as a measure of safe navigation and in the event of an emergency requiring immediate knowledge of the ship's position.</p>

Note: The examination consists of:

- (a) a practical chartwork paper, and
- (b) a multiple-choice examination.

Duration three hours.

### 13.11 Astro-Navigation

#### Examination number 051

Companion to Section 12.7

ITEM	COLUMN
1.	Basic Basic nautical astronomy, shape of the earth, poles, latitude, longitude; celestial sphere; solar system, including relative movement of bodies; hour angles; time; rising and setting of bodies and their true bearing at these times.
2.	Calculations Correction of sextant altitudes; geographical position of a body, including circle of position line.
3.	Charts Principles of construction of Mercator, polyconic and gnomonic charts, and their use.
4.	Time-Keeping
5.	Plane and Mercator Sailing
6.	Astro-Sights Latitude by meridian altitude of any body (sun, moon, planets and star, including Polaris); use of one or more observations of heavenly bodies, in or out of the meridian, simultaneous or otherwise; combination of celestial and terrestrial observations; finding the true bearing of any body.
7.	Tracks Determining great circle tracks on gnomonic charts and transferring to relevant Mercator charts, including composite great circle; determination of great circle distances; tidal phenomenon, varying effects of the influences of the sun and moon.

Note: The examination consists of a multiple-choice test on basic principles and practical navigation calculations:  
Duration is three hours.

### 13.12 Navigation Safety

#### Examination number 061

Companion to Sections 16.19, 18.7, 19.8, 20.8 and 21.7

ITEM	COLUMN
1.	Navigation Safety Knowledge and application of the content of the Collision Regulations with Canadian Modifications 1983; STCW Code section A-VIII/2.

Note: The examination is a multiple-choice test, supplemented by oral questions as necessary.  
Duration one and a half hours.



**13.13 General Ship Knowledge**  
**Examination number 151**

<b>ITEM</b>	<b>COLUMN</b>
1.	Weather Observations Ability to observe weather conditions and code these observations for transmission to forecasting agencies using standard meteorological material.
2.	Forecasting Systems A knowledge of the weather and ice forecasting systems within the area of validity, availability of information regarding forecast areas and times of broadcasting.
3.	Tackle Knowledge of Tackle Regulations as they apply to the processes, marking of gear, fencing and gangways.
4.	Safe Working Practices Use and interpretation of the Safe Working Practices Regulations; the need for accident prevention and precautions to be taken in ship operation; measurement and strengths of synthetic and fibre ropes, wires and chains.
5.	Pollution Prevention Knowledge of the pollution-prevention practices as contained in Oil Pollution Prevention Regulations, Garbage Pollution Prevention Regulations, Arctic Shipping Pollution Prevention Regulations, Shipping Safety Control Zones Order.
6.	Ship Construction Elementary knowledge of ship construction, including knowledge of framing, shell plating, decks, water-tight bulkheads, hatchways, bilges, double-bottoms, sounding pipes and air pipes; names of the principal parts of the ship; general arrangement of the principal ship types, general trader, bulk carrier, oil tanker, oil-bulk-ore, package freighters, ro-ro vessels, self-unloaders, ferries and use of general arrangement plans.
7.	Loadlines Ability to read draft and find mean draft with and without list; effect of adding, removing and transferring weights on draft, list and trim and a simple appreciation of stiff and tender ships; practical appreciation of the dangers of slack tanks and icing; purpose and terminology of loadline markings.
8.	Cargo Knowledge of cargo handling arrangements in the following types of carriers: general cargo, bulk carriers, oil tankers, ro-ro (vehicle and rail cars), self-unloaders, package freighters; preparation for loading; rigging for loading or discharging with ship's gear; bulk loading and discharging at shore installations; bulk oil cargoes; responsibilities of deck duty officer and logbook entries; elementary knowledge of the use of cargo plans; basic principles of ventilation and avoidance of sweat damage.

Note: The examination consists of a multiple-choice test, open book resources for items 3,4 and 5 allowed in the examination room.  
Duration three hours.

### 13.14 General Seamanship


#### Examination number 161

Companion to Section 16.20

ITEM	COLUMN
1.	<p><b>Rigging</b></p> <p>Practical knowledge of the rigging of ships, comprising the names, purpose, and construction of standing and running rigging; reeving of blocks and purchases; rigging of stages and chairs; rigging of booms for single boom and union-working boom; names, purposes and construction of the various parts of a boom; positioning and construction of guys and preventers; stresses on the various parts of a boom system during operation.</p>
2.	<p><b>Knots and Splicing</b></p> <p>Basic knotting, gripping and splicing with reference to current practice, seizings, rackings, frappings, and stoppers.</p>
3.	<p><b>Bridge Procedures</b></p> <p>Bridge discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; fire drills, life boat drills and crew training.</p>
4.	<p><b>Duties at Sea</b></p> <p>Duties and responsibilities of the master, officer of the watch, pilot and other bridge personnel (jointly and separately); purpose, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties, responsibilities, and action to be taken when dragging anchor; ascertaining dragging anchor; arrangement and responsibilities of departments aboard ship; action and manoeuvres required of the officer of the watch in emergencies at sea, man overboard, Williamson and elliptical turns, running aground, collision, discovery of fire, sighting of derelicts, sighting or receiving distress signals; breakdown of aids or equipment, power failure, capsizes of tugs when under tow or manoeuvring.</p>
5.	<p><b>Duties in Port</b></p> <p>Duties and responsibilities of the officer of the watch in port; tending of lines and gangways; routine and exceptional fire patrols and inspections; action on discovery of fire aboard or ashore, fire alarms ashore; precautions when taking on or transferring fuel, water or stores; protection of crew members and stevedores; action to be taken in event of excessive ranging, parted moorings, burst oil lines, tank overflows, striking by another vessel, collapse of crew member in tank or other confined space, accidents to any person on board, ship taking bottom.</p>
6.	<p><b>Anchors</b></p> <p>Anchors and associated equipment, construction and names of the parts of stocked and stockless anchors; chain cable and shackles; chain cable markings and reporting; cable stowage; fittings between cable locker and hawse pipe; common terms used in anchor work; terms associated with lead of cable; anchoring in shallow or deep water; anchoring in an emergency; heaving up and securing cable; terms pertaining to vessel at anchor.</p>
7.	<p><b>Mooring</b></p> <p>Mooring and mooring lines comprising the names of various mooring lines, their purpose and terms used in handling and working them.</p>
8.	<p><b>Joining Ship</b></p> <p>Responsibilities on joining a ship.</p>

9.	<p>Ship Handling</p> <p>General manoeuvring characteristics of merchant vessels of all types; the terms turning circle, advance, transfer, drift angle and tactical diameter; effect of propellers on steering; effect of trim, draft, list and squat on manoeuvrability; effect of current, wind, shallows, bank suction and bank cushion reactions in restricted waters; propeller and rudder effects on steering, including wake current, transverse thrust and screw race when going ahead and astern; behaviour of the ship when engines are put astern, the pivoting point.</p>
10.	<p>Signals</p> <p>Recognition and knowledge of the lifesaving signals contained in the International Code of Signals.</p>
11.	<p>Reports</p> <p>Simple oral ship damage reports.</p>
12.	<p>Meteorological Reports</p> <p>Read and record the instruments supplied by the Meteorological Service, aneroid barometer graduated in inches or millibars, barograph, thermometer graduated in degrees Celsius or Fahrenheit, psychrometer (Stevenson screen); obtain relative humidity and dew point temperature from psychrometer.</p>
13.	<p>Rules</p> <p>Collision Regulations with Canadian Modifications 1983; recommended Code of Nautical Procedures and Practices; ship's documentation, inspection certificates, loadline certificates, manning certificates, tackle book, oil book, station bill, crew list, ship's log; rights and privileges of the various certificates of competency issued by Transport Canada.</p>
14.	<p>Sextant (Watchkeeping Mate, Ship, only)</p> <p>Principles of position fixing by means of a sextant using vertical and horizontal angles.</p>

Note: The examination consists of an oral and practical test.  
Items 1 and 2 and questions relating to lifesaving, firefighting and rescue may be omitted if applicant holds an Able Seaman's Certificate or MED B1 and B2 certificates.  
Duration as necessary.

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	<b>Marine Safety</b>	<b>Approved by: AMSP</b>	<b>Revision No: 04</b>	<b>Page: 1 of 8</b>
<b>TP 2293 E</b>		<b><i>THE EXAMINATION AND CERTIFICATION OF SEAFARERS</i></b>		

## CHAPTER 14 - MASTER, SHIP OF NOT MORE THAN 350 TONS GROSS TONNAGE, OR TUG, LOCAL VOYAGE

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 14.1 (1) Every applicant for a certificate as Master, Ship of Not More than 350 Tons Gross Tonnage, or Tug, Local Voyage, shall:
- (a) complete a minimum of 12 months service after obtaining a certificate as Watchkeeping Mate, Ship, or Restricted Watchkeeping Mate, Ship, as officer in charge of the watch on vessels of at least five tons gross tonnage making local or minor waters voyages beyond smooth or partially smooth waters;
  - (b) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
  - (c) obtain a medical certificate prescribed by the Crewing Regulations;
  - (d) obtain a certificate of completion for each of the following courses from a school or organization listed in TP 10655:
    - (i) Marine Emergency Duties Course, Senior Officer (D), set out in TP 4957;
    - (ii) Simulated Electronic Navigation Level II, set out in TP 4958; and
    - (iii) Marine First Aid Advanced Certificate, set out in TP 13008;
  - (e) pass written examinations in each of the following subjects:
    - (i) Meteorology;
    - (ii) Ship Management; and
    - (iii) Ship Stability;
  - (f) pass a practical examination in Simulated Electronic Navigation Level II; and
  - (g) pass an oral examination in General Seamanship.
- (2) Except as provided in subsection (3), an applicant for oral examination 160 shall have completed a total sea service of at least three years in vessels of not less than five tons gross tonnage, including not less than 12 month as officer in charge of the watch while holding at least a Restricted Watchkeeping Mate, Ship, Certificate.
- (3) Graduates of co-operative training schemes who qualify to be examined for First Mate, Intermediate Voyage, Certificate will also qualify for examination for the Master, Ship of Not More Than 350 Tons Gross Tonnage, or Tug, Local Voyage certificate.

## PART II - EXAMINATIONS

14.2 The following table lists the examinations for the Command Certificate, qualifying service necessary before each may be attempted; and other requirements.

Examination	Qualifying Service	Other Requirements
SIM 2 Chartwork and Pilotage	Nil	Must have passed SIM 1
073 Meteorology	Nil	Must hold WKMSR certificate
090 Ship Management	Nil	Must hold WKMSR certificate
110 Ship Stability	Nil	Must hold WKMSR certificate
160 General Seamanship	Total of three years sea service.	All other exams must have been passed before attempting 160.

Note: 092 may be substituted for 090 and 113 may be substituted for 110 at the applicant's request.

14.3 Credits for other certificates of competency held will be awarded in accordance with the table in Appendix F.

## PART III - VALIDITY OF CERTIFICATE

14.4 A certificate as Master, Ship Not More Than 350 Tons, Gross Tonnage or Tug, Local Voyage is valid as master of a vessel not exceeding 350 tons gross tonnage, or a tug of any size on local or minor waters voyage vessels.

## PART IV - SYLLABUSES OF EXAMINATIONS

**14.5 Chartwork and Pilotage**  
**Examination** number SIM 2  
 Companion to Sections 11.6 and 18.5

ITEM	COLUMN
1.	The syllabus of the examination is presented in TP 4958, Simulated Electronic Navigation Courses.
2.	Preparation of Passage To be completed ahead of simulator examination.
3.	Simulator Exercise (duration two hours) Includes items 2, 3, and 4; passage about 20 nautical miles; parallel indexing, including wheel over; complex collision avoidance; course alteration for navigational purposes; all available electronic navigation.

4.	<p>Navigator Notebook</p> <p>Navigator notebook to include chart number and courses for voyage, course alteration and wheel over positions, position of danger areas in the proximity of the intended track, traffic CIPs and distance to next CIP; position where a change of machinery status will be required; parallel indexing information or information on the elements used to construct an ARPA graphic map; radar datum chosen for PI; time of HW/LW and information on tidal currents; pilotage information, if applicable; total distance and steaming time at proposed speed.</p>
5.	<p>Manoeuvre a Ship</p> <p>Manoeuvring a ship, stopping, mooring, and anchoring.</p>
6.	<p>Emergencies</p> <p>Emergencies may be introduced but not at a critical moment during the exercise.</p>

Note: The examination consists of simulated exercises conducted by Marine Safety.

Time for passage planning one and a half to three hours.

Total duration four to five hours.


#### 14.6 Meteorology

##### Examination number 073

Companion to Sections 11.12, 18.8, 19.9 and 20.10

ITEM	COLUMN
1.	<p>Chemical Composition of the Atmosphere</p> <p>Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust, hygroscopic particles, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).</p>
2.	<p>Vertical Structure of the Atmosphere</p> <p>Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parheliion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.</p>
3.	<p>Transfer of Heat</p> <p>Radiation, conduction, convection, and turbulence.</p>
4.	<p>Temperature</p> <p>Related to the atmosphere and the earth; caloric, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.</p>
5.	<p>Atmospheric Moisture and Changes of State</p> <p>Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.</p>
6.	<p>Atmospheric Stability</p> <p>Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke; causes of subsidence; effects of substances, compression heating, evaporation.</p>
7.	<p>Fog</p> <p>Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.</p>

8.	<p>Clouds</p> <p>Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.</p>
9.	<p>Precipitation</p> <p>Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convectional, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.</p>
10.	<p>Lightning</p> <p>Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.</p>
11.	<p>Pressure and Pressure Systems</p> <p>Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isallator, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depression, polar front low, thermal depression, vertical instability depression (e.g., tropical revolving storm); straight isobars, effect of straight isobars on wind, on weather.</p>
12.	<p>Winds</p> <p>Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, pressure and weather characteristics associated with, monsoons in the Indian Ocean and monsoons in the Chins Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevals, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.</p>
13.	<p>Air Masses</p> <p>Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical, equatorial.</p>
14.	<p>Fronts</p> <p>Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).</p>
15.	<p>Families of Depressions or Extra-Tropical Cyclones</p> <p>Formation between two air masses, life cycle and movement cross section, associated weather, frontogenesis, frontolysis, secondary depressions.</p>

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16.	<p><b>Waves and Swells</b></p> <p>Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, description, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.</p>
17.	<p><b>Oceanic Currents and Effect on the Climate</b></p> <p>Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; knowledge of the various currents of the world.</p>
18.	<p><b>Tropical Revolving Storms</b></p> <p>Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: the North Atlantic, the western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.</p>
19.	<p><b>Ice Formation and Decay</b></p> <p>Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs; presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.</p>
20.	<p><b>Ice Detection and Reporting</b></p> <p>Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Canadian Waters and Manice</i>, ice climatology and ice operations, ice navigation in Canadian waters; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, seawater temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.</p>
21.	<p><b>Weather Messages and Codes</b></p> <p>International analysis in code, definition, interpret messages; plot pressure systems, fronts, isobars; forecast 12-24 hours, pressure, wind, sea state, visibility, clouds, weather changes; knowledge of services available; <i>Radio Aids to Marine Navigation, Atlantic and Great Lakes Pacific</i>; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weatherfax, weather, satellite, sea state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weatherfax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts; ability to forecast the following for 12-24 hours: pressure, wind, sea state, visibility, clouds, weather changes.</p>



22.	<p>Optimum Weather Routing</p> <p>Advantages, reduce storm damage, save time, meet special requirements; methods, on board ship, through shore-based firm, through government departments; climatological routing, in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long-range progs are available.</p>
23.	<p>Requirements</p> <p>Application of ship's performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship performance curves and locus positions; factors that require a continuous updating and revision of weather routing procedures.</p>

Note: The examination consists of a written test comprising multiple-choice and descriptive questions.  
Duration is three hours.

**14.7 Ship Management**  
**Examination number 090**  
Companion to Section 15.14

ITEM	COLUMN
1.	<p>Organization</p> <p>Knowledge of the organization of crew for emergencies, drills and routine maintenance; responsibilities under the: Boat and Fire Drill Regulations, Crewing Regulations; official and ship's logbooks, their entries under all conditions.</p>
2.	<p>Acts</p> <p>Working knowledge of the <i>Canada Shipping Act</i> in identifying grades and classes of certificates of competency; rights of holders of certificates; offences relating to certificates; loss of certificates; engagement and discharge of seafarers, in and out of Canada; rights of seafarers; maintenance of discipline; registration of ships; port wardens and steamship inspectors; wrecks, salvage and casualties; provisions, health and accommodation; distressed seafarers; limitation of liability; ship's safety inspection certificates; coasting trade of Canada; <i>Pilotage Act, Canada Labour Code, Part II.</i></p>
3.	<p>Ship's Business</p> <p>Knowledge of custom house and immigration procedures; coasting licence and regulations; de-rat certificates; tonnage certificates; charter parties and bills of lading; noting protest and right to extend; marine insurance contract and its relationship to master's responsibility to owners and underwriters.</p>
4.	<p>Regulations</p> <p>Ship's responsibilities under Shipping Casualty Reporting Regulations; Quarantine Regulations; Potable Water Regulations of Common Carriers; Ship's Crew Food and Catering Regulations; Crewing Regulations; Inspection Certificates for Non-Safety-Convention Ship's Safety Certificate Regulations; Foreign-Going, Home-Trade, Inland Waters and Minor Waters Voyages Regulations; Oil Pollution Prevention Regulations; Occupational Safety and Health Regulations.</p>
5.	<p>Ship's Master</p> <p>Knowledge of master's responsibilities in event of salvage and salvage agreements; obligations and responsibilities in event of emergencies, collision, distress, search and rescue; vessel reporting systems; legal consequences of infractions of regulations; functions of agents; business aspects of putting into port with damaged ship or cargo.</p>
6.	<p>Stability</p> <p>Knowledge and ability to read and interpret stability data particularly related to tugboats, including curves of statical stability; hydrostatic curves; dynamical stability; principle of rudders and rudder design; factors influencing steering; rudder terminology; different types of propulsion.</p>

Note: The examination is written.  
Duration is three hours.

## 14.8 General Seamanship

### Examination number 160

Companion to Sections 15.15 and 16.17

ITEM	COLUMN
1.	<p>Ship-Handling, Routine</p> <p>Fixed- or controlled -pitch propellers, transverse thrust, turning ahead or astern; vessel's pivoting point when manoeuvring with headway and with sternway; head reach and stern reach; effect of cavitation and wake current; rudder force and manoeuvring of twin screws; sail effect of vessel superstructure; berthing, unberthing and use of the water wedge in ship handling; locking and unlocking a vessel, including precautions to avoid girding; anchoring to a single-bower anchor; anchoring to a stern anchor, mooring to two anchors; mooring to a buoy; turning a vessel short round; bank suction and cushion effect in narrow channels; the effect of shallow water resistance on ship's behaviour; use of mooring lines and ground tackle in all circumstances; the use of tugs in manoeuvring.</p>
2.	<p>Ship-Handling, Exceptional</p> <p>Practical handling and managing a ship in exceptional circumstances; loss of or damage to rudder and the use of auxiliary means of steering; steering by screws; rigging jury rudder or jury steering gear; damage control in case of collision, grounding, fire, explosion or other accident; procedure when grounded and methods of refloating; procedure when beaching a vessel; procedure in case of wreck with emphasis on preservation of life, methods of abandoning a wrecked vessel; steps to be taken when disabled and in distress; taking and being taken in tow; rescuing crew of a disabled vessel or person in the water; manoeuvring in bad weather; heaving to and running before a sea; dangers of being pooped; keeping head to sea; the use of oil in bad weather and rescue operations; keeping a disabled vessel out of trough and lessening lee drift.</p>
3.	<p>Ship-Handling, Unusual</p> <p>Practical handling and manoeuvring of a ship in unusual circumstances; retrieval of man overboard; procedures in ice, alone or in convoy, and movements to be expected by an ice breaker with reference to Transport Canada publication <i>Ice Navigation in Canadian Waters</i>; search and rescue procedures, including the responsibilities of the on-scene commander, with reference to MERSAR, CANMERSAR and Transport Canada publications; precautions to be taken in bad weather.</p>
4.	<p>Dry-docking</p> <p>Procedures and precautions observed when dry-docking, effect of distribution of weight, dry-docking with a full cargo, use of bilge blocks; dry-dock inspections and precautions to be observed in dry-dock; procedure to be followed prior to and during refloating.</p>
5.	<p>Duties and Responsibilities of the Master</p> <p>On first joining a vessel; official documents on board a vessel; issuance and understanding of standing, general, night and special orders; berthing and unberthing under all conditions; manoeuvring a vessel and assessing risks involved; underway, in port or at anchor under all circumstances and conditions, shipboard, local and general emergencies of any nature; verifying information on the ship's manoeuvring characteristics, determining approximate manoeuvring data and recording the ship's manoeuvring peculiarities; setting and manning the watches according to regulation and during exceptional circumstances; organizing the crew and other persons for routine operation and emergencies of all kinds; maintaining equipment in good condition.</p>
6.	<p>Basics of Naval Architecture</p> <p>Volumes of ship shapes; centres of gravity (G) and buoyancy; couples; righting moment and righting arm; inertia; equilibrium; freeboard; movement of G, real and virtual; free surface effects; metacentre and metacentric height; list, loll and increase in draft due to each; factors affecting static stability; damage stability; effect of beam and freeboard on stability; dry-docking and grounding; dynamical stability.</p>
7.	<p>Regulations</p> <p>Collision Regulations with Canadian Modifications 1983; Code of Nautical Procedures and Practices; Canadian Buoyage System.</p>


Note: The examination is oral and practical.  
Duration as necessary.

## 14.9 Stability

### Examination number 110

ITEM	COLUMN
1.	<p>Ship's Draft</p> <p>Draft and freeboard, including effect of water density and fresh water allowance; use of displacement and ton per inch / tonne per centimetre (TPI / TPC) scales to determine displacement from draft and vice versa; statutory freeboard and loadlines; general loadline rules (sea) and loadline rules for lakes and rivers (inland).</p>
2.	<p>Terms</p> <p>Meaning of displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights: angle of heel, righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability; danger of slack tanks; effect of beam and freeboard on stability; angle of loll; heel due to turning; period of roll; centre of flotation (F) and trim, and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL); meaning and characteristics of stiff and tender ships.</p>
3.	<p>Stability Data</p> <p>Use of stability data supplied to typical vessels and towboats, allowing for the effect of water density on draft and displacement; interpreting curves of statical stability, achieving satisfactory transverse stability, achieving the desired trim; existence of transverse moment exerted on the towing hook; effect of adding, removing and transferring weights on draft, list and trim, allowing for the free surface effect of tanks and change of stability during the voyage; effects of reduction in freeboard on stability and the dangers of overloading and capsizing; dangers due to icing effects.</p>


Note: The examination consists of multiple-choice questions and practical calculations based on ship's stability data booklet.  
Duration is three hours.

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## CHAPTER 15 - MASTER, LIMITED

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 15.1 (1) Every applicant for a certificate as Master, Limited, for a ship not exceeding 60 tons gross tonnage, not carrying passengers shall:
- (a) acquire two months of service performing deck department duties on a ship that is of a tonnage and that engages on voyages similar to the tonnage and voyages of the ship for which the certificate is sought;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with a radiotelephone station;
  - (d) obtain:
    - (i) a certificate of completion for Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655;
    - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages; or
    - (iii) a pass in a practical examination using the ship's equipment for marine emergencies and questions relating to Basic Safety (A1) of the Marine Emergency Duties Course, set out in TP 4957; and
  - (e) pass an examination as specified in section 15.7.
- 15.2 (1) Every applicant for a certificate as Master, Limited, for a ship not exceeding 60 tons gross tonnage, carrying passengers shall:
- (a) acquire two months of service performing deck department duties on a ship that is of a tonnage and that engages on voyages similar to the tonnage and voyages of the ship for which the certificate is sought;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with a radiotelephone station;
  - (d) obtain:
    - (i) a certificate of completion for Small Vessel Safety (A2) of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655; or
    - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages;
  - (e) obtain a Marine First Aid Basic Certificate, set out in TP 13008; and
  - (f) pass an examination as specified in section 15.7.

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- 15.3 (1) Every applicant for a certificate as Master, Limited, for a pleasure yacht exceeding 20 metres in length shall:
- (a) complete the service for a period determined by the examiner and performed on vessels with tonnage and voyages equivalent to the certificate sought, all of which may have been performed on pleasure yachts while holding a First Mate, Limited, Certificate valid on a pleasure yacht exceeding 20 meters;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with a radiotelephone station;
  - (d) obtain certificates in approved courses as determined by the examiner; and
  - (e) pass an examination as specified in section 15.7.
- 15.4 (1) Subject to Section 15.6.1, every applicant for a certificate as Master, Limited, for a ship exceeding 60 tons gross tonnage, other than a certificate referred to in subsections 15.3, 15.5 and 15.6, shall:
- (a) complete six months service after obtaining a certificate as a Restricted Watchkeeping Mate, Ship, or First Mate, Limited, as officer in charge of the watch on a ship of not less than 25 tons gross tonnage making voyages within the waters for which the certificate relates or on equivalent voyages;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with a radiotelephone station;
  - (d) meet the requirements of paragraph 15.1 (d) or 15.2 (d), according to whether or not passengers are carried;
  - (e) where the ship has multiple enclosed decks or boat or liferaft launching equipment, obtain a certificate of completion for each of the following courses of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
    - (i) Survival Craft (B1);
    - (ii) Marine Fire Fighting (B2);
    - (iii) for Officers (C); and
    - (iv) for Senior Officers (D);
  - (f) where the ship carries electronic navigation equipment obtain a certificate of completion for a Simulated Electronic Navigation Course Level I, set out in TP 4958, from a school listed in TP 10655;
  - (g) after fulfilling the requirement in (f) pass a practical examination in Simulated Electronic Navigation Level I;
  - (h) obtain a Marine First Aid Basic Certificate, set out in TP 13008 if the ship carries passengers; and
  - (i) pass an examination as specified in section 15.7.


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15.5 (1) Every applicant for a certificate as Master Limited, Short-Run Ferry Ship, shall:

- (a) complete three months service after obtaining a certificate as Restricted Watchkeeping Mate, Ship, or First Mate, Limited, as officer in charge of the watch engaged on voyages in the waters to which the certificate relates or on equivalent voyages;
- (b) obtain a medical certificate prescribed by the Crewing Regulations;
- (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with a radiotelephone station;
- (d) obtain:
  - (i) a certificate of completion for Small Vessel Safety (A2) Course of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655;
  - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages; or
  - (iii) a pass in a practical examination using the ship's emergency equipment in the following Marine Emergency Duties subjects:
    - (A) Small Vessel Safety (A2);
    - (B) Survival Craft (B1);
    - (C) Marine Fire Fighting (B2);
    - (D) for Officers (C); and
    - (E) for Senior Officers (D);
- (e) obtain a Marine First Aid Basic Certificate, set out in TP 13008 if the ship carries passengers; and
- (f) pass an examination as specified in 15.7.

15.6 (1) Every applicant for a certificate as Master, Limited, Intermediate-Run Ferry Ship, shall:

- (a) complete 12 months service after obtaining a certificate as Restricted Watchkeeping Mate, Ship, or First Mate, Limited, as officer in charge of the watch on board a ferry ship on intermediate runs within minor waters or within harbours, ports, bays inlets or sheltered coastal waters to which the certificate relates or on equivalent voyages;
- (b) obtain a medical certificate prescribed by the Crewing Regulations;
- (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with a radiotelephone station;
- (d) obtain a certificate of completion for the following courses of the Marine Emergency Duties set out in TP 4957 from a school listed in TP 10655:
  - (i) Small Vessel Safety (A2)
  - (ii) Survival Craft (B1);
  - (iii) Marine Fire Fighting (B2);
  - (iv) for Officers (C); and
  - (v) for Senior Officers (D);
- (e) obtain a certificate of completion for a Simulated Electronic Navigation Course Level I, set out in TP 4958, from a school listed in TP 10655;
- (f) pass a practical examination in Simulated Electronic Navigation Level I;
- (g) obtain a Marine First Aid Basic Certificate, set out in TP 13008 if the ship carries passengers; and

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(h) pass an examination as specified in section 15.7.

- 15.6.1 In lieu of the requirements of Section 15.4(e), every applicant for a Master, Limited certificate for a passenger ship of more than 60 tons that is not a short-run or intermediate-run ferry and is used for a seasonal operation between March 31 and December 1 in any year in minor waters within five nautical miles of shore shall provide the examiner with a certificate of the applicant's successful completion, at a recognized institution, of a course in marine emergency duties with respect to small vessel safety (A2), survival craft (B1) and marine fire fighting (B2), or a TC approved equivalent.

## **PART II - EXAMINATIONS**

- 15.7 The examination is based on as much of the syllabus, as determined by the examiner and deemed appropriate to the area of operation, type of craft and equipment carried on board ship, for which the certificate is to be valid.

Note: The examination is oral and practical, and it includes written papers.

## **PART III - VALIDITY OF CERTIFICATE**

- 15.8 The certificate is valid for a period of five years beginning on the date on which it is issued and only
- (a) within the voyage area specified on the certificate;
  - (b) on the ship or ships specified on the certificate; and
  - (c) where the ship is not a pleasure craft and is engaged on
    - (i) a voyage that does not go beyond the minor waters of Canada,
    - (ii) a voyage within a harbour, port, bay, inlet or similar sheltered waters off the coast of Canada, or
    - (iii) in the case of a ship of not more than 60 tons, a limited voyage off the coast of Canada.

## **PART IV - SYLLABUSES OF EXAMINATIONS**

- 15.9 (1) The questions used in the examination may be taken from the following tables.
- (2) Sections 15.10, 15.11, 15.12, 15.13 and 15.17 are considered an appropriate guide to examination for a certificate as Master, Limited, set out in sections 15.1, 15.2, 15.3 and 15.4.
  - (3) Sections 15.14, 15.15, 15.16, 15.17 and 15.18 are considered an appropriate guide to examination for a certificate as Master, Limited, Short-Run Ferry, set out in section 15.5.
  - (4) Sections 15.11, 15.13, 15.19, and 15.20 are considered an appropriate guide to examination for a certificate as Master, Limited, Intermediate-Run Ferry, set out in section 15.6.
  - (5) Section 15.21 sets out the Simulated Electronic Navigation Course for the certificates of Master, Limited, for a ship exceeding 60 tons when fitted with electronic navigation equipment and Master, Limited, Intermediate-Run Ferry.

### 15.10 Navigation Safety

#### Examination number 062

Companion to Section 11.7

ITEM	COLUMN
1.	Navigation Safety Practical application of rules from an interpretation in multi-ship navigational situations; Regulations for the Prevention of Collisions with Canadian Modifications 1983; multi-ship or multi-factor navigational situations involving more than one rule, more than one factor of Radar Annex; Ship Routing Regulations; inconsistencies between regulations, ordinary practices of seafarer; application of STCW Code section A-VIII/2; Notice to Mariners – Annual Edition.

Note: The examination consists of a screening test and oral examination.  
Duration approximately one and a half hours, as necessary.

### 15.11 Ship Management

#### Examination number 092

ITEM	COLUMN
1.	Business and Law The provisions of the <i>Canada Shipping Act</i> relating to ship safety, ship registration, ship manning, seafarers' rights, pollution and protection; certification of seafarers; accident investigation; use of councillor offices; engagement and discharge of seafarers, in and out of Canada; maintenance of discipline; port wardens and steamship inspectors; limitation of liability; provisions, health and accommodation; <i>Pilotage Act</i> ; pilotage; coasting trade, coasting licences and regulations; customs and immigration procedures; <i>Carriage of Goods by Water Act</i> ; control of ships and Canada's international obligations.
2.	Contracts Marine insurance; charter parties, deviation and its effect on various contracts; function of ship's agents; master's responsibilities in the event of salvage and salvage agreements; business aspects of putting into port with damaged ship or cargo; noting and extending protest.
3.	Management General organization of ship's management; shipboard accounting; procurement of ship's stores; entering and clearing ships in foreign ports; sick seafarers in foreign ports; crew training; crew union representation; putting into port with damaged ship or cargo.
4.	Conventions Function and jurisdiction of International Maritime Organization, International Labour Organization, Safety Of Life at Sea, Standards of Training, Certification and Watchkeeping for Seafarers 1978; Antwerp Rules; United Nations Convention on Trade and Development; Tonnage Measurement 1976; tonnage rules for coasting; Suez and Panama rules; articles, regulations and resolutions; MARPOL.
5.	Regulations Regulations governing: Shipping Casualties Reporting; Vessel Traffic Reporting Systems; Foreign-Going, Home-Trade, Inland Waters and Minor Waters Voyage; Potable Water; Medical Examination of Seafarers; Quarantine; Ship's Crew Food and Catering; Inspection Certificate for Non-Convention Ships; Safety Certificate; Oil Prevention; <i>Canada Labour Code Part II</i> , pertaining to marine; ship's obligation and responsibilities in the event of emergencies, collision, distress, search and rescue; legal consequences of infractions of regulation.

Note: The examination consists of a written test.



**15.12 Engineering Knowledge**  
**Examination number 132**

<b>ITEM</b>	<b>COLUMN</b>
1.	Piping Construction, operation and maintenance of bilge, ballast and cargo pumping systems, valves, drains, manifolds, strum boxes, change-over bells and blank flanges; precautions to be observed in the operation of piping systems, cross connections, venting and overflow; routine pumping operations.
2.	Steering Systems Mechanical and hydraulic steering gears, follow-up and non-follow-up systems, emergency steering arrangements, starting power of steering gears, routine checks of steering gear, operation of steering gears, principles and operating characteristics of automatic steering systems, safety and precautions of operation.
3.	Deck Machinery Mechanical and hydraulic deck machinery; operating safety precautions; general arrangements of windlasses, capstans, winches, cranes and derricks, standing and running rigging; lubrication; inspection, testing and records.
4.	Pumps Purpose, general characteristics and operational safety of reciprocating, centrifugal and screw displacement pumps.
5.	Fixed Fire Detection and Extinguishing General principles, testing, maintenance and operational characteristics of fire-detection and -extinguishing systems: heat-detecting systems and alarms; smoke-detecting systems and alarms; automatic and manual sprinkler systems; CO <sub>2</sub> and inert-gas smothering systems; emergency shut-offs.
6.	Remote Control General principles and operational characteristics of remote-control main engine and thruster units, safety and precautions in operating, changing over from engine room to bridge control, interlocks, overloading and re-setting, time delays, operation minimum speed, block diagram of major components.
7.	Tank-Sounding and Draft-Measuring Gauges General principles and operation of tank-sounding gauges and draft-measuring gauges, safety in operation, reliability, maintenance, purging, calibration, block diagrams of system.

Note: The examination consists of a multiple-choice test.

### 15.13 General Seamanship

#### Examination number 163

Companion to Section 11.10

ITEM	COLUMN
1.	Manoeuvring Information. Tables of stopping distances; turning circle diagrams and derivation of appropriate information of ship characteristics.
2.	Ship-Handling, Routine Fixed- or controlled-pitch propeller or propellers, transverse thrust, turning ahead or astern; vessel's pivoting point when manoeuvring with headway and with sternway; head reach and stern reach; effect of cavitation and wake current; rudder force and manoeuvring of twin screws; sail effect of vessel superstructure; berthing, unberthing and use of the water wedge in ship handling; locking and unlocking a vessel; anchoring to a single-bower anchor; anchoring to a stern anchor, mooring to two anchors; mooring to a buoy; turning a vessel short round; bank suction and cushion effect in narrow channels; the effect of shallow water resistance on ship's behaviour; use of mooring lines and ground tackle in all circumstances; the use of tugs in manoeuvring.
3.	Ship-Handling, Exceptional Practical handling and managing a ship in exceptional circumstances, loss of or damage to rudder and the use of auxiliary means of steering; steering by screws; rigging jury rudder or jury steering gear; damage control in case of collision, grounding, fire, explosion or other accident; procedure when grounded and methods of refloating; procedure when beaching a vessel; procedure in case of wreck with emphasis on preservation of life, methods of abandoning a wrecked vessel; steps to be taken when disabled and in distress; taking and being taken in tow; rescuing crew of a disabled vessel or person in the water; manoeuvring in bad weather, heaving to and running before a sea; dangers of being pooped; keeping head to sea; the use of oil in bad weather and rescue operations; keeping a disabled vessel out of trough and lessening lee drift.
4.	Ship-Handling, Unusual Practical handling and manoeuvring a ship in unusual circumstances, retrieval of man overboard; procedures in ice, alone or in convoy, and movements to be expected by an ice breaker with reference to Transport Canada publication <i>Ice Navigation in Canadian Waters</i> ; search and rescue procedures, including the responsibilities of the on-scene commander, with reference to MERSAR, CANMERSAR and Transport Canada publications; precautions to be taken in bad weather.
5.	Dry-Docking Procedures and precautions observed when dry-docking, effect of distribution of weight, dry-docking with a full cargo, use of bilge blocks; dry-dock inspections and precautions to be observed in dry-dock; procedure to be followed prior to and during refloating.
6.	Duties and Responsibilities of the Master: On first joining a vessel; official documents on board a vessel; issuance and understanding of standing, general, night and special orders; berthing and unberthing under all conditions; manoeuvring a vessel and assessing risks involved; underway, in port or at anchor under all circumstances and conditions; shipboard, local and general emergencies of any nature; verifying information on the ship's manoeuvring characteristics, determining approximate manoeuvring data, and recording the ship's manoeuvring peculiarities; setting and manning the watches according to regulation and during exceptional circumstances; organizing the crew and other persons for routine operation and emergencies of all kinds; maintaining equipment in good condition.
7.	Regulations Collision Regulations with Canadian Modifications 1983; Canadian Buoyage System; Code of Nautical Procedures and Practices; <i>Canada Labour Code Part II</i> ; WHIMIS.

Note: This examination is oral.  
Duration as necessary.


### 15.14 Ship Management

#### Examination number 090

Companion to Section 14.7

ITEM	COLUMN
1.	<p>Organization</p> <p>Organization of crew for emergencies, drills and routine maintenance; responsibilities under the Boat and Fire Drill Regulations and Crewing Regulations; official and ship's logbooks, their entries under all conditions.</p>
2.	<p>Acts</p> <p><i>Canada Shipping Act</i>: identify grades and classes of certificates of competency; rights of holders of certificates; offences relating to certificates; loss of certificates; engagement and discharge of seafarers in and out of Canada; rights of seafarers; maintenance of discipline; registration of ships; port wardens and steamship inspectors; wrecks, salvage and casualties; provisions, health and accommodation; distressed seafarers; limitation of liability; ship's safety inspection certificates; coasting trade of Canada; <i>Pilotage Act</i>; <i>Canada Labour Code Part II</i>.</p>
3.	<p>Ship's Business</p> <p>Custom house and immigration procedures; coasting licence and regulations; de-rat certificates; tonnage certificates; charter parties and bills of lading; protest, note and extend; marine insurance contract and its relationship to the master's responsibility to owners and underwriters.</p>
4.	<p>Regulations</p> <p>Ship's responsibilities under Shipping Casualties Reporting Regulations; Quarantine Regulations; Potable Water Regulations for Common Carriers; Ship's Crew Food and Catering Regulations; Crewing Regulations, Inspection Certificates for Non-Safety Convention Ships; Safety Certificate Regulations; Foreign-Going, Home-Trade, Inland Waters and Minor Waters Voyages Regulations; Oil Pollution Prevention Regulations; Occupation Safety and Health Regulations.</p>
5.	<p>Ship's Master</p> <p>Responsibilities in event of salvage and salvage agreements; obligations and responsibilities in event of emergencies, collision, distress, search and rescue; vessel reporting systems; legal consequences of infractions of regulations; functions of agents; business aspects of putting into port with damaged ship/cargo.</p>
6.	<p>Stability</p> <p>Relating particularly to tugboat stability: curves of statical stability; hydrostatic curves; dynamical stability; principle of rudders and rudder design; factors influencing steering; rudder terminology; different types of propulsion.</p>

Note: The examination is written.  
Duration is 3 hours.

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### 15.15 General Seamanship

#### Examination number 160

Companion to Section 14.8

ITEM	COLUMN
1.	Ship-Handling, Routine Fixed- or controlled-pitch propeller or propellers, transverse thrust, turning ahead or astern; vessel's pivoting point when manoeuvring with headway and with sternway; head reach and stern reach; effect of cavitation and wake current; rudder force and manoeuvring of twin screws; sail effect of vessel superstructure; berthing, unberthing and use of the water wedge in ship handling; locking and unlocking a vessel, including precautions to avoid girding; anchoring to a single-bower anchor; anchoring to a stern anchor, mooring to two anchors; mooring to a buoy; turning a vessel short round; bank suction and cushion effect in narrow channels; the effect of shallow water resistance on ship's behaviour; use of mooring lines and ground tackle in all circumstances; the use of tugs in manoeuvring.
2.	Ship-Handling, Exceptional Practical handling and managing of a ship in exceptional circumstances, loss of or damage to rudder and the use of auxiliary means of steering; steering by screws; rigging jury rudder or jury steering gear; damage control in case of collision, grounding, fire, explosion or other accident; procedure when grounded and methods of refloating; procedure when beaching a vessel; procedure in case of wreck with emphasis on preservation of life, methods of abandoning a wrecked vessel; steps to be taken when disabled and in distress; taking and being taken in tow; rescuing crew of a disabled vessel or person in the water; manoeuvring in bad weather, heaving to and running before a sea; dangers of being pooped; keeping head to sea; the use of oil in bad weather and rescue operations; keeping a disabled vessel out of trough and lessening lee drift.
3.	Ship-Handling, Unusual Practical handling and manoeuvring a ship in unusual circumstances; retrieval of man overboard; procedures in ice, alone or in convoy, and movements to be expected by an ice breaker with reference to Transport Canada publication <i>Ice Navigation in Canadian Waters</i> ; search and rescue procedures, including the responsibilities of the on-scene commander, with reference to MERSAR, CANMERSAR and Transport Canada publications; precautions to be taken in bad weather.
4.	Dry-Docking Procedures and precautions observed when dry-docking, effect of distribution of weight, dry-docking with a full cargo, use of bilge blocks; dry-dock inspections and precautions to be observed in dry-dock; procedure to be followed prior to and during refloating.
5.	Duties and Responsibilities of the Master On first joining a vessel; official documents on board a vessel; issuance and understanding of standing, general, night and special orders; berthing and unberthing under all conditions; manoeuvring a vessel and assessing risks involved; underway, in port or at anchor under all circumstances and conditions; shipboard, local and general emergencies of any nature; verifying information on the ship's manoeuvring characteristics, determining approximate manoeuvring data, and recording the ship's manoeuvring peculiarities; setting and manning the watches according to regulation and during exceptional circumstances; organizing the crew and other persons for routine operation and emergencies of all kinds; maintaining equipment in good condition.
6.	Basics of Naval Architecture Volumes of ship shapes; centres of gravity (G) and buoyancy; couples; righting moment and righting arm; inertia; equilibrium; freeboard; movement of G, real and virtual; free surface effects; metacentre and metacentric height; list, loll and increase in draft due to each; factors affecting static stability; damage stability; effect of beam and freeboard on stability; dry-docking and grounding; dynamical stability.
7.	Regulations Collision Regulations with Canadian Modifications 1983; Code of Nautical Procedures and Practices; Canadian Buoyage System.

Note: The examination is oral and practical.  
Duration as necessary.

### 15.16 Navigation Instruments

#### Examination number 020

Companion to Sections 16.14, 20.6 and 21.5

ITEM	COLUMN
1.	<p><b>Radar</b></p> <p>Use of all radar operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustments of controls; periodic operator checks and determination of heading marker, bearing marker, range ring and range marker error; obtaining ranges and bearings from equipment using proper reporting procedures and recognition of targets of all types; recognition of meteorological phenomena and false, multiple, and second-trace echoes and side lobes and interference; knowledge of the limitations of radar, sufficient to ensure safe navigation; correcting range and bearing data for known errors; use of radar data (i.e. position fixing, following a track, matching radar image to chart, radar plotting restricted to ability to determine CPA and time); use of reflection plotter, radar horizon and extreme-range charts and tables, operator's manual and radar logbook.</p>
2.	<p><b>Decca</b></p> <p>Use of all Decca operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; periodic operator checks and determination of errors in the fraction, lane, and zone indicators, and in the L.I lamp sequence meter; obtaining readings from equipment; limitations of Decca sufficient to ensure safe navigation; correcting readings for fixed and variable errors; use of Decca data for position fixing, use of Decca over-printed charts, and minimizing effect of variable errors; use of Decca data sheets and operator's manual.</p>
3.	<p><b>Loran</b></p> <p>Use of all Loran operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustment of controls; periodic operator checks and knowledge of compensation for measurement and instrument errors; obtaining readings from equipment; recognition of unwanted data, blinking and sky-waves; limitations of Loran, sufficient to ensure safe navigation; use of Loran data for position fixing, use of Loran over-printed charts, and minimizing effect of variable errors; use of operator's manual.</p>
4.	<p><b>Echo-Sounding Machine</b></p> <p>Use of echo-sounder controls and interpretation of display.</p>

Note: The examination is a practical test.  
Duration as necessary.

### 15.17 Chartwork and Pilotage

#### Examination number 040

Companion to Sections 16.15 and 21.6

ITEM	COLUMN
1.	Charts The chart, its nature and function as an aid to navigation; practical effects of projection distortion, numbering and the presentation of information, factors affecting reliability of charts; ability to use Mercator and polyconic charts; chart symbols and abbreviations as published in <i>Canadian Hydrographic Service Chart No. 1</i> .
2.	Publications Light characteristics and colours and sound signals used as aids to navigation, List of Lights, Buoys and Fog Signals; Canadian Buoyage System and its use; use and purpose of Canadian Notices to Shipping and Mariners, and chart corrections.
3.	Chartwork Locating a vessel's position on the chart by simultaneous true bearings and/or true bearing and distance; locating a vessel's position by two or more simultaneous distances. Determining the latitude and longitude of a given position; locating a position by its latitude and longitude, and its true bearing and distance from a given point. Laying off a course between given positions; measuring the true direction of a course laid-off on the chart; measuring distance on the chart. Finding the DR position, given course, speed and time elapsed from the last observed position by plotting on a chart or by other acceptable method of the applicant's choice. Demonstrating an appreciation that current and/or wind may affect the vessel's course and speed over the ground; determination of speed over the ground between observed positions; determining the true course made good between observed positions.
4.	Records and Errors Appreciation of the need to keep an accurate record of the vessel's progress, and the keeping of this record; care of dividers and parallel rulers. Periodic operator checks and determination of compass error by comparison with true terrestrial bearings or headings; determining and recording compass deviation; use of the magnetic compass to determine accuracy of the gyro compass by comparison; correcting courses and bearings for compass error, magnetic variation and deviation; use of table of deviations.

Note: The examination is oral and includes a practical chart paper.  
Duration as necessary.

### 15.18 Navigation Safety

#### Examination number 060

Companion to Section 16.16

ITEM	COLUMN
1.	General Knowledge Knowledge of the content of the following regulations and International Maritime Organisation (IMO) documents: Collision Regulations with Canadian Modifications 1983; Operational Guidance for Officers in Charge of a Navigational Watch, STCW Code section A-VIII/2.

Note: The examination is a multiple-choice test. The applicant has the option of taking it in either oral or written format.  
Duration as necessary.

### 15.19 Ship Management

#### Examination number 091

Companion to Section 16.10

ITEM	COLUMN
1.	Industrial Safety Tackle Regulations, inspection and testing of gear and machinery and the maintenance of the machinery register; Safe Working Practices Regulations, emphasizing the recognition and correction of unsafe practices; precautions for vessels under fumigation; <i>Canada Labour Code</i> for Industrial Safety; Oil Pollution Prevention Regulations, MARPOL extended to include interpretations, and ship's responsibilities under them.
2.	Stress on Tackle Calculation of stresses in the various parts of single boom and union rig; methods of testing.
3.	Ship Management Organization of crew for emergencies, drills and routine operations and maintenance; ship's responsibilities under Boat and Fire Drill Regulations, Crewing Regulations; <i>Canada Shipping Act</i> and regulations, grades and classes of certificates of competency, rights of holders of certificates, offences relating to certificates, loss and replacement of certificates, seafarers' rights concerning wages.
4.	Records Official and ship's logbooks, and entries under all conditions.

Note: An open book examination.  
The examination consists of a multiple-choice test, calculations and descriptive questions.

### 15.20 Stability

#### Examination number 112

Companion to Sections 12.6 and 16.12

ITEM	COLUMN
1.	Ship's Draft Draft, including effect of water density and fresh water allowance; use of displacement and ton per inch/tonne per centimetre (TPI/TPC) scales to determine displacement from draft and vice versa; statutory freeboard and loadlines; general loadline rules and loadline rules for lakes and rivers.
2.	Terms Meaning of block coefficient, displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights; righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability, danger of slack tanks; centre of flotation (F) and trim and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL).
3.	Stability Data Use of stability data supplied to typical bulk-oil and oil-and-ore carriers, general cargo vessels and package freighters to perform these operations: allowing for effect of water density on draft and displacement, interpreting curves of statical stability, achieving satisfactory transverse stability, achieving desired trim, loading and discharging problems, list created during loading or discharging, counteracting trim and list together, allowing for free surface effect of tanks, change of stability during voyage.
4.	Mensuration Areas and volumes of common figures, squares, rectangles, triangles, cubes, cones, wedges, cylinders, spheres; centre of gravity of common areas and volume.

Note: The examination consists of a multiple-choice questions and a practical calculations based on ships' stability data booklets.  
Duration is three hours.

### 15.21 Navigation Instruments


#### Examination number SIM 1

Companion to Sections 13.9, 16.21 and 19.6

ITEM	COLUMN
1.	The syllabus for the examination is presented in TP 4958, Simulated Electronic Navigation Courses.

Note: The examination consists of a check list approved by the instructor after a practical and oral test at an approved school; a multiple-choice examination conducted by an approved school and subject to scrutiny and monitoring by Transport Canada; and an examination conducted by Marine Safety with simulated exercises.  
Duration is three and a half hours.




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## CHAPTER 16 - FIRST MATE, LIMITED

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 16.1 (1) Every applicant for a certificate as First Mate, Limited, for a ship not exceeding 60 tons gross tonnage, not carrying passengers shall:
- (a) complete one month service in the area for the requested certificate on a ship of not less than five tons gross tonnage;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
  - (d) obtain
    - (i) a certificate of completion for Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655;
    - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages; or
    - (iii) a pass in a practical examination using the ship's equipment for marine emergencies, and questions relating to Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957; and
  - (e) pass an examination as specified in 16.7.
- 16.2 Every applicant for a certificate as First Mate, Limited, for a ship not exceeding 60 tons gross tonnage, carrying passengers shall:
- (a) complete one month service in the area for the requested certificate on a ship of not less than five tons gross tonnage;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
  - (d) obtain:
    - (i) a certificate of completion for Small Vessel Safety (A2) of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655; or
    - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages;
  - (e) obtain a Marine First Aid Basic Certificate, set out in TP 13008; and
  - (f) pass an examination as specified in 16.7

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- 16.3 Every applicant for a certificate as First Mate, Limited, for a pleasure yacht that exceeds 20 metres in length shall:
- (a) complete the service for a period determined by the examiner and performed on vessels with tonnage and voyage equivalent to the certificate sought, all of which may have been performed on pleasure yachts exceeding 20 metres in length;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
  - (d) obtain certificates in approved courses, as determined by the examiner; and
  - (e) pass an examination as specified in 16.7.
- 16.4 Subject to subsection 16.6.1, every applicant for a certificate as First Mate, Limited, for a ship exceeding 60 tons gross tonnage, other than a certificate referred to in 16.3, 16.5 and 16.6, shall:
- (a) complete six months service on a ship of not less than 25 tons gross tonnage making voyages within the waters to which the certificate relates or on equivalent voyages;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
  - (d) meet the requirements of paragraph 16.1 (d) or 16.2 (d), according to whether or not passengers are carried;
  - (e) where the ship has multiple enclosed decks or boat or liferaft launching equipment, obtain a certificate of completion for each of the following courses of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
    - (i) Survival Craft (B1);
    - (ii) Marine Fire Fighting (B2); and
    - (iii) for Officers (C);
  - (f) where the ship carries electronic navigation equipment, obtain a certificate of completion for a Simulated Electronic Navigation Course Level I, set out in TP 4958, from a school listed in TP 10655;
  - (g) after fulfilling the requirement of (f), pass a practical examination in Simulated Electronic Navigation Level I;
  - (h) obtain a Marine First Aid Basic Certificate, set out in TP 13008 if the ship carries passengers; and
  - (i) pass an examination as specified in 16.7.
- 16.5 Every applicant for a certificate as First Mate, Limited, Short-Run Ferry Ship, shall:
- (a) complete one month service in the waters to which the certificate relates or on equivalent voyages;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;


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- (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
- (d) obtain
  - (i) a certificate of completion for Small Vessel Safety (A2) course of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655;
  - (ii) at a minimum, a certificate of completion for small vessel safety (A3) course where the ship is not more than 15 GT and it is engaged in minor waters or Home Trade, class IV voyages; or
  - (iii) a pass in a practical examination using the ship's emergency equipment for the following subjects in the Marine Emergency Duties Courses:
    - (A) Small Vessel Safety (A2);
    - (B) Survival Craft (B1);
    - (C) Marine Fire Fighting (B2); and
    - (D) for Officers (C);
- (e) obtain a Marine First Aid Basic Certificate, set out in TP 13008 if the ship carries passengers; and
- (f) pass an examination as specified in 16.7.

16.6 Every applicant for a certificate as First Mate, Limited, Intermediate-Run Ferry Ship, shall:

- (a) complete 24 months service on board a ferry ship on intermediate runs within minor waters or within harbours, ports, bays inlets or sheltered coastal waters to which the certificate relates or on equivalent voyages;
- (b) obtain a medical certificate prescribed by the Crewing Regulations;
- (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada if the ship is fitted with radiotelephone station;
- (d) obtain a certificate of completion for the following courses of the Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
  - (i) Small Vessel Safety (A2)
  - (ii) Survival Craft; (B1)
  - (iii) Marine Fire Fighting (B2);
  - (iv) for Officers (C); and
  - (v) for Senior Officers (D);
- (e) obtain a certificate of completion for a Simulated Electronic Navigation Course Level I, set out in TP 4958, from a school listed in TP 10655;
- (f) after fulfilling the requirements of (e), pass a practical examination in Simulated Electronic Navigation Level I;
- (g) obtain a Marine First Aid Basic certificate, set out in TP 13008 if the ship carries passengers; and
- (h) pass an examination as specified in 16.7.

16.6.1 In lieu of the requirements of Section 16.4(e), every applicant for a first mate, limited certificate for a passenger ship of more than 60 tons that is not a short-run or intermediate-run ferry and is used for a seasonal operation between March 31 and December 1 in any year in minor waters within five nautical miles of shore shall provide the examiner with a certificate of the applicant's successful completion, at a recognized institution, of a course in marine emergency duties with respect to small vessel safety (A2), survival craft (B1) and marine fire fighting (B2), or a TC approved equivalent.

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## PART II - EXAMINATIONS

16.7 The examination is based on as much of the syllabus, as determined by the examiner and deemed appropriate to the area of operation, type of craft and equipment carried on board ship, for which the certificate is to be valid.

Note: The examination is oral and practical and it includes written papers.

## PART III - VALIDITY OF CERTIFICATE

16.8 The certificate is valid for a period of five years beginning on the date on which it is issued and only

- (a) within the voyage area specified on the certificate;
- (b) on the ship or ships specified on the certificate; and
- (c) where the ship is not a pleasure craft and is engaged on
  - (i) a voyage that does not go beyond the minor waters of Canada,
  - (ii) a voyage within a harbour, port, inlet or similar sheltered waters off the coast of Canada, or
  - (iii) in the case of a ship of not more than 60 tons, a limited voyage off the coast of Canada.

## PART IV - SYLLABUSES OF EXAMINATIONS

- 16.9 (1) The questions used in the examination may be taken from the following tables.
- (2) Sections 16.10, 16.11, 16.12, 16.13 and 16.15 are considered an appropriate guide to examination for certificates as Mate, Limited, set out in sections 16.1, 16.2, 16.3 and 16.4.
  - (3) Sections 16.14, 16.15, 16.16 and 16.17 are considered an appropriate guide to examination for a certificate as Mate, Limited, Short-Run Ferry, set out in section 16.5.
  - (4) Sections 16.18, 16.19, 16.20 are considered an appropriate guide to examination for a certificate as Mate, Limited, Intermediate-Run Ferry, set out in section 16.6.
  - (5) Section 16.21 sets out the Simulated Electronic Navigation Course for the certificates of Mate, Limited, Ship Exceeding 60 Tons Gross Tonnage, and Mate, Limited, Intermediate-Run Ferry.

### 16.10 Ship Management

#### Examination number 091

Companion to Section 15.19

ITEM	COLUMN
1.	Industrial Safety Tackle Regulations, inspection and testing of gear and machinery and the maintenance of the machinery register; Safe Working Practices Regulations, emphasizing the recognition and correction of unsafe practices; precautions for vessels under fumigation; <i>Canada LabourCode</i> for Industrial Safety; Oil Pollution Prevention Regulations, MARPOL extended to include interpretations, and ship's responsibilities under them
2.	Stress on Tackle Calculation of stresses in the various parts of single boom and union rig; methods of testing.
3.	Ship Management Organization of crew for emergencies, drills, routine operations and maintenance; ship's responsibilities under Boat and Fire Drill Regulations, Ship Manning Regulations; <i>Canada Shipping Act</i> and regulations, grades and classes of certificates of competency, rights of holders of certificates, offences relating to certificates, loss and replacement of certificates, seafarers' rights concerning wages.
4.	Records Official and ship's logbooks, and entries under all conditions.

Note: An open-book examination.  
The examination consists of a multiple-choice test, calculations and descriptive questions.

### 16.11 Ship Construction and Cargo

#### Examination number 122

Companion to section 12.5

ITEM	COLUMN
1.	Ship Stresses Stresses to which a ship is subject, structural strengthening to compensate for them, and where to anticipate structural failure.
2.	Reports Compile reports of defects and damage sustained by ship.
3.	Repairs and Tests Superintend minor repairs and tests of tanks and other watertight work; emergency repairs to maintain watertightness; maintenance of watertightness and fire integrity on ferries and ro-ro vessels.
4.	Construction Midship section and the basic construction of the principal ship types; bilge and ballast pumping arrangements; welding and riveting, their advantages and shortcomings; construction and members of bow and stern sections, rudders and steering gear, propeller shafts, stern tubes, thrust units, deck hatches, and side, bow and stern doors; read and interpret ships' plans; construction of masts, sampson posts, derricks, cranes and conveyors.
5.	Inspections Preparation of vessels for statutory surveys and inspections; classification societies, purposes and advantages of classification; dry-docking and dry-dock procedure.
6.	Regulations Use of Load Line Regulations; IMO Dangerous Goods Code, and Deck Cargo Safety Code.
7.	Cargo Practices in loading, carrying and discharging cargo with reference to general cargo, bulk carriers, ro-ro vessels, oil tankers, self-unloading and package freighters; ventilation and ventilation systems; preparation and care of refrigeration systems; preparation and use of cargo plans; stowage of cargo, with respect to damage, ease of discharge, space occupied, contamination and ventilation; palletization; responsibilities of cargo officer.

Note: Regulations and necessary data will be provided.  
The examination consists of a section of descriptive, calculation and simple drawing exercises and a section of multiple-choice questions.

## 16.12 Stability

### Examination number 112

Companion to Section 12.6 and 15.20

ITEM	COLUMN
1.	Ship's Draft Draft, including effect of water density and fresh water allowance; use of displacement and ton per inch/tonne per centimetre (TPI/TPC) scales to determine displacement from draft and vice versa; statutory freeboard and loadlines; general loadline rules and loadline rules for lakes and rivers.
2.	Terms Meaning of block coefficient, displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights; righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability, danger of slack tanks; centre of flotation (F) and trim and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL).
3.	Stability Data Use of stability data supplied to typical bulk-oil and oil-and-ore carriers, general cargo vessels and package freighters to perform these operations: allowing for effect of water density on draft and displacement, interpreting curves of statical stability, achieving satisfactory transverse stability, achieving desired trim, loading and discharging problems, list created during loading or discharging, counteracting trim and list together, allowing for free surface effect of tanks, change of stability during voyage.
4.	Mensuration Areas and volumes of common figures, squares, rectangles, triangles, cubes, cones, wedges, cylinders, spheres; centre of gravity of common areas and volume.


Note: The examination consists of a multiple-choice questions and practical calculations based on ships' stability data booklets.  
Duration is three hours.

## 16.13 General Seamanship

### Examination number 162

Companion to section 12.10

ITEM	COLUMN
1.	Deck Machinery Practical use and care in the use of: electric, hydraulic and steam winches, ordinary and self-tensioning windlasses and capstans, main and emergency steering gears, electric control and telemotor systems, electric derrick-topping lift winches; electric and hydraulic deck cranes; elevators and hatch-opening systems; telegraphs.
2.	Ship Handling Conning ship; manoeuvring single and twin-screw ships in open and narrow waters with or without wind, tide or current; preparations for getting underway and proceeding to sea; making harbour and entering a dock, lock or canal in any type of vessel; passing another vessel closely in any circumstances; coming alongside or securing to a buoy with or without wind, tide or current, and the use of an anchor under similar conditions; turning short round twin-screw and single-screw vessels, with or without the use of an anchor; letting go bow or stern anchors in emergencies in shallow or deep water; the use of an anchor buoy; towing and being towed in ships of all types; search and rescue procedures by reference to MERSAR, CANMERSAR, and Transport Canada publications (TP).

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3.	<p><b>Anchor and Mooring</b></p> <p>Manoeuvring and cable-handling involved in the use of ground tackle and ancillary equipment including: the use of anchor buoys, anchoring to two anchors and handling two cables simultaneously, mooring by running, ordinary, standing or dropping moors, clearing a foul anchor, clearing a foul hawser (cross, elbow or round turn), hanging off an anchor, mooring to a buoy with anchor cable, weighing anchor with and without a windlass, housing a tripped anchor snubbing round, forming a lee while at anchor, securing anchor gear in preparation for sea passage, use of ground tackle when aground, use of anchors in emergency to take way off, anchor and cable stowage, fittings and cable markings.</p>
4.	<p><b>Mooring Lines</b></p> <p>Use, care and stowage of mooring lines, types of line used for mooring and their characteristics; names of the various mooring lines and orders; making fast on-shore bollards being used by another ship; use of moorings on the bight and doubling up; use, handling and securing of towing wires; use, handling and securing of insurance wires; the use of lines in securing a vessel and in warping alongside a berth, lock or along a lay-by; use of mooring wire rope reels; types of fairlead, their construction, naming and use; use of rat-guards.</p>
5.	<p><b>Working General Cargo</b></p> <p>Practical working of general cargo, mate's responsibilities when preparing the ship for work, and working general and dry bulk cargo; inspections of holds before loading; testing suction and drainage arrangements before loading; inspection of refrigerated compartments before loading; derrick riggings, types and uses for loading and/or discharging; arrangements and working of heavy lifts by ship or shore equipment, and lifts that cannot be handled by a single runner; overhaul and regular inspections of cargo-handling gear.</p>
6.	<p><b>Working Liquid Cargo</b></p> <p>Working of liquid bulk cargoes, mate's duties and responsibilities when preparing the ship for working, and when working liquid bulk cargoes; inspections and testing of tanks, valves and lines before loading, discharging or transferring liquid bulk cargoes; handling cargo hoses at shore-side or sea-line terminals; cleaning and gas-freeing tanks and lines (Butterworth and Sellers equipment); use of explosimeters; purpose and operation of pressure vacuum valves and flame traps; pressure-testing of lines, valves and heating coils; methods of and need for grounding/earthing the vessel; precautions for manifold quick-release, securing fire wires for emergency tow-off.</p>
7.	<p><b>Ship Routines and Organization</b></p> <p>Practical knowledge of shipboard routine and organization, mate's executive and organizational duties when relating to officers and the various crew members, crew watches and the direction of the crew on day work; drawing up emergency muster lists with appropriate duties for crew members; organizational duties for working of cargo, fuelling, storing or ballasting in all conditions; cleaning and maintaining the ship and its gear; mate's duties concerning the official log-book, entries in the deck log and owners' or charterers' records, duties in dry-dock or when repairs, alterations or maintenance work is being carried out; duties when preparing the vessels for sea; duties and responsibilities on joining a vessel; necessary paperwork or documentation to encompass the foregoing items where applicable.</p>
8.	<p><b>Emergency Duties</b></p> <p>Emergency duties and responsibilities for equipment, organization, frequency and routing of fire patrols under routine and exceptional conditions at sea and in port; recognition and assessment of fire hazards; organization of realistic fire drills, training of crew in use of firefighting equipment; taking charge of firefighting operations at sea and in port; inspections, testing and maintenance of portable and fixed firefighting equipment; organization of realistic boat and life-saving appliance drills, training of crew in use of life-saving appliances; stowage, inspections, testing and maintenance of lifeboats, rigid and inflatable liferafts and their equipment, lifejackets, lifebuoys, self-igniting lights and distress signals; taking charge of the launching of boats and rafts; assessing damage and flooding in cases of collision or stranding.</p>
9.	<p><b>Certificates</b></p> <p>Practical knowledge of the rights and privileges of the various certificates of competency and documentation required on board ship and issued by Transport Canada.</p>
10.	<p><b>For First Mate, Intermediate Voyage, Applicants Only</b></p> <p>Correctly make the three basic adjustments to a sextant using heavenly body or the horizon, and know the principles of position fixing by means of vertical and horizontal angles.</p>

Note: The examination is oral.  
Duration as necessary.

### 16.14 Navigation Instruments

#### Examination number 020

Companion to Sections 15.16, 20.6 and 21.5

ITEM	COLUMN
1.	<p><b>Radar</b></p> <p>Use of all radar operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustments of controls; periodic operator checks and determination of heading marker, bearing marker, range ring and range marker error; obtaining ranges and bearings from equipment using proper reporting procedures and recognition of targets of all types; recognition of meteorological phenomena and false, multiple, and second-trace echoes and side lobes and interference; knowledge of the limitations of radar, sufficient to ensure safe navigation; correcting range and bearing data for known errors; use of radar data (i.e. position fixing, following a track, matching radar image to chart, radar plotting restricted to ability to determine CPA and time); use of reflection plotter, radar horizon and extreme-range charts and tables, operator's manual and radar logbook.</p>
2.	<p><b>Decca</b></p> <p>Use of all Decca operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; periodic operator checks and determination of errors in the fraction, lane, and zone indicators, and in the LI lamp sequence meter; obtaining readings from equipment; limitations of Decca sufficient to ensure safe navigation; correcting readings for fixed and variable errors; use of Decca data for position fixing, use of Decca over-printed charts, minimizing effect of variable errors; use of Decca data sheets and operator's manual.</p>
3.	<p><b>Loran</b></p> <p>Use of all Loran operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustment of controls; periodic operator checks and knowledge of compensation for measurement and instrument errors; obtaining readings from equipment; recognition of unwanted data, blinking and sky-waves; limitations of Loran, sufficient to ensure safe navigation; use of Loran data for position fixing, use of Loran over-printed charts, minimizing effect of variable errors; use of operator's manual.</p>
4.	<p><b>Echo-Sounding Machine</b></p> <p>Use of echo-sounder controls and interpretation of display.</p>

Note: The examination is a practical test.  
Duration as necessary.



### 16.15 Chartwork and Pilotage

#### Examination number 040

Companion to Sections 15.17 and 21.6

ITEM	COLUMN
1.	Charts The chart, its nature and function as an aid to navigation; practical effects of projection distortion, numbering and the presentation of information, factors affecting reliability of charts; ability to use Mercator and polyconic charts; chart symbols and abbreviations as published in <i>Canadian Hydrographic Service Chart No. 1</i> .
2.	Publications Light characteristics and colours and sound signals used as aids to navigation, List of Lights, Buoys and Fog Signals; Canadian Buoyage System and its use; use and purpose of Canadian Notices to Shipping and Mariners, and chart corrections.
3.	Chartwork Locating a vessel's position on the chart by simultaneous true bearings and/or true bearing and distance; locating a vessel's position by two or more simultaneous distances. Determining the latitude and longitude of a given position; locating a position by its latitude and longitude, and its true bearing and distance from a given point. Laying off a course between given positions; measuring the true direction of a course layed off on the chart; measuring distance on the chart. Finding the DR position, given course, speed and time elapsed from the last observed position by plotting on a chart or by other acceptable method of the applicant's choice. Demonstrate an appreciation that current and/or wind may affect the vessel's course and speed over the ground; determine speed over the ground between observed positions; determine the true course made good between observed positions.
4.	Records and Errors Appreciation of the need to keep an accurate record of the vessel's progress, and the keeping of this record; care of dividers and parallel rulers. Periodic operator checks and determination of compass error by comparison with true terrestrial bearings, or headings, and determining and recording compass deviation; use of the magnetic compass to determine accuracy of the gyro compass by comparison; correcting courses and bearings for compass error, magnetic variation and deviation; use of table of deviations.

Note: The examination is oral and includes a practical chart paper.  
Duration as necessary

### 16.16 Navigation Safety

#### Examination number 060

Companion to Section 15.18

ITEM	COLUMN
1.	General Knowledge Knowledge of the content of the following regulations and International Maritime Organisation (IMO) documents: Collision Regulations with Canadian Modifications 1983; Operational Guidance For Officers in Charge of a Navigational Watch, STCW Code section A-VIII/2.

Note: The examination is a multiple-choice test. The applicant has the option of taking the examination in either written or oral format.  
Duration as necessary.


## 16.17 General Seamanship

### Examination number 160

Companion to Sections 14.8 and 15.15

ITEM	COLUMN
1.	<p>Ship-Handling, Routine</p> <p>Fixed- or controlled-pitch propeller or propellers, transverse thrust, turning ahead or astern; vessel's pivoting point when manoeuvring with headway and with sternway; head reach and stern reach; effect of cavitation and wake current; rudder force and manoeuvring of twin screws; sail effect of vessel superstructure; berthing, unberthing and use of the water wedge in ship handling; locking and unlocking a vessel; anchoring to a single-bower anchor; anchoring to a stern anchor, mooring to two anchors; mooring to a buoy; turning a vessel short round; bank suction and cushion effect in narrow channels; the effect of shallow water resistance on ship's behaviour; use of mooring lines and ground tackle in all circumstances; the use of tugs in manoeuvring.</p>
2.	<p>Ship-Handling, Exceptional</p> <p>Practical handling and managing a ship in exceptional circumstances, loss of or damage to rudder and the use of auxiliary means of steering; steering by screws; rigging jury rudder or jury steering gear; damage control in case of collision, grounding, fire, explosion or other accident; procedure when grounded and methods of refloating; procedure when beaching a vessel; procedure in case of wreck with emphasis on preservation of life, methods of abandoning a wrecked vessel; steps to be taken when disabled and in distress; taking and being taken in tow; rescuing crew of a disabled vessel or person in the water; manoeuvring in bad weather, heaving to and running before a sea; dangers of being pooped; keeping head to sea; the use of oil in bad weather and rescue operations; keeping a disabled vessel out of trough and lessening lee drift.</p>
3.	<p>Ship-Handling, Unusual</p> <p>Practical handling and manoeuvring a ship in unusual circumstances, retrieval of man overboard; procedures in ice, alone or in convoy, and movements to be expected by an ice breaker with reference to Transport Canada publication <i>Ice Navigation in Canadian Waters</i>; search and rescue procedures, including the responsibilities of the on-scene commander, with reference to MERSAR, CANMERSAR and Transport Canada publications; precautions to be taken in bad weather.</p>
4.	<p>Dry-Docking</p> <p>Procedures and precautions observed when dry-docking, effect of distribution of weight, dry-docking with a full cargo, use of bilge blocks; dry-dock inspections and precautions to be observed in dry-dock; procedure to be followed prior to and during refloating.</p>
5.	<p>Duties and Responsibilities of the Master:</p> <p>On first joining a vessel; official documents on board a vessel; issuance and understanding of standing, general, night and special orders; berthing and unberthing under all conditions; manoeuvring a vessel and assessing risks involved; underway, in port or at anchor under all circumstances and conditions; shipboard, local and general emergencies of any nature; verifying information on the ship's manoeuvring characteristics, determining approximate manoeuvring data and recording the ship's manoeuvring peculiarities; setting and manning the watches according to regulation and during exceptional circumstances; organizing the crew and other persons for routine operation and emergencies of all kinds; maintaining equipment in good condition.</p>
6.	<p>Basics of Naval Architecture</p> <p>Volumes of ship shapes; centres of gravity (G) and buoyancy; couples; righting moment and righting arm; inertia; equilibrium; freeboard; movement of G, real and virtual; free surface effects; metacentre and metacentric height; list, loll and increase in draft due to each; factors affecting static stability; damage stability; effect of beam and freeboard on stability; dry-docking and grounding; dynamical stability.</p>
7.	<p>Regulations</p> <p>Collision Regulations with Canadian Modifications 1983; Code of Nautical Procedures and Practices; Canadian Buoyage System.</p>

Note: The examination is oral and practical.  
Duration as necessary.

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**16.18 Chartwork and Pilotage  
Examination number 041**

Companion to Sections 13.10, 19.7 and 20.7

ITEM	COLUMN
1.	Pilotage Preparations for pilotage; using available charts and publications; possession and ready for immediate use all necessary charts, including large-scale charts of the pilotage area duly corrected to date, latest sailing directions, <i>Notices to Mariners</i> , Light Lists, Traffic Zone Regulations (as applicable), tide tables, copy of Charts and Publications Regulations, Code of Navigation Procedures and Practices, and <i>Radio Aids to Marine Navigation</i> .
2.	Steering Common steering procedures, their purpose and how to put them into effect; the importance of establishing and adhering to internationally-accepted procedures in issuing helm and steering orders and having them acknowledged and complied with; the instruction of helmsmen in this matter.
3.	Symbols The chart symbols and abbreviations as published in <i>Canadian Hydrographic Service(CHS) Chart No. 1</i> .
4.	Sailing Directions The contents of preface to <i>Sailing Directions</i> , the important general navigational information contained in the preamble and opening chapter of these volumes.
5.	Lists of Lights Light characteristics, colours and sound signals used as aids to navigation; use of Lists of Lights, Buoys and Fog Signals; terms used to define the power of lights (e.g., geographical range, luminous range, charted range computed range, nominal range, computed visibility); use of a luminous-range diagram; the effect of abnormal-refraction fog signals of different types, anomalies of sound propagation in fog, notices regarding lights lighthouses and buoys etc. published in <i>Notices to Mariners</i> .
6.	Tidal Currents Find the set and rate of tidal current that may be expected at a given point from information given in tide and current tables or on the chart; ability to use tables and information on the chart of the locality with awareness of the possibly significant effect of weather on the reliability of the information so obtained.
7.	Navigation in Confined Waters Navigation in confined waters: altering course; transits; leading marks and bearings; recording the vessel's progress; making allowance for height of tide; preparatory details to be attended to paid to entering confined waters (e.g., a review of the relevant sections of the sailing directions, ready availability of large-scale charts of the area with proposed track drawn indicating distances, courses and near dangers noted); navigational aids with their characteristics to be identified, clearing lines, marks and bearings to be used during the passage to be drawn in, precalculation of tidal heights where critical depths of water may be encountered; the maintenance of a record of the vessel's progress on both charts in logbook, including times of passing successive points, course's compass error, speed, weather; fixing the vessel's position by relative and true bearings, transits; dead reckoning position, estimated position and observed position.
8.	Navigational Aids Navigational aids in pilotage situations; the necessity of continuing the customary checks and counts of the vessel's safe progress by the Officer of the Watch (OOW) and ship's personnel with record of the details of duties performed, notwithstanding that the vessel was under the conduct of a pilot; the duty of the OOW to ensure that the pilot's advice is understood and effectively carried out, the extent to which reliance is placed on buoys.
9.	Canadian System Canadian System of Buoyage in detail; differences between lateral and cardinal systems; use of <i>Sailing Directions</i> for determining other buoyage systems in use; current and new Canadian buoyage system with an understanding of the basic principles employed in the lateral and the cardinal buoyage systems, the importance of consulting the applicable volume of <i>Sailing Direction</i> for details of buoyage system in force locally prior to entering unfamiliar waters of other countries; Aids to Navigation.

10.	<p><b>Bridge Practices</b></p> <p>Bridge practices and procedures in pilotage situations charts, various projections in common use; the requirement to continue the practice of good navigation procedures by the OOW and ship's personnel and the realization that the presence of a pilot on the bridge does not absolve the ship's personnel from their continuing responsibility for the safe navigation of the ship; the principle employed in construction charts on the Mercator, polyconic, and gnomonic projections, the limitations associated with each of these projections and the purposes of each in practical navigation.</p>
11.	<p><b>Charts</b></p> <p>Significant distortion, numbering and the presentation of information; the cause of chart distortion, need for nautical charts on board ship; the replacement of superseded editions; the mode of presentation of information on charts; metrication; chart catalogues and numbering.</p>
12.	<p><b>Chart Usage</b></p> <p>Use charts produced by the major projections in common use by the Canadian Hydrographic Service, including gnomonic charts; the use of charts in the practice of coastal navigation and on ocean passages; the plotting of bearings, position lines clearing lines, etc.; the transfer of positions from a chart of one projection to another of a different projection; the use of a gnomonic projection chart, and Mercator and polyconic charts.</p>
13.	<p><b>Fixing Position</b></p> <p>Fixing the ship's position by means at the disposal of the OOW, including electronic navigational aids; considerations to be taken into account, including errors and limitations of equipment; the correction and plotting of bearings taken visually, by radar or direction finder (DF) and the limitations of accuracy inherent in each of these methods; the ship's position, established by bearings or ranges taken simultaneously or with an interval and run intervening.</p>
14.	<p><b>Estimating Position</b></p> <p>Estimating the vessel's position, including allowing for effects of wind and/or tide; the reliability of the value in direction and force of wind, current and tidal effect used in arriving at the ship's DR position and the resulting area of doubt.</p>
15.	<p><b>Laying Off Courses</b></p> <p>Laying off courses, including allowance for effects of wind and tide; the problem of combining vectors of wind, current, tidal effect and course to steer to arrive at course made good; scrutiny of chart for off-lying dangers.</p>
16.	<p><b>Conversion of Course</b></p> <p>Conversion of true courses laid off to magnetic courses, including determination of variation at any place; conversion of true courses to gyro, magnetic and compass courses and vice versa; determining the up-to-date value of variation and interpolating for variation at a given locality from isogonic lines or compass roses; use of transit lines, azimuth and amplitude to determine compass error.</p>
17.	<p><b>Distance Measurement</b></p> <p>Distance measurement and the determination of speed made good and speed through the water; the measurement of distance on a Mercator or polyconic chart; the factors contributing to speed made good and speed through the water, how the difference between the two is expressed.</p>
18.	<p><b>Range of Visibility</b></p> <p>Factors controlling the range of visibility; terms associated with visibility of lights on navigational aids.</p>
19.	<p><b>Reliability of Charts</b></p> <p>Reliability of charts; indications by which reliability may be judged (e.g., date of original survey and possibility of subsequent surveys, adequacy of recorded soundings, with corrections having been made to date); large-scale charts show a small area in greater detail than small-scale charts; care and upkeep of charts.</p>
20.	<p><b>Publications</b></p> <p>Use of publications at the disposal of the coastal navigator, including <i>Notices to Mariners</i> for the correction of charts and publications; the various publications available to the navigator and the nature of their contents; the importance of chart corrections being kept up-to-date.</p>
21.	<p><b>Tidal Terms</b></p> <p>The meaning of tidal terms in common use in CHS and United States tide tables; general understanding of tidal phenomena necessary for the comprehension of tidal terms; tidal atlases.</p>

22.	<b>Calculation of Tides</b> Calculation of tides and heights of high and low water at reference and secondary ports and the calculation of depth of water at those times; use of the calculated depth of water at high and low water to determine the height of water at a given charted position.
23.	<b>Set and Rate of Tides</b> Estimation of set and rate of tidal currents by reference to tidal current tables and by actual observation; the tentative nature of tabulated tidal current values and the need for caution in using them; the care required in making tidal current observations and the associated details that must be recorded.
24.	<b>Records</b> The need for keeping an accurate record of the vessel's progress and the keeping of such a record; the duty of the OOW to maintain an accurate, detailed and continuous record of the vessel's progress from which a position may be readily determined at any time; the value of such a record being available as a measure of safe navigation and in the event of an emergency requiring immediate knowledge of the ship's position.

Note: The examination consists of:  
(a) a practical chartwork paper, and  
(b) a multiple-choice examination.  
Duration is 3 hours.

#### 16.19 Navigation Safety

##### Examination 061

Companion to Sections 13.12, 18.7, 19.8, 20.8 and 21.7

ITEM	COLUMN
1.	<b>Navigation Safety</b> Application of the content of Collision Regulations with Canadian Modifications 1983; STCW Code section A-VIII/2.

Note: The examination is a multiple-choice test, supplemented by oral questions as necessary.  
Duration is one and a half hours.

## 16.20 General Seamanship

### Examination number 161

Companion to section 13.14

ITEM	COLUMN
1.	<b>Rigging</b> Practical knowledge of the rigging of ships, comprising the names, purpose, and construction of standing and running rigging; reeving of blocks and purchases, rigging of stages and chairs; rigging of booms for single-boom and union-working; names, purposes and construction of the various parts of a boom; positioning and construction of guys and preventers; stresses on the various parts of a boom system during operation.
2.	<b>Knots and Splicing</b> Basic knotting, gripping and splicing with reference to current practice, seizings, rackings, frappings, and stoppers.
3.	<b>Bridge Procedures</b> Bridge discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; fire drills, lifeboat drills and crew training.
4.	<b>Duties at Sea</b> Duties and responsibilities of the master, officer of the watch, pilot and other bridge personnel (jointly and separately); purpose, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties, responsibilities, and action to be taken when dragging anchor; ascertaining dragging anchor; arrangement and responsibilities of departments aboard ship; action and manoeuvres required of the officer of the watch in emergencies at sea, man overboard, Williamson and elliptical turns, running aground, collision, discovery of fire, sighting of derelicts, sighting or receiving distress signals; breakdown of aids or equipment, power failure, capsize of tugs when under tow or manoeuvring.
5.	<b>Duties in Port</b> Duties and responsibilities of the officer of the watch in port, tending of lines and gangways, routine and exceptional fire patrols and inspections, action on discovery of fire aboard or ashore, fire alarms ashore, precautions when taking on or transferring fuel, water or stores, protection of crew members and stevedores, action to be taken in event of excessive ranging, parted moorings, burst oil lines, tank overflows, striking by another vessel, collapse of crew member in tank or other confined space, accidents to any person on board, ship taking bottom.
6.	<b>Anchors</b> Anchors and associated equipment, construction and names of the parts of stocked and stockless anchors; chain cable and shackles; chain-cable markings and reporting; cable stowage; fittings between cable locker and hawse pipe; common terms used in anchor work; terms associated with lead of cable; anchoring in shallow or deep water; anchoring in an emergency; heaving up and securing cable; terms pertaining to vessel at anchor.
7.	<b>Mooring</b> Mooring and mooring lines comprising the names of various mooring lines, their purpose and terms used in handling and working them.
8.	<b>Joining Ship</b> Responsibilities on joining a ship.
9.	<b>Ship Handling</b> General manoeuvring characteristics of merchant vessels of all types; terms, including turning circle, advance, transfer, drift angle and tactical diameter; effect of propellers on steering; effect of trim, draft, list and squat on manoeuvrability; effect of current, wind, shallows, bank suction and bank cushion reactions in restricted waters; propeller and rudder effects on steering, including wake current, transverse thrust and screw race when going ahead and astern; behaviour of the ship when engines are put astern, the pivoting point.
10.	<b>Signals</b> Recognition and knowledge of the lifesaving signals contained in the International Code of Signals.

11.	Reports Simple oral ship damage reports.
12.	Meteorological Reports Read and record the instruments supplied by the Meteorological Service, aneroid barometer graduated in inches or millibars, barograph, thermometer graduated in degrees Celsius or Fahrenheit, psychrometer (Stevenson screen); obtain relative humidity and dew point temperature from psychrometer.
13.	Rules Collision Regulations with Canadian Modifications 1983; recommended Code of Nautical Procedures and Practices; ship's documentation, inspection certificates, loadline certificates, manning certificates, tackle book, oil book, station bill, crew list, ship's log; rights and privileges of the various certificates of competency issued by Transport Canada.
14.	Sextant (Watchkeeping Mate, Ship, only) Principles of position fixing by means of a sextant using vertical and horizontal angles.

Note: The examination consists of an oral and practical test.  
Items 1 and 2 and questions relating to lifesaving, firefighting and rescue may be omitted if applicant holds an Able Seaman's Certificate or MED B1 and B2 certificates.  
Duration as necessary.

## 16.21 Navigation Instruments

### Examination number SIM 1

Companion to Sections 13.9, 15.21 and 19.6

ITEM	COLUMN
1.	The syllabus for the examination is presented in TP 4958, Simulated Electronic Navigation Courses.

Note: The examination consists of a check list approved by instructor after a practical and oral test at an approved school; a multiple-choice examination conducted by an approved school and subject to scrutiny and monitoring by Transport Canada; and an examination conducted by Marine Safety with simulated exercises.  
Duration is three and a half hours.

## CHAPTER 17 - FISHING CERTIFICATES

### PART I - GENERAL DESCRIPTION

- 17.1 The following six chapters (17-22) describe the four levels of Fishing Master certificates and the Certificate of Service as Master for a fishing vessel not exceeding 100 tons gross tonnage.
- 17.2 Fishing certificates are included within the general certification structure, but owing to the specialized nature of the industry, some of the examinations are different and will not be credited for a general stream certificate. Conversely, the general stream exams for General Ship Knowledge and General Seamanship will not be credited for fishing certificates.
- 17.3 If all other requirements are fulfilled, applicants may substitute examinations 012 for 011; 051 for 050; 092 for 099; and 073 for 072.
- 17.4 The table below summarizes the examination credits required for the various fishing certificates. Classes II, III and IV are all direct-entry examinations. Class II or Watchkeeping Mate, Ship, is a prerequisite for acceptance of an applicant into Class I.

### PART II - FISHING EXAMINATIONS

SUBJECT CERTIFICATE	01		02		04		05	06		07	09	11	15		16			
	C	I	S	C	S	Nav.	Nav Safety		Met.	Sh Mgt	Stability	GSK		Gen. Sea				
	omm.	N S T.	I M	H A R T	I M													
	2	0	1	0	1	2	0	0	1	3	9	1	7	8	6	7	8	9
Class I						2	050		061	073		111		158				169
Class II	011		1		041				061	073	099	111	157					168
Class III	011	020			041				061	073		111	157					167
Class IV		020		040					061						166			

- 17.5 A list of credits for certificates held appears in Appendix F.



### PART III - VALIDITY OF CERTIFICATES


17.6 The following table summarizes the validity of the fishing certificates.

Highest permissible Rank Fishing Voyages

CERTIFICATE	Class I Unrestricted voyages	Class II Voyages within the area bounded by 6° N, 30° W and 180° W	Class III Voyages within Coastal Waters of North America that is within 200 miles of shore or within waters of the continental shelf which ever is farther.
Fishing Master, Class I	Master	Master	Master
Fishing Master, Class II	First Mate	Master	Master
Fishing Master, Class III	Second Mate	First Mate	Master
Fishing Master, Class IV	Second Mate	Second Mate	Master of a fishing vessel less than 100 tons or First Mate of any fishing vessel

Note:


Fishing certificates are not valid on passenger ships, cargo ships or tug boats. General stream certificates are valid on fishing vessels, subject to any tonnage or voyage limitation that they may contain.

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## CHAPTER 18 - FISHING MASTER, FIRST-CLASS

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 18.1 Every applicant for a certificate as a Fishing Master, First-Class, shall:
- (a) complete 12 months service as officer in charge of the watch after obtaining a certificate as Fishing Master, Second-Class, or Watchkeeping Mate, Ship, on a ship of not less than 25 tons gross tonnage engaged on voyages beyond partially smooth water limits;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
  - (d) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Course, set out in TP 4957:
      - (A) for Officers (C); and
      - (B) for Senior Officers (D);
    - (ii) Simulated Electronic Navigation Course Level II, set out in TP 4958;
    - (iii) Marine First Aid Advanced Course, set out in TP 13008;
  - (e) pass an examination in each of the following subjects:
    - (i) Navigation;
    - (ii) Meteorology;
    - (iii) General Ship Knowledge including Engineering Knowledge; and
    - (iv) Navigation Safety;
    - (v) Ship Stability
  - (f) pass a practical examination in Simulated Electronic Navigation Level II; and
  - (g) pass an oral examination in General Seamanship.

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## PART II - EXAMINATIONS

18.2 The following table lists the examinations for the Fishing Master, First-Class, Certificate, the qualifying service required before each may be attempted, and other requirements. The examinations listed in chapter 19 must also have been passed.

Examination	Qualifying Watchkeeping Service While Holding Certificate	Other Requirements
SIM 2 Chartwork and Pilotage	Nil	Must have completed SIM 1.
050 Navigation	Nil	Must have completed 18 months sea service.
062 Navigation Safety	12 months	Must hold WKMS or FC II.
073 Meteorology	Nil	Must hold WKMS or FC II.
111 Ship Stability	Nil	Must hold WKMS or FC II.
158 General Ship Knowledge including Eng. Knowledge	Nil	Must hold WKMS or FC II.
169 General Seamanship	12 months	The applicant must have passed all other examinations before attempting 169.

## PART III - VALIDITY OF CERTIFICATE

18.3 The certificate as Fishing Master, First-Class, is valid as master of a fishing vessel without restriction.

## PART IV - SYLLABUSES OF EXAMINATIONS

18.4 Not in use.

## 18.5 Chartwork and Pilotage

### SIMULATED ELECTRONIC NAVIGATION

#### Examination number SIM 2

Companion to Sections 11.6 and 14.5

ITEM	COLUMN
1.	The syllabus of the examination is presented in TP 4958, Simulated Electronic Navigation Courses.
2.	Passage Preparation To be completed ahead of simulator examination.
3.	Simulator Exercise (Duration Two Hours) Includes items 2, 3, and 4; passage about 20 nautical miles; parallel indexing, including wheel over; complex collision avoidance; course alteration for navigational purposes; all available electronic navigation.
4.	Navigator Note Book Navigator notebook to include chart number and courses for voyage, course alteration and wheel over positions, position of danger areas in the proximity of the intended track, traffic CIPs and distance to next CIP; position where a change of machinery status will be required; parallel indexing information or information on the elements used to construct an ARPA graphic map; radar datum chosen for P.I; time of HW/LW and information on tidal currents; pilotage information, if applicable; total distance and steaming time at proposed speed.
5.	Manoeuvre a Ship Manoeuvring a ship stopping anchoring.
6.	Emergencies Emergencies may be introduced, but not at a critical moment during the exercise.

Note: The examination consists of simulated exercises conducted by Marine Safety.  
Time for passage planning to be one and a half to three hours.  
Duration is three and a half to five hours.

## 18.6 Navigation

#### Examination number 050

ITEM	COLUMN
1.	Basic Basic nautical astronomy, shape of the earth, poles, latitude, longitude; celestial sphere structure; solar system, including relative movement of bodies; hour angles; time, units of time; time keeping; rising and setting of sun and twilight times.
2.	Calculations Correction of sextant altitudes and understanding of applied corrections; care and knowledge of sextant and sextant errors; application of <i>Nautical Almanac</i> ; calculation of distance/speed from engine revolutions; circle of position and use of position line.
3.	Charts Principles of construction of Mercator, polyconic and gnomonic charts and their use.
4.	Plane and Mercator Sailing Plane and Mercator sailing and application of traverse tables; determining great circle courses and distances by HO 229.
5.	Astro Sights Latitude by meridian altitude of sun, and stars, including Polaris; latitude and position line by ex-meridian altitude of the sun; longitude and position line by sun and/or stars; finding position by two observations of heavenly bodies simultaneously or separately by a run (sun and/or stars only); combination of celestial and terrestrial observations.

Note: The examination consists of:  
(a) practical navigation calculations; and  
(b) a multiple-choice test on basic principles of the subject.  
Duration is three hours.

### 18.7 Navigation Safety

#### Examination number 061

Companion to Sections 13.12, 16.19, 19.8, 20.8 and 21.7

ITEM	COLUMN
1.	Navigation Safety Application of the content of Collision Regulations with Canadian Modifications 1983; STCW Code section A-VIII/2.


Note: The examination is a multiple-choice test, supplemented by oral questions as necessary.  
Duration is one and a half hours.

### 18.8 Meteorology


#### Examination number 073

Companion to Section 11.12, 14.6, 19.9 and 20.10

ITEM	COLUMN
1.	Chemical Composition of the Atmosphere Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust and hygroscopic particles, dust, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).
2.	Vertical Structure Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parhelion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.
3.	Transfer of Heat Radiation, conduction, convection, turbulence.
4.	Temperature Related to the atmosphere and the earth; calorie, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.
5.	Atmospheric Moisture and Changes of State Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.
6.	Atmospheric Stability Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke, causes of subsidence, effect of substances, compression heating, evaporation.
7.	Fog Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.
8.	Clouds Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.
9.	Precipitation Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convectional, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.
10.	Lightning Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.

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11.	<p><b>Pressure and Pressure Systems</b>  Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isallator, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depressions, polar front low, thermal depression, vertical instability depression (e.g. tropical revolving storm); straight isobars, effect of straight isobars on wind and weather.</p>
12.	<p><b>Winds</b>  Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, pressure and weather characteristics associated with monsoons in the Indian Ocean and China Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevals, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.</p>
13.	<p><b>Air masses</b>  Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical, equatorial.</p>
14.	<p><b>Fronts</b>  Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).</p>
15.	<p><b>Families of Depressions or Extra-Tropical Cyclones</b>  Formation between two air masses, life cycle and movement cross section, associated weather, frontogenesis, frontolysis, secondary depressions.</p>
16.	<p><b>Waves and Swells</b>  Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, description, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.</p>
17.	<p><b>Oceanic Currents and Effect on the Climate</b>  Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; knowledge of the various currents of the world.</p>
18.	<p><b>Tropical Revolving Storms</b>  Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: North Atlantic, western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.</p>

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19.	<p><b>Ice Formation and Decay</b>  Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs; presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.</p>
20.	<p><b>Ice Detection and Reporting</b>  Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Ice Navigation in Canadian Waters and Manice</i>, ice climatology and ice operations; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, sea-water temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.</p>
21.	<p><b>Weather Messages and Codes</b>  Knowledge of services available through <i>Radio Aids to Marine Navigation, Atlantic, Great Lakes and Pacific</i>; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weather fax, weather, satellite, sea-state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weather fax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts; ability to forecast the following for 12-24 hours, pressure, wind, sea state, visibility, clouds, weather changes.</p>
22.	<p><b>Optimum Weather Routing</b>  Advantages, reducing storm damage, saving time, meeting special requirements; methods on board ship, through shore-based firm, through government departments; climatological routing, in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long-range progs are available.</p>
23.	<p><b>Requirements</b>  Application of ship's performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship performance curves and locus positions; factors that require a continuous updating and revision of weather routing procedures.</p>

Note: The examination consists of a written test comprising multiple-choice and descriptive questions.  
Duration is three hours.

### 18.8A Stability

#### Examination number 111

Companion to Sections 14.9

ITEM	COLUMN
1.	Ship's Draft Draft and freeboard, including effect of water density and fresh water allowance; use of displacement and ton per inch / tonne per centimetre (TPI/TPC) scales to determine displacement from draft and vice versa.
2.	Terms Meaning of displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights; righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability, danger of slack tanks; centre of flotation (F) and trim, and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL); meaning and characteristics of stiff and tender ships.
3.	Stability Data Use of stability data supplied to fishing vessels, allowing for the effect of water density on draft and displacement; interpreting curves of statical stability, achieving satisfactory transverse stability, achieving desired trim; effect of adding, removing and transferring weights on draft, list and trim, allowing for the free surface effect of tanks or when the fish load is carried in bulk and change of stability during the voyage; effects of reduction in freeboard on stability and the dangers of overloading; dangers due to icing effects.

Note: The examination consists of multiple-choice questions and practical calculations based on ship's stability data booklet.  
Duration is three hours.

### 18.9 General Ship Knowledge

#### Examination number 158

ITEM	COLUMN
1.	Pumping Systems General pumping arrangements, bilge and ballast, valves, pumps, manifolds, bulkhead valves, strum boxes, ship side valves, sea inlets, bilge ejection valves.
2.	Ship's Data Ship's plans and specifications; arranging for minor repairs for dry-docking; effects of reduction in freeboard on stability and seaworthiness; dangers of overloading;
3.	Calculations Determination of approximate metacentric height from the rolling period using the monogram supplied in the IMO booklet, <i>Recommendation on Intact Stability for Fishing Vessels</i> ; calculation of change of trim or draft from trim tables; ability to read draft and find mean draft, with or without lists.
4.	Mechanics Emergency repairs to maintain watertight integrity; different types of rudders and propellers on fishing vessels.

Note: The examination is a multiple-choice test.  
Duration is two hours.




### 18.10 General Seamanship

#### Examination number 169

ITEM	COLUMN
1.	Communications Recognition and knowledge of the meanings of the lifesaving and distress signals contained in the International Code of Signals.
2.	Safe Working Practical knowledge of safe working practices aboard fishing vessels; basic knowledge of pollution prevention; knowledge of the Code of Safe Working Practices as it applies to fishing vessels.
3.	Watchkeeping Duties and responsibilities of watch members; action of the officer of the watch in emergencies at sea and in port; maintenance of a proper deck log concerning navigation progress, electronic instrument use and unusual occurrences; common steering procedures, their purpose and how to put them into effect; use of azimuth circle, pelorus or any selected method of taking a bearing; familiarity with changing over between automatic and hand steering, and emergency steering (referring to operator's manual); reading bearings and headings.
4.	Responsibility Master's responsibilities in emergencies; duties and responsibilities of the master of a small vessel as required by the <i>Canada Shipping Act</i> ; practical considerations of boat handling in heavy weather, while towing and being towed, grounding, bilging, in damaged condition, channels, rivers and confined waters, berthing, unberthing, anchoring and weighing anchor, manoeuvring in close proximity to other ships; master's duties on taking over and relinquishing command; preparation of the vessel for inspection and surveys; planning the voyage.
5.	Weather Weather reports and their use; elementary knowledge of weather systems, high- and low-pressure areas and frontals.
6.	Rules Collision Regulations with Canadian Modifications 1983; Code of Nautical Procedures and Practices.
7.	Maintenance Maintenance of deck gear and structure (not including nets and other gear specific to a particular type of ship).

Note: The examination is based on the oral examinations for all previous fishing certificates. Answers shall reflect the additional experience, responsibilities and studies at this level.  
The examination is oral.  
Duration as necessary.

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## CHAPTER 19 - FISHING MASTER, SECOND-CLASS

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 19.1 Every applicant for a certificate as Fishing Master, Second-Class, shall:
- (a) have acquired 12 months of service as an officer in charge of the watch while holding a Watch Keeping Mate certificate or a Fishing Master, class III certificate on a ship of not less than 25 tons engaged on voyages beyond the limits of partially smooth waters.
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
  - (d) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2); and
      - (C) for officers; and
      - (D) for senior officers ;
    - (ii) Simulated Electronic Navigation Level I, set out in TP 4958; and
    - (iii) Marine First Aid Advanced Course, set out in TP 13008;
  - (e) pass an examination in each of the following subjects:
    - (i) Communications;
    - (ii) Chartwork and Pilotage;
    - (iii) Navigation Safety;
    - (iv) Meteorology;
    - (v) Ship Management; and
    - (vi) Ship Stability
    - (vii) General Ship Knowledge;
  - (f) pass a practical examination in Simulated Electronic Navigation Level I; and
  - (g) pass an oral examination in General Seamanship.

## PART II - EXAMINATIONS

19.2 The following table lists the examinations for the Fishing Master, Second Class, Certificate, the qualifying service required before each may be attempted, and other requirements:

Examination	Qualifying Service	Other Requirements
011 Communications	Nil	Nil
SIM 1 Navigating Instruments	18 months	Completion of SEN I course.
041 Chartwork and Pilotage	18 months	Nil
061 Navigation Safety	12 months	Nil
073 Meteorology	24 months	WKMS or FM class IV
099 Ship Management	12 months	Nil
111 Ship Stability	9 months	Nil
157 General Ship Knowledge	9 months	Nil
168 General Seamanship	24 months	The applicant must have completed all other exams and MED training before attempting 168.

## PART III - VALIDITY OF CERTIFICATE

19.3 The certificate as Fishing Master, Second Class, is valid as:

- (a) first mate of a fishing vessel without restriction;
- (b) master of a fishing vessel within the intermediate voyage limits; and
- (c) master of a fishing vessel within the local voyage limits.

19.4 Fishing Master, Restricted, Certificate may be exchanged for a Fishing Master, Second-Class, Certificate by passing examination 011 and 061. This refers to the Fishing Master, Restricted, Certificate obtained under the Regulations that came into effect in September 1976. Certificates issued prior to September 1976 cannot be exchanged.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 19.5 Communications

#### Examination number 011

Companion to Section 20.5

ITEM	COLUMN
1.	Visual Signals Recognition of International Code flags; knowledge of single letter signals under the International Code.
2.	Code Use of International Code of Signals in coding and decoding messages and in flag, Morse and voice procedures.
3.	Radio Use of <i>Radio Aids to Marine Navigation</i> publication for ascertaining facilities and services.

Note: The examination is multiple-choice.  
Duration as necessary.

### 19.6 Navigation Instruments

#### Examination number SIM 1


Companion to Sections 13.9, 15.21 and 16.21

ITEM	COLUMN
1.	The syllabus for the examination is presented in TP 4958, Simulated Electronic Navigation Courses; and simulator exercises include testing on the following:  Collision avoidance by the application of Collision Regulations, including course and speed alteration; assessment of the rate and direction of current to affect parallel indexing, including wind and tide; ability to deal with emergencies and conduct radio communications effectively.

Note: The examination consists of:

- (a) a check list approved by the instructor after a practical and oral test at an approved school;
- (b) a multiple-choice examination conducted by an approved school and subject to scrutiny and monitoring by Marine Safety; and
- (c) and examination conducted by Marine Safety with simulated exercises.

Duration is three and a half hours.


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## 19.7 Chartwork and Pilotage

### Examination number 041

Companion to Sections 13.10, 16.18 and 20.7

ITEM	COLUMN
1.	Pilotage Preparations for pilotage; using available charts and publications, possession and ready for immediate use all necessary charts, including large-scale charts of the pilotage area duly corrected to date, latest sailing directions, <i>Notices to Mariners</i> , Light Lists, Traffic Zone Regulations (as applicable), tide tables, copy of Charts and Publications Regulations, Code of Navigation Procedures and Practices, and <i>Radio Aids to Marine Navigation</i> .
2.	Steering Common steering procedures, their purpose and how to put them into effect; the importance of establishing and adhering to internationally-accepted procedures in issuing helm and steering orders and having them acknowledged and complied with; the instruction of helmsmen in this matter.
3.	Symbols Chart symbols and abbreviations as published in <i>Canadian Hydrographic Service(CHS)Chart No. 1</i> .
4.	Sailing Directions Contents of preface to <i>Sailing Directions</i> , the important general navigational information contained in the preamble and opening chapter of these volumes.
5.	Lists of Lights Light characteristics, colours and sound signals used as aids to navigation; use of Lists of Lights, Buoys and Fog Signals; the terms used to define the power of lights (e.g., geographical range, luminous range, charted range, computed range, nominal range, computed visibility; use of a luminous range diagram); the effect of abnormal refraction fog signals of different types, anomalies of sound propagation in fog, notices regarding lights, lighthouses and buoys etc. published in <i>Notices to Mariners</i> .
6.	Tidal Currents Find the set and rate of tidal current that may be expected at a given point from information given in tide and current table or on the chart; ability to use tables and information on the chart of the locality with awareness of the possibly significant effect of weather on the reliability of the information so obtained.
7.	Navigation in Confined Waters Navigation in confined waters: altering course; transits; leading marks and bearings; recording the vessel's progress; making allowance for height of tide; the preparatory details to be attended to upon entering confined waters (e.g., a review of the relevant sections of the <i>Sailing Directions</i> , ready availability of large-scale charts of the area with proposed track drawn indicating distances, courses and near dangers noted); navigational aids with their characteristics to be identified, clearing lines, marks and bearings to be used during the passage to be drawn in, precalculation of tidal heights where critical depths of water may be encountered; the maintenance of a record of the vessel's progress on both chart and in logbook, including times of passing successive points, course's compass error, speed, weather; fixing the vessel's position by relative and true bearings, transits; dead reckoning position, estimated position and observed position.
8.	Navigation Aids Navigational aids in pilotage situations; the necessity of continuing the customary checks and counts of the vessel's safe progress by the officer of the watch (OOW) and ship's personnel with record of the details of duties performed, notwithstanding that the vessel was under the conduct of a pilot; the duty of the OOW to ensure that the pilot's advice is understood and effectively carried out, the extent to which reliance is placed on buoys.
9.	Canadian System Canadian System of Buoyage in detail; differences between lateral and cardinal systems; use of <i>Sailing Directions</i> for determining other buoyage systems in use; current and new Canadian buoyage system with an understanding of the basic principles employed in the lateral and the cardinal buoyage systems, the importance of consulting the applicable volume of <i>Sailing Directions</i> for details of the buoyage system in force locally prior to entering unfamiliar waters of other countries; <i>Aids to Navigation</i> .

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10.	<p><b>Bridge Practices</b>          Bridge practices and procedures in pilotage situations charts, various projections in common use; the requirement to continue the practice of good navigation procedures by the OOW and ship's personnel in general, and the realization that the presence of a pilot on the bridge does not absolve the ship's personnel from their continuing responsibility for the safe navigation of the ship; the principle employed in construction charts on the Mercator, polyconic and gnomonic projections, the limitations associated with each of these projections and the purposes of each in practical navigation.</p>
11.	<p><b>Charts</b>          Significant distortion, numbering and the presentation of information; the cause of chart distortion, need for nautical charts on board ship; the replacement of superseded editions; the mode of presentation of information on charts; metrication; chart catalogues and numbering.</p>
12.	<p><b>Chart Usage</b>          Use charts produced by the major projections in common use by the Canadian Hydrographic Service, including gnomonic charts; the use of charts in the practice of coastal navigation and on ocean passages; the plotting of bearings, position lines clearing lines etc.; the transfer of positions from a chart of one projection to another of a different projection; the use of a gnomonic projection chart, Mercator and polyconic charts.</p>
13.	<p><b>Fixing Position</b>          Fixing the ship's position by means at the disposal of the OOW, including electronic navigational aids; considerations to be taken into account, including errors and limitations of equipment; the correction and plotting of bearings taken visually, by radar or direction finder (DF) and the limitations of accuracy inherent in each of these methods; the ship's position established by bearings or ranges taken simultaneously or with an interval and run intervening.</p>
14.	<p><b>Estimating Position</b>          Estimating the vessel's position, including allowing for effects of wind and/or tide; the reliability of the value in direction and force of wind, current and tidal effect used in arriving at the ship's DR position and the resulting area of doubt.</p>
15.	<p><b>Laying Off Courses</b>          Laying off courses, including allowance for effects of wind and tide; the problem of combining vectors of wind, current, tidal effect and course to steer to arrive at course made good, scrutiny of chart for off-lying dangers.</p>
16.	<p><b>Conversion of Course</b>          Conversion of true courses laid off to magnetic courses, including determination of variation at any place; conversion of true courses to gyro, magnetic and compass courses and vice versa; determining the up-to-date value of variation and interpolating for variation at a given locality from isogonic lines or compass roses; use of transit lines, azimuth and amplitude to determine compass error.</p>
17.	<p><b>Distance Measurement</b>          Distance measurement and the determination of speed made good and speed through the water; the measurement of distance on a Mercator or polyconic chart; the factors contributing to speed made good and speed through the water, how the difference between the two is expressed.</p>
18.	<p><b>Range of Visibility</b>          Factors controlling the range of visibility; terms associated with visibility of lights on navigational aids.</p>
19.	<p><b>Reliability of Charts</b>          Reliability of charts; indications by which reliability may be judged (e.g., date of original survey and possibility of subsequent surveys, adequacy of recorded sounding corrections made to date); large-scale charts show a small area in greater detail than small-scale charts; care and upkeep of charts.</p>
20.	<p><b>Publications</b>          Use of publications at the disposal of the coastal navigator, including <i>Notices to Mariners</i> for the correction of charts and publications; the various publications available to the navigator and the nature of their contents; the importance of chart corrections being kept up-to-date.</p>
21.	<p><b>Tidal Terms</b>          Meaning of tidal terms in common use in CHS and United States tide tables; general understanding of tidal phenomena necessary for the comprehension of tidal terms; tidal atlases.</p>

22.	Calculation of Tides Calculation of tides and heights of high and low water at reference and secondary ports and the calculation of depth of water at those times; use of the calculated depth of water at high and low water to determine the height of water at a given charted position.
23.	Set and Rate of Tides Estimation of set and rate of tidal currents by reference to tidal current tables and by actual observation; the tentative nature of tabulated tidal current values and the need for caution in using them; the care required in making tidal current observations and the associated details that must be recorded.
24.	Records Need for keeping an accurate record of the vessel's progress and the keeping of such a record; the duty of the OOW to maintain an accurate, detailed and continuous record of the vessel's progress from which a position may be readily determined at any time; the value of such a record being available as a measure of safe navigation and in the event of an emergency requiring immediate knowledge of the ship's position.

Note: The examination consists of:  
(a) a practical chartwork paper, and  
(b) a multiple-choice examination.  
Duration is three hours.

### 19.8 Navigation Safety

#### Examination number 061

Companion to Sections 13.12, 16.19, 18.7, 20.8 and 21.7

ITEM	COLUMN
1.	Navigation Safety Knowledge and application of the content of Collision Regulations with Canadian Modifications 1983; STCW Code section A-VIII/2.


Note: The examination is a multiple-choice test, supplemented by oral questions as necessary.  
Duration is one and a half hours.

### 19.9 Meteorology

#### Examination number 073


Companion to Sections 11.12, 14.6, 18.8 and 20.10

ITEM	COLUMN
1.	Chemical Composition of the Atmosphere Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust, hygroscopic particles, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).
2.	Vertical Structure of the Atmosphere Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parhelion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.
3.	Transfer of Heat Radiation, conduction, convection, and turbulence.
4.	Temperature Related to the atmosphere and the earth; calorie, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.
5.	Atmospheric Moisture and Changes of State Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.

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6.	<p><b>Atmospheric Stability</b> Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke; causes of subsidence; effects of substances, compression heating, evaporation.</p>
7.	<p><b>Fog</b> Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.</p>
8.	<p><b>Clouds</b> Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.</p>
9.	<p><b>Precipitation</b> Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convectional, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.</p>
10.	<p><b>Lightning</b> Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.</p>
11.	<p><b>Pressure and Pressure Systems</b> Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isallator, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depression, polar front low, thermal depression, vertical instability depression (e.g., tropical revolving storm); straight isobars, effect of straight isobars on wind, on weather.</p>
12.	<p><b>Winds</b> Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, pressure and weather characteristics associated with monsoons in the Indian Ocean and monsoons in the Chins Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevals, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.</p>
13.	<p><b>Air Masses</b> Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical, equatorial.</p>
14.	<p><b>Fronts</b> Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).</p>
15.	<p><b>Families of Depressions or Extra-Tropical Cyclones</b> Formation between two air masses, life cycle and movement cross section, associated weather, frontogenesis, frontolysis, secondary depressions.</p>
16.	<p><b>Waves and Swells</b> Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, description, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.</p>



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17.	Oceanic Currents and Effect on the Climate Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; knowledge of the various currents of the world.
18.	Tropical Revolving Storms Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: the North Atlantic, the western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.
19.	Ice Formation and Decay Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs; presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.
20.	Ice Detection and Reporting Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Canadian Waters and Manice</i> , ice climatology and ice operations, ice navigation in Canadian waters; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, seawater temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.
21.	Weather Messages and Codes International analysis in code, definition, interpret messages; plot pressure systems, fronts, isobars; forecast 12-24 hours, pressure, wind, sea state, visibility, clouds, weather changes; knowledge of services available; <i>Radio Aids to Marine Navigation, Atlantic and Great Lakes Pacific</i> ; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weatherfax, weather, satellite, sea state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weatherfax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts; ability to forecast the following for 12-24 hours: pressure, wind, sea state, visibility, clouds, weather changes.
22.	Optimum Weather Routing Advantages, reduce storm damage, save time, meet special requirements; methods, on board ship, through shore-based firm, through government departments; climatological routing, in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long-range progs are available.
23.	Requirements Application of ship's performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship performance curves and locus positions; factors that require a continuous updating and revision of weather routing procedures.

Note: The examination consists of a written test comprising multiple-choice and descriptive questions. Duration is three hours.

**19.10 Ship Management**  
**Examination number 099**

ITEM	COLUMN
1.	Organization Organization of crew for emergencies and drills; assigning duties to crew members; establishing watches; safe manning of ship.
2.	Regulations Responsibilities of the ship as outlined in the following regulations: Quarantine Regulations; Boat and Fire Drill Regulations; Small Fishing Vessel Inspection Regulations; Large Fishing Vessel Inspection Regulations; Crewing Regulations; Navigating Appliance Regulations; Shipping Casualties Reporting Regulations; Safe Working Practices Regulations; Arctic Shipping Pollution Prevention Regulations; Charts and Publications Regulations; Oil Pollution Prevention Regulations.
3.	Records Official logs issued under the <i>Canada Shipping Act</i> ; noting and extending protest; vessel reporting and vessel traffic management systems.
4.	Specific Duties <i>Criminal Code</i> as it applies to ships and ship's crews; <i>Territorial Sea and Fishing Zones Act</i> as it affects the ship's working and movement; provisions for health and accommodations, Transport Canada's <i>Manual of Safety and Health for Fishermen</i> ; <i>Canada Shipping Act</i> regarding: grades and classes of fishing certificates, rights of holders of certificates, offences relating to certificates, loss of certificates, requirement to keep a crew list; seafarers' rights, maintenance of discipline, wrecks, salvage and casualties; entering and clearing foreign ports.

Note: Items 2 and 4 are open book.  
The examination is a multiple-choice test.  
Duration is two hours.

**19.11A Stability**  
**Examination number 111**  
Companion to Sections 14.9, 18.8A

ITEM	COLUMN
1.	Ship's Draft Draft and freeboard, including effect of water density and fresh water allowance; use of displacement and ton per inch / tonne per centimetre (TPI/TPC) scales to determine displacement from draft and vice versa.
2.	Terms Meaning of displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights; righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability, danger of slack tanks; centre of flotation (F) and trim, and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL); meaning and characteristics of stiff and tender ships.
3.	Stability Data Use of stability data supplied to fishing vessels, allowing for the effect of water density on draft and displacement; interpreting curves of statical stability, achieving satisfactory transverse stability, achieving desired trim; effect of adding, removing and transferring weights on draft, list and trim, allowing for the free surface effect of tanks or when the fish load is carried in bulk and change of stability during the voyage; effects of reduction in freeboard on stability and the dangers of overloading; dangers due to icing effects.

Note: The examination consists of multiple-choice questions and practical calculations based on ship's stability data booklet.  
Duration is three hours.


### 19.11 General Ship Knowledge

#### Examination number 157

Companion to Section 20.9

ITEM	COLUMN
1.	Safety Need for accident prevention and precautions to be taken for fishing operations, those aspects not covered by applicable MED; ability to use the <i>Code of Safety for Fishermen</i> , a Transport Canada Booklet; knowledge of the Safe Working Practice Regulations, as applied to fishing vessels; knowledge of: Oil Pollution Prevention Regulations, Garbage Pollution Prevention Regulations.
2.	Parts of Ship Names, sections and contribution to overall strength of the principle members of wooden vessels comprising: keel, keelson, frames, stringers, planking, stern construction; functions of the principle parts and members of steel ships comprising: framing, plating, decks, bulkheads, hatchways, bilges, double bottoms, sounding and air pipes, propellers, and rudders.
3.	Superintend Minor repair work; dry-docking and slipping inspections; emergency repairs to maintain watertight integrity; basic knowledge of general pumping arrangements;
4.	Documents Understanding of ships' plans and specifications up to ships of 150 gross tons; determination of approximate metacentric height from the rolling period, using the monogram supplied in IMO booklet <i>Recommendation on Intact Stability of Fishing Vessels</i> ; ability to use and interpret stability and trim data supplied to fishing vessels up to 150 gross tons.
5.	Construction Names of principal parts of fishing vessels; knowledge of the construction of different types of fishing vessels built of steel, wood, aluminium, fibreglass and ferro-cement, including a knowledge of framing, shell plating, decks, bulkheads, hatchways, bilges, air pipes and freeing ports; meaning of the terms gross tonnage, net tonnage, deadweight and freeboard.
6.	Draft Reading draft and finding mean drafts, with and without list, and change of draft when going from salt to fresh water and vice versa; effect, in general terms and excluding calculation, of adding, removing and transferring weights on draft, list and trim and an appreciation of the meaning and characteristics of stiff and tender ships; meaning of terms displacement and deadweight; use of displacement scale to determine displacement from draft and vice versa.
7.	Stability Appreciation of the effects of reduction in freeboard on stability and seaworthiness and the dangers of overloading; use of stability and trim information supplied to fishing vessels; knowledge of law of flotation. centre of gravity, centre of buoyancy and its movement; metacentre and metacentric height, initial stability; stiff and tender ships; stable, neutral and unstable equilibrium; angle of loll, its causes and effects; practical appreciation of the dangers of free surfaces in tanks and when the fish load is carried in bulk; effect on stability of loading or discharging weight and lowering and raising weights; effect on stability of a suspended weight; dangers due to icing effects.
8.	Rigging Deck machinery, standing and running gear pertaining to fishing vessels; appreciation of power gained by purchases; measurements and strengths of synthetic and fibre ropes, wires and chain.

Note: Items 1 and 4 are open book.  
The examination is a multiple-choice test.  
Duration is two hours.

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**19.12 General Seamanship**  
**Examination number 168**

ITEM	COLUMN
1.	Communications Recognition and knowledge of the meanings of the lifesaving and distress signals contained in the International Code of Signals.
2.	Safe Working Practical knowledge of safe working practices aboard fishing vessels; basic knowledge of pollution prevention; knowledge of Code of Safe Working Practices as it applies to fishing vessels.
3.	Watchkeeping Duties and responsibilities of watch members; action of the officer of the watch in emergencies at sea and in port; maintenance of a proper deck log concerning navigation progress, electronic instrument use and unusual occurrences; common steering procedures, their purpose and how to put them into effect; use of azimuth circle, pelorus or any selected method of taking a bearing; familiarity with changing over between automatic and hand steering, emergency steering (referring to operator's manual); reading bearings and headings.
4.	Responsibility Master's responsibilities in emergencies; duties and responsibilities of the master of a small vessel as required by the <i>Canada Shipping Act</i> ; practical considerations of boat handling in heavy weather; towing and being towed, grounding, bilging, damaged condition, channels, rivers and confined waters, berthing, unberthing, anchoring and weighing anchor, manoeuvring in close proximity to other ships; master's duties on taking over and relinquishing command; preparation of the vessel for inspection and surveys; planning the voyage.
5.	Weather Weather reports and their use; elementary knowledge of weather systems, high and low pressure areas and frontals.
6.	Rules Collision Regulations with Canadian Modifications 1983; Code of Nautical Procedures and Practices.
7.	Maintenance Maintenance of deck gear and structure (not including nets and other gear specific to a particular type of ship).

Note: The examination is an oral test.  
Duration as necessary.

## CHAPTER 20 - FISHING MASTER, THIRD-CLASS

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 20.1 Every applicant for a certificate as Fishing Master, Third-Class, shall:
- (a) have acquired 24 months of service, or 12 months of service while holding a fishing master, fourth-class certificate, on a ship of not less than 25 tons engaged on voyages beyond the limits of partially smooth waters.
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
  - (d) obtain a certificate of completion for the Basic Safety (A1) of the Marine Emergency Duties Course, set out in TP 4957, from a school listed in TP 10655;
  - (e) obtain a Marine First Aid Advance Certificate, set out in TP 13008;
  - (f) pass an examination in each of the following subjects:
    - (i) Communications;
    - (ii) Navigation Instruments;
    - (iii) Chartwork and Pilotage;
    - (iv) Navigation Safety; and
    - (v) General Ship Knowledge including Engineering knowledge;
    - (vi) Meteorology
    - (vii) Ship Stability
  - (h) pass an oral examination in General Seamanship.

### PART II - EXAMINATIONS

- 20.2 The following table lists the examinations for the Fishing Master, Third-Class, Certificate, the qualifying sea service required before each may be attempted, and other requirements:

Examination	Qualifying Service	Other Requirements
011 Communications	Nil	Nil
020 Navigating Instruments	9 months	Nil
041 Chartwork and Pilotage	18 months	Nil
061 Navigation Safety	12 months	Nil
073 Meteorology	9 months	Nil
111 Ship Stability	9 months	Nil
157 General Ship Knowledge including Eng Knowledge	12 months	Nil
167 General Seamanship	24 months	All other examinations and MED A1 must have been passed before attempting 167.

### PART III - VALIDITY OF CERTIFICATE

- 20.3 The certificate as Fishing Master, Third-Class, is valid for:
- (a) second mate of a fishing vessel without restriction;
  - (b) first mate of a fishing vessel within the intermediate voyage limits; and
  - (c) master of a fishing vessel within local voyage limits.
- 20.4 A Fishing Mate Certificate may be exchanged for a Fishing Master, Third-Class, by passing examinations 011 and 061 and an oral examination on the command aspects of paper 167. This refers to the Fishing Mate Certificate obtained under the regulations that came into effect in September of 1976. Certificates issued prior to September 1976 cannot be exchanged.

### PART IV - SYLLABUSES OF EXAMINATIONS

#### 20.5 Communications

##### Examination number 011

Companion to Section 19.5

ITEM	COLUMN
1.	Visual Signals Recognition of international flags; knowledge of single letter signals under the International Code.
2.	Code Use of International Code of Signals in coding and decoding messages and in flag, Morse and voice procedures.
3.	Radio Use of <i>Radio Aids to Marine Navigation</i> for ascertaining facilities and services.

Note: The examination is multiple-choice.  
Duration as necessary.

#### 20.6 Navigation Instruments

##### Examination number 020

Companion to Sections 15.16, 16.14 and 21.5

ITEM	COLUMN
1.	Radar Use of all radar operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustments of controls; periodic operator checks and determination of heading marker, bearing marker, range ring and range-marker error; obtaining ranges and bearings from equipment using proper reporting procedures and recognition of targets of all types; recognition of meteorological phenomena and false, multiple, and second-trace echoes, side lobes and interference; knowledge of the limitations of radar sufficient to ensure safe navigation; correcting range and bearing data for known errors; use of radar data (i.e. position fixing, following a track, matching radar image to chart, radar plotting restricted to ability to determine CPA and time); use of reflection plotter, radar horizon and extreme range charts and tables, operator's manual and radar logbook.

2.	Decca Use of all Decca operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; periodic operator checks and determination of errors in the fraction, lane, and zone indicators, and in the LI lamp sequence meter; obtaining readings from equipment; limitations of Decca sufficient to ensure safe navigation; correcting readings for fixed and variable errors; use of Decca data for position fixing, use of Decca over-printed charts, and minimizing effect of variable errors; use of Decca data sheets and operator's manual.
3.	Loran Use of all Loran operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustment of controls; periodic operator checks and knowledge of compensation for measurement and instrument errors; obtaining readings from equipment; recognition of unwanted data, blinking and sky-waves; limitations of Loran, sufficient to ensure safe navigation; use of Loran data for position-fixing, use of Loran over-printed charts, and minimizing effect of variable errors; use of operator's manual.
4.	Echo-Sounding Machine Use of echo-sounder controls and interpretation of display.


Note: The examination is a practical test.  
Duration as necessary.

## 20.7 Chartwork and Pilotage

### Examination number 041

Companion to Sections 13.10, 16.18 and 19.7

ITEM	COLUMN
1.	Pilotage Preparations for pilotage; using available charts and publications, possession and ready for immediate use all necessary charts, including large-scale charts of the pilotage area duly corrected to date, latest sailing directions, <i>Notices to Mariners</i> , Light Lists, Traffic Zone Regulations (as applicable), tide tables, copy of Charts and Publications Regulations, Code of Navigation Procedures and Practices, and <i>Radio Aids to Marine Navigation</i> .
2.	Steering Common steering procedures, their purpose and how to put them into effect; the importance of establishing and adhering to internationally-accepted procedures in issuing helm and steering orders and having them acknowledged and complied with; the instruction of helmsmen in this matter.
3.	Symbols Chart symbols and abbreviations as published in <i>Canadian Hydrographic Service (CHS) Chart No. 1</i> .
4.	Sailing Directions Contents of preface to <i>Sailing Directions</i> , the important general navigational information contained in the preamble and opening chapter of these volumes.
5.	Lists of Lights Light characteristics, colours and sound signals used as aids to navigation; use of Lists of Lights, Buoys and Fog Signals; the terms used to define the power of lights (e.g., geographical range, luminous range, charted range, computed range, nominal range, computed visibility; use of a luminous range diagram); the effect of abnormal refraction fog signals of different types, anomalies of sound propagation in fog, notices regarding lights, lighthouses and buoys etc. published in <i>Notices to Mariners</i> .
6.	Tidal Currents Find the set and rate of tidal current that may be expected at a given point from information given in tide and current table or on the chart; ability to use tables and information on the chart of the locality with awareness of the possibly significant effect of weather on the reliability of the information so obtained.

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7.	<p>Navigation in Confined Waters</p> <p>Navigation in confined waters: altering course; transits; leading marks and bearings; recording the vessel's progress; making allowance for height of tide; the preparatory details to be attended to upon entering confined waters (e.g., a review of the relevant sections of the sailing directions, ready availability of large-scale charts of the area with proposed track drawn indicating distances, courses and near dangers noted); navigational aids with their characteristics to be identified, clearing lines, marks and bearings to be used during the passage to be drawn in, precalculation of tidal heights where critical depths of water may be encountered; the maintenance of a record of the vessel's progress on both charts in logbook, including times of passing successive points, course's compass error, speed, weather; fixing the vessel's position by relative and true bearings, transits; dead reckoning position, estimated position and observed position.</p>
8.	<p>Navigation Aids</p> <p>Navigational aids in pilotage situations; the necessity of continuing the customary checks and counts of the vessel's safe progress by the officer of the watch (OOW) and ship's personnel, with record of the details of duties performed, notwithstanding that the vessel was under the conduct of a pilot; the duty of the OOW to ensure that the pilot's advice is understood and effectively carried out; the extent to which reliance is placed on buoys.</p>
9.	<p>Canadian System</p> <p>Canadian System of Buoyage in detail; differences between lateral and cardinal systems; use of <i>Sailing Directions</i> for determining other buoyage systems in use; current and new Canadian buoyage system with an understanding of the basic principles employed in the lateral and cardinal buoyage systems, the importance of consulting the applicable volume of <i>Sailing Directions</i> for details of buoyage system in force locally prior to entering unfamiliar waters of other countries; <i>Aids to Navigation</i>.</p>
10.	<p>Bridge Practices</p> <p>Bridge practices and procedures in pilotage situations charts, various projections in common use; the requirement to continue the practice of good navigational procedures by the OOW and ship's personnel in general, and the realization that the presence of a pilot on the bridge does not absolve the ship's personnel from their continuing responsibility for the safe navigation of the ship; the principle employed in construction charts on the Mercator, polyconic, and gnomonic projections, the limitations associated with each of these projections and the purposes of each in practical navigation.</p>
11.	<p>Charts</p> <p>Significant distortion, numbering and the presentation of information; the cause of chart distortion, need for nautical charts on board ship; the replacement of superseded editions; the mode of presentation of information on charts; metrication; chart catalogues and numbering.</p>
12.	<p>Chart Usage</p> <p>Use charts produced by the major projections in common use by the Canadian Hydrographic Service, including gnomonic charts; the use of charts in the practice of coastal navigation and on ocean passages; the plotting of bearings, position lines clearing lines etc.; the transfer of positions from a chart of one projection to another of a different projection; the use of a gnomonic projection chart, Mercator and polyconic charts.</p>
13.	<p>Fixing Position</p> <p>Fixing the ship's position by means at the disposal of the OOW, including electronic navigational aids; considerations to be taken into account, including errors and limitations of equipment; the correction and plotting of bearings taken visually, by radar or direction finder (DF) and the limitations of accuracy inherent in each of these methods; the ship's position established by bearings or ranges taken simultaneously or with an interval and run intervening.</p>
14.	<p>Estimating Position</p> <p>Estimating the vessel's position, including allowing for effects of wind and/or tide; the reliability of the value in direction and force of wind, current and tidal effect used in arriving at the ship's DR position and the resulting area of doubt.</p>
15.	<p>Laying Off Courses</p> <p>Laying off courses, including allowance for effects of wind and tide; the problem of combining vectors of wind, current, tidal effect and course to steer to arrive at course made good, scrutiny of chart for off-lying dangers.</p>



16.	<p><b>Conversion of Course</b> Conversion of true courses laid off to magnetic courses, including determination of variation at any place; conversion of true courses to gyro, magnetic and compass courses and vice versa; determining the up-to-date value of variation and interpolating for variation at a given locality from isogonic lines or compass roses; use of transit lines, azimuth and amplitude to determine compass error.</p>
17.	<p><b>Distance Measurement</b> Distance measurement and the determination of speed made good and speed through the water; the measurement of distance on a Mercator or polyconic chart; the factors contributing to speed made good and speed through the water, how the difference between the two is expressed.</p>
18.	<p><b>Range of Visibility</b> Factors controlling the range of visibility; terms associated with visibility of lights on navigational aids.</p>
19.	<p><b>Reliability of Charts</b> Reliability of charts; indications by which reliability may be judged (e.g., date of original survey and possibility of subsequent surveys, adequacy of recorded soundings, with corrections having been made to date; large-scale charts show a small area in greater detail than small-scale charts; care and upkeep of charts.</p>
20.	<p><b>Publications</b> Use of publications at the disposal of the coastal navigator, including <i>Notices to Mariners</i> for the correction of charts and publications; the various publications available to the navigator and the nature of their contents; the importance of chart corrections being kept up-to-date.</p>
21.	<p><b>Tidal Terms</b> Meaning of tidal terms in common use in CHC and United States tide tables; general understanding of tidal phenomena necessary for the comprehension of tidal terms; tidal atlases.</p>
22.	<p><b>Calculation of Tides</b> Calculation of tides and heights of high and low water at reference and secondary ports and the calculation of depth of water at those times; use of the calculated depth of water at high and low water to determine the height of water at a given charted position.</p>
23.	<p><b>Set and Rate of Tides</b> Estimation of set and rate of tidal currents by reference to tidal current tables and by actual observation; the tentative nature of tabulated tidal current values and the need for caution in using them; the care required in making tidal current observations and the associated details that must be recorded.</p>
24.	<p><b>Records</b> Need for keeping an accurate record of the vessel's progress and the keeping of such a record; the duty of the OOW to maintain an accurate, detailed and continuous record of the vessel's progress from which a position may be readily determined at any time; the value of such a record being available as a measure of safe navigation and in the event of an emergency requiring immediate knowledge of the ship's position.</p>

Note: The examination consists of:  
(a) a practical chartwork paper, and  
(b) a multiple-choice examination.  
Duration is three hours.

## 20.8 Navigation Safety

### Examination number 061

Companion to Sections 13.12, 16.19, 18.7, 19.8 and 21.7

ITEM	COLUMN
1.	<p>General Knowledge Knowledge and application of the content of the Collision Regulations with Canadian Modifications 1983; STCW Code section A-VIII/2.</p>

Note: The examination is a multiple-choice test.  
The examination may be oral at the applicant's option.  
Duration as necessary.

## 20.9 General Ship Knowledge

### Examination number 157

Companion to Section 19.11

ITEM	COLUMN
1.	Safety Need for accident prevention and precautions to be taken for fishing operations, those aspects not covered by applicable MED; ability to use the <i>Code of Safety for Fishermen</i> , a Transport Canada booklet; knowledge of the Safe Working Practice Regulations as applied to fishing vessels; knowledge of: Oil Pollution Prevention Regulations, Garbage Pollution Prevention Regulations.
2.	Parts of Ship Names, sections and contribution to overall strength of the principle members of wooden vessels comprising: keel, keelson, frames, stringers, planking, stern construction; functions of the principle parts and members of steel ships comprising: framing, plating, decks, bulkheads, hatchways, bilges, double bottoms, sounding and air pipes, propellers, and rudders.
3.	Superintend Minor repair work; dry-docking and slipping inspections; emergency repairs to maintain watertight integrity; basic knowledge of general pumping arrangements.
4.	Documents Understanding of ships' plans and specifications up to ships of 150 gross tons; determination of approximate metacentric height from the rolling period, using the monogram supplied in the IMO booklet <i>Recommendation on Intact Stability of Fishing Vessels</i> ; ability to use and interpret stability and trim data supplied to fishing vessels up to 150 gross tons.
5.	Construction Names of principal parts of fishing vessels; knowledge of the construction of different types of fishing vessels built of steel, wood, aluminium, fibreglass, and ferro-cement, including a knowledge of framing, shell plating, decks, bulkheads, hatchways, bilges, air pipes and freeing ports; meaning of the terms gross tonnage, net tonnage, deadweight and freeboard.
6.	Draft Reading draft and finding mean drafts, with and without list, and change of draft when going from salt to fresh water and vice versa; effect, in general terms and excluding calculation, of adding, removing and transferring weights on draft, list and trim and an appreciation of the meaning and characteristics of stiff and tender ships; meaning of terms displacement and deadweight; use of displacement scale to determine displacement from draft and vice versa.
7.	Stability Effects of reduction in freeboard on stability and seaworthiness, and the dangers of overloading; use of stability and trim information supplied to fishing vessels; knowledge of: law of flotation; centre of gravity; centre of buoyancy, its movement; metacentre and metacentric height, initial stability; stiff and tender ships; stable, neutral and unstable equilibrium; angle of loll, its causes and effects; practical appreciation of the dangers of free surfaces in tanks and when the fish load is carried in bulk; effect on stability of loading or discharging weight and lowering and raising weights; effect on stability of a suspended weight; dangers due to icing effects.
8.	Rigging Deck machinery, standing and running gear pertaining to fishing vessels; appreciation of power gained by purchases; measurements and strengths of synthetic and fibre ropes, wires and chain.


Note: Items 1 and 4 are open book.  
The examination is a multiple-choice test.  
Duration is two hours.

## 20.10 Meteorology

### Examination number 073

Companion to Section 11.12, 14.6, 18.8 and 19.9

ITEM	COLUMN
1.	Chemical Composition of the Atmosphere Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust and hygroscopic particles, dust, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).
2.	Vertical Structure Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parhelion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.
3.	Transfer of Heat Radiation, conduction, convection, turbulence.
4.	Temperature Related to the atmosphere and the earth; calorie, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.
5.	Atmospheric Moisture and Changes of State Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.
6.	Atmospheric Stability Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke, causes of subsidence, effect of substances, compression heating, evaporation.
7.	Fog Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.
8.	Clouds Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.
9.	Precipitation Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convective, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.
10.	Lightning Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.
11.	Pressure and Pressure Systems Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isallator, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depressions, polar front low, thermal depression, vertical instability depression (e.g. tropical revolving storm); straight isobars, effect of straight isobars on wind and weather.

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12.	<p><b>Winds</b>  Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, pressure and weather characteristics associated with, monsoons in the Indian Ocean and China Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevals, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.</p>
13.	<p><b>Air masses</b>  Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical, equatorial.</p>
14.	<p><b>Fronts</b>  Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).</p>
15.	<p><b>Families of Depressions or Extra-Tropical Cyclones</b>  Formation between two air masses, life cycle and movement cross section, associated weather, frontogenesis, frontolysis, secondary depressions.</p>
16.	<p><b>Waves and Swells</b>  Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, description, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.</p>
17.	<p><b>Oceanic Currents and Effect on the Climate</b>  Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; knowledge of the various currents of the world.</p>
18.	<p><b>Tropical Revolving Storms</b>  Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: North Atlantic, western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.</p>
19.	<p><b>Ice Formation and Decay</b>  Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs; presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.</p>

20.	Ice Detection and Reporting Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Ice Navigation in Canadian Waters and Manice</i> , ice climatology and ice operations; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, sea-water temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.
21.	Weather Messages and Codes Knowledge of services available through <i>Radio Aids to Marine Navigation, Atlantic, Great Lakes and Pacific</i> ; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weather fax, weather, satellite, sea-state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weather fax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts; ability to forecast the following for 12-24 hours, pressure, wind, sea state, visibility, clouds, weather changes.
22.	Optimum Weather Routing Advantages, reducing storm damage, saving time, meeting special requirements; methods on board ship, through shore-based firm, through government departments; climatological routing, in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long-range progs are available.
23.	Requirements Application of ship's performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship performance curves and locus positions; factors that require a continuous updating and revision of weather routing procedures.

Note: The examination consists of a written test comprising multiple-choice and descriptive questions.  
Duration is three hours.


## 20.11 Stability

### Examination number 111

Companion to Sections 14.9, 18.9 and 19.12

ITEM	COLUMN
1.	Ship's Draft Draft and freeboard, including effect of water density and fresh water allowance; use of displacement and ton per inch / tonne per centimetre (TPI/TPC) scales to determine displacement from draft and vice versa.
2.	Terms Meaning of displacement and deadweight; buoyancy, centre of buoyancy (B) and its movement, reserve buoyancy; centre of gravity (G), including the effect of adding, removing and transferring weights; righting lever (GZ) when the vessel is heeled, metacentre (M), metacentric height (GM) as an indication of initial stability, danger of slack tanks; centre of flotation (F) and trim, and existence of trimming moment created by G longitudinal (GL) and B longitudinal (BL); meaning and characteristics of stiff and tender ships.
3.	Stability Data Use of stability data supplied to fishing vessels, allowing for the effect of water density on draft and displacement; interpreting curves of statical stability, achieving satisfactory transverse stability, achieving desired trim; effect of adding, removing and transferring weights on draft, list and trim, allowing for the free surface effect of tanks or when the fish load is carried in bulk and change of stability during the voyage; effects of reduction in freeboard on stability and the dangers of overloading; dangers due to icing effects.

Note: The examination consists of multiple-choice questions and practical calculations based on ship's stability data booklet.  
Duration is three hours.

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**20.12 General Seamanship**  
**Examination number 167**

<b>ITEM</b>	<b>COLUMN</b>
1.	Communications Recognition and knowledge of the meanings of the lifesaving and distress signals contained in the International Code of Signals.
2.	Safe Working Practical knowledge of safe working practices aboard fishing vessels; basic knowledge of pollution prevention; knowledge of Code of Safe Working Practices as it applies to fishing vessels.
3.	Watchkeeping Duties and responsibilities of watch members; action of the officer of the watch in emergencies at sea and in port; maintenance of a proper deck log concerning navigation progress, electronic instrument use and unusual occurrences; common steering procedures, their purpose and how to put them into effect; use of azimuth circle, pelorus or any selected method of taking a bearing; familiarity with changing over between automatic and hand steering, emergency steering (referring to operator's manual); reading bearings and headings.
4.	Responsibility Master's responsibilities in emergencies; duties and responsibilities of the master of a small vessel as required by the <i>Canada Shipping Act</i> ; practical considerations of boat handling in heavy weather; master's duties on taking over and relinquishing command; preparation of the vessel for inspection and surveys.
5.	Weather Weather reports and their use; elementary knowledge of weather systems, high and low pressure areas and frontals.
6.	Rules Collision Regulations with Canadian Modifications 1983; Code of Nautical Procedures and Practices.

Note: The examination is an oral test.  
Duration as necessary.

## CHAPTER 21 - FISHING MASTER, FOURTH-CLASS

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 21.1 Every applicant for a certificate as Fishing Master, Fourth-Class, shall:
- (a) complete 12 months service on a ship of not less than five tons gross tonnage engaged on voyages beyond partially smooth water limits;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
  - (d) obtain a certificate of completion for the Basic Safety (A1) of the Marine Emergency Duties Course, set out in TP 4957, from school listed in TP 10655;
  - (e) obtain a Marine First Aid Advanced Certificate, set out in TP 13008;
  - (f) pass an examination in each of the following subjects:
    - (i) Navigation Instruments;
    - (ii) Chartwork and Pilotage; and
    - (iii) Navigation Safety; and
  - (g) pass an oral examination in General Seamanship.

### PART II - EXAMINATIONS

- 21.2 The following table indicates the examinations for the Fishing Master, Fourth-Class, Certificate, the qualifying sea service required before each examination may be attempted, and other requirements.

Examination	Qualifying Service	Other Requirements
020 Navigating Instruments	9 months	Nil
040 Chartwork and Pilotage	9 months	Nil
061 Navigation Safety	12 months	Nil
166 General Seamanship	12 months	All other examinations and MED A1 must have been passed before attempting 166.

### PART III - VALIDITY OF CERTIFICATE

- 21.3 The certificate as Fishing Master, Fourth-Class, is valid for:
- (a) second mate on a fishing vessel without restriction; and
  - (b) Master of a fishing vessel not exceeding 100 gross tons on a fishing voyage class III, or First Mate on any fishing vessel on a fishing voyage class III.
- 21.4 WKM (F) can be exchanged for Fishing Master, Fourth-Class, by passing examination 061 and an oral examination in the command aspects (item 4 in examination 166). This refers to the WKM (F) certificate obtained under the regulations that came into effect in September 1976. Certificates issued prior to September 1976 cannot be exchanged.

### PART IV - SYLLABUSES OF EXAMINATIONS

#### 21.5 Navigation Instruments

##### Examination number 020

Companion to Sections 15.16, 16.14 and 20.6

ITEM	COLUMN
1.	Radar Use of all radar operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustments of controls; periodic operator checks and determination of heading marker, bearing marker, range ring and range marker error; obtaining ranges and bearings from equipment using proper reporting procedures and recognition of targets of all types; recognition of meteorological phenomena and false, multiple, and second-trace echoes, side lobes and interference; knowledge of the limitations of radar, sufficient to ensure safe navigation; correcting range and bearing data for known errors; use of radar data (i.e. position fixing, following a track, matching radar image to chart, radar plotting restricted to ability to determine CPA and time); use of reflection plotter, radar horizon and extreme range charts and tables, operator's manual and radar logbook.
2.	Decca Use of all Decca operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; periodic operator checks and determination of errors in the fraction, lane, and zone indicators, and in the L.I. Lamp sequence meter; obtaining readings from equipment; limitations of Decca sufficient to ensure safe navigation; correcting readings for fixed and variable errors; use of Decca data for position fixing, use of Decca over-printed charts, and minimizing effect of variable errors; use of Decca data sheets and operator's manual.
3.	Loran Use of all Loran operator controls; correct setting up and shutting down of equipment; performance check and recognition of malfunctions; recognition and correction of maladjustment of controls; periodic operator checks and knowledge of compensation for measurement and instrument errors; obtaining readings from equipment; recognition of unwanted data, blinking and sky-waves; limitations of Loran, sufficient to ensure safe navigation; use of Loran data for position fixing, use of Loran over-printed charts, minimizing effect of variable errors; use of operator's manual.
4.	Echo-Sounding Machine Use of echo-sounder controls and interpretation of display.

Note: The examination is a practical test.  
Duration as necessary.



**21.6 Chartwork and Pilotage**  
**Examination number 040**  
Companion to Sections 15.17 and 16.15

ITEM	COLUMN
1.	Charts The chart, its nature and function as an aid to navigation; practical effects of projection distortion, numbering and the presentation of information, factors affecting reliability of charts; ability to use Mercator and polyconic charts; chart, symbols and abbreviations as published in <i>Canadian Hydrographic Service Chart No. 1</i> .
2.	Publications Light characteristics and colours and sound signals used as aids to navigation, List of Lights, Buoys and Fog Signals; Canadian Buoyage System and its use; use and purpose of Canadian Notices to Shipping and Mariners, and chart corrections.
3.	Chartwork Locating a vessel's position on the chart by simultaneous true bearings and/or true bearing and distance; locating a vessel's position by two or more simultaneous distances. Determining the latitude and longitude of a given position; locating a position by its latitude and longitude, and its true bearing and distance from a given point. Laying off a course between given positions; measuring the true direction of a course laid off on the chart; measuring distance on the chart. Finding the DR position, given course, speed and time elapsed from the last observed position by plotting on a chart or by other acceptable method of the applicant's choice. Demonstrating an appreciation that current and/or wind may affect the vessel's course and speed over the ground; determining speed over the ground between observed positions; determining the true course made good between observed positions.
4.	Records and Errors Appreciation of the need for keeping an accurate record of the vessel's progress and the keeping of this record; care of dividers and parallel rulers. Periodic operator checks and determination of compass error by comparison with true terrestrial bearings or headings; determining and recording compass deviation; use of the magnetic compass to determine accuracy of the gyro compass by comparison; correcting courses and bearings for compass error, magnetic variation and deviation; use of table of deviations.

Note: The examination is oral and includes a practical chart paper.  
Duration as necessary.

**21.7 Navigation Safety**  
**Examination number 061**  
Companion to Sections 13.12, 16.19, 18.7, 19.8 and 20.8


ITEM	COLUMN
1.	General Knowledge Knowledge of the content of the Collision Regulations with Canadian Modifications 1983; STCW Code section A-VIII/2.

Note: The examination is a multiple-choice test.  
The applicant has the option of taking the examination as either an oral or written test.  
Duration as necessary.

**21.8 General Seamanship**  
**Examination number 166**

ITEM	COLUMN
1.	<p>Communications</p> <p>Recognition and knowledge of the meanings of the lifesaving and distress signals contained in the International Code of Signals.</p>
2.	<p>Safe Working</p> <p>Practical knowledge of safe working practices aboard fishing vessels; basic knowledge of pollution prevention; knowledge of Code of Safe Working Practices as it applies to fishing vessels.</p>
3.	<p>Watchkeeping</p> <p>Duties and responsibilities of watch members; action of the officer of the watch in emergencies at sea and in port; maintenance of a proper deck log concerning navigation progress, electronic instrument use and unusual occurrences; common steering procedures, their purpose and how to put them into effect; use of azimuth circle, pelorus or any selected method of taking a bearing; familiarity with changing over between automatic and hand steering, emergency steering (referring to operator's manual); reading bearings and headings.</p>
4.	<p>Responsibility</p> <p>Master's responsibilities in emergencies; duties and responsibilities of the master of a small vessel as required by the <i>Canada Shipping Act</i>; practical considerations of boat handling in heavy weather.</p>
5.	<p>Documents</p> <p>Understanding of ship's plans and specifications; awareness of the content and practices described in the Small Fishing Vessel Safety Manual (TP 10038); ability to use and interpret stability and trim data supplied to fishing vessels.</p>
6.	<p>Stability</p> <p>Reading draft and finding mean drafts, with and without list, and change of draft when going from salt to fresh water and vice versa; effect, in general terms and excluding calculation, of adding, removing and transferring weights on draft, list and trim and an appreciation of the meaning and characteristics of stiff and tender ships; effects of reduction in freeboard on stability and seaworthiness, and the dangers of overloading; practical appreciation of the dangers of free surfaces in tanks and when the fish load is carried in bulk; dangers due to icing effects.</p>

Note: The examination is an oral and practical test.  
Duration as necessary.

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## **CHAPTER 22 - CERTIFICATE OF SERVICE AS MASTER OF A FISHING VESSEL OF NOT MORE THAN 100 TONS GROSS TONNAGE**

### **PART I - GENERAL REQUIREMENTS OF APPLICANTS**


- 22.1 An applicant who may be granted a Certificate of Service to be valid on board a fishing vessel of not more than 100 tons gross tonnage, shall:
- (a) complete 12 months service as master on a fishing vessel of not less than 60 tons gross tonnage, performed;
    - (i) before July 30, 1997; and
    - (ii) during the six-year period immediately preceding the date of application;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
  - (d) obtain a certificate of completion for each of the following courses from a school listed in TP 10655;
    - (i) Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957;
    - (ii) the training program set out in TP 8060; and
    - (iii) Marine First Aid Advanced Course, set out in TP 13008.

### **PART II - EXAMINATION**

- 22.2 The applicant shall obtain a certificate of completion from a school listed in TP 10655 for the training program set out in TP 8060.

### **PART III - VALIDITY OF CERTIFICATE**

- 22.3 The Certificate of Service as Master, Fishing Vessel Not Exceeding 100 Tons Gross Tonnage, is valid as master of a fishing vessel or a vessel engaged in transferring to shore the unprocessed catch of a fishing vessel not exceeding 100 tons gross tonnage on voyages within the limits specified in the certificate.

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## **CHAPTER 23 - RO-RO PASSENGER, LEVEL 2**

### **PART I – GENERAL REQUIREMENTS OF APPLICANTS**

23.1 Every applicant for a ro-ro passenger, level 2 certificate shall,

- (a) obtain a medical certificate prescribed by the *Crewing Regulations*;
- (b) hold a master, mate or engineer certificate; and
- (c) provide the examiner with a certificate of the applicant's successful completion, at a recognized institution, of a course in ro-ro passenger safety, Level 2.

## CHAPTER 24 - PROFICIENCY IN COMPASS DEVIATION

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 24.1 (1) Every applicant for a certificate of proficiency in compass deviation shall
- (a) complete compensations or adjustments of a ship's magnetic compasses on at least 12 different ships;
    - (i) of which not less than four must have been on steel ships; and
    - (ii) all of which must have been completed within three years immediately preceding the application;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Marine First Aid Basic Certificate on completion of a course set out in TP 13008; and
  - (d) pass a written, oral and practical examination.


### PART II - VALIDITY OF CERTIFICATE

- 24.2 The certificate allows the holder to adjust ships' magnetic compasses and provide compass deviation certificates.


### PART III - SYLLABUS OF EXAMINATION

#### 24.3 Examination Syllabus

ITEM	COLUMN
1.	<p>Magnetism</p> <p>Knowledge of magnetic properties of materials, including induction, susceptibility and permeability; terrestrial magnetism, dip, total force, horizontal force, vertical force, and the effect on the deviation of the compass accompanying any change in the values of these elements; causes and effects of variation; ship's magnetism, including the characteristics of hard and soft iron and permanent, sub-permanent and induced magnetism; components P, Q and R, and the rods a, b, c, d, e, f, g, h and k; approximate coefficients A, B, C, D, E and J, and the causes of sextantal, octonal, decantal and dodecantal deviations; constants lambda and mu and the relationship between them; general principles of compass correction and methods of finding, compensating a compass for the various components that might cause deviation, including the effects of heel and trim; compensation by use of the kelvin deflector, the principle of the deflector method and the information that can be deduced from the deflector readings; setting and lining up of compasses with due regard for the proximity of magnetic material, electrical devices and other disturbing influences; theory of degaussing in ships fitted with M coils and compass compensation by means of B and heeling error coils; procedure when swinging ship and construction of deviation tables from bearings of a distant object, reciprocal bearings or azimuths of a heavenly body; practical analysis of a deviation table and practical compass correction.</p>

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2.	<p>Electricity</p> <p>Knowledge of: electrical currents and their production; simple cells of primary and secondary types, including the effects of polarization; electromotive force, resistance and current; Ohm's law and Kirchoff's laws; magnetic fields and lines of force, induced magnetism, fields of conductors carrying currents; solenoids and electromagnets; effect of magnetic fields of all types on the compass needle; elementary principles of dynamos and motors; electrical lighting.</p>
3.	<p>Oral Examination</p> <p>The oral examination is based on practical compass adjustment using Beall's compass deviascope or instructional binnacle; practical aspects of the syllabus in the written examination.</p>

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## CHAPTER 25 - SUPERVISOR OF OIL TRANSFER OPERATION AND SUPERVISOR OF AN OIL TRANSFER OPERATION IN ARCTIC WATERS NORTH OF 60<sup>00</sup>'N

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 25.1 Every applicant for a Certificate as Supervisor of an Oil Transfer Operation shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Basic Safety (A1) of the Marine Emergency Duties Course, set out in TP 4957;
    - (ii) Advanced Oil Tanker Safety Course or Supervisor of an Oil Transfer Operation Course, set out in TP 8129;
    - (iii) Marine First Aid Basic Course, set out in TP 13008; and
  - (c) have a minimum of three months service that includes duties relating to oil transfer operations.
- Note: Supervisors of oil transfer operations may hold an officer's certificate that meets the requirements of the Marine Certification Regulations for oil transfer operations.
- 25.2 Every applicant for a Certificate as Supervisor of an Oil Transfer Operation in Arctic Waters, north of 60 degrees North, shall complete the requirements of subsection 25.1 and have a minimum of:
- (a) two Arctic shipping seasons of service under the supervision of a holder of a Supervisor of an Oil Transfer Operation in Arctic Waters Certificate; and
  - (b) have assisted in at least six oil transfer operations in Arctic waters during the period of service described in (a).

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## **CHAPTER 26 - SUPERVISOR OF CHEMICAL TRANSFER OPERATION AND SUPERVISOR OF LIQUEFIED GAS TRANSFER OPERATION**

### **PART I - SUPERVISOR OF CHEMICAL TRANSFER OPERATION**

#### **General requirements of applicants**


- 26.1 Every applicant for a certificate as Supervisor of a Chemical Transfer Operation shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957;
    - (ii) Advanced Chemical Tanker Safety Course, set out in TP 8129; and
    - (iii) Marine First Aid Basic Course, set out in TP 13008; and
  - (c) have a minimum of three months service on a chemical tanker, which includes duties relating to chemical transfer operations.

### **PART II - SUPERVISOR OF LIQUEFIED GAS TRANSFER OPERATION**

#### **General Requirements of Applicants**

- 26.2 Every applicant for a certificate as Supervisor of a Liquefied Gas Transfer Operation shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Basic Safety (A1) of the Marine Emergency Duties Courses, set out in TP 4957;
    - (ii) Advanced Liquefied Gas Tanker Safety Course, set out in TP 8129; and
    - (iii) Marine First Aid Basic Course, set out in TP 13008; and
  - (c) have a minimum of three months service on a liquefied gas tanker, which includes duties relating to liquefied gas transfer operations.



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## **CHAPTER 27 - OIL TANKER, CHEMICAL TANKER AND LIQUEFIED GAS TANKER (LEVEL 1)**

### **GENERAL REQUIREMENTS OF APPLICANTS**

- 27.1 (1) These endorsements are provided in response to the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW'78) as amended in 1995, (STCW 95), and are available to holders of certificates of competency listed in 27.2(1)(a).
- (2) Level I endorsement attests ability to take charge of cargo operations and equipment.

### **PART I - OIL TANKER, LEVEL 1**

- 27.2 Every applicant for a certificate for Oil Tanker, Level I, shall
- (a) hold a certificate as:
- (i) master mariner;
  - (ii) master, intermediate voyage;
  - (iii) first mate, intermediate voyage;
  - (iv) master, local voyage;
  - (v) first mate, local voyage;
  - (vi) watchkeeping mate, ship;
  - (vii) restricted watchkeeping mate, ship;
  - (viii) master, local-voyage steamship not exceeding 350 tons, or master, local-voyage tug;
  - (ix) master, ship not exceeding 1600 tons gross tonnage;
  - (x) first-class engineer, steamship;
  - (xi) first-class engineer, motor ship;
  - (xii) maintenance supervisor, MODU/surface;
  - (xiii) second-class engineer, steamship;
  - (xiv) second-class engineer, motor ship;
  - (xv) maintenance supervisor, MODU/self-elevating;
  - (xvi) third-class engineer, steamship;
  - (xvii) third-class engineer, motor ship;
  - (xviii) fourth-class engineer, steamship; or
  - (xix) fourth-class engineer, motor ship;
- (b) obtain a medical certificate prescribed by the Crewing Regulations;
- (c) obtain certificate of completion for the marine fire fighting (B2) of the Marine Emergency Duties Course, set out in TP 4957, from a school listed in TP 10655; and
- (d) have
- (i) obtained a certificate of completion for an Advanced Oil Tanker Safety Course, set out in TP 8129, from a school listed in TP 10655; or
  - (ii) a minimum of three months sea service on board an oil tanker or chemical tanker having duties relating to the loading, discharging or transfer of cargo and cargo equipment within the five-year period before the date of the application. The cargo must have been an oil or chemical cargo.


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## **PART II - CHEMICAL TANKER, LEVEL 1**

- 27.3 Every applicant for a certificate for Chemical Tanker, Level I, shall
- (a) hold a certificate as listed in 27.2 (1)(a) (i) to (xix);
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a certificate of completion for marine fire fighting (B2) of the Marine Emergency Duties Course, set out in TP 4957, from a school listed in TP 10655; and
  - (d) have
    - (i) obtained a certificate of completion for an Advanced Chemical Tanker Safety Course, set out in TP 8129, from a school listed in TP 10655; or
    - (ii) a minimum of three months sea service on board a chemical tanker having duties relating to the loading, discharging or transfer of cargo and cargo equipment within the five-year period before the date of the application. The cargo must have been a chemical cargo.

## **PART III - LIQUEFIED GAS TANKER, LEVEL 1**

- 27.4 Every applicant for a certificate for a Liquefied Gas Tanker, Level I, shall
- (a) hold a certificate as listed in 27.2 (1)(a) (i) to (xix);
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a certificate of completion for marine fire fighting (B2) of the Marine Emergency Duties Course, set out in TP 4957, from a school listed in TP 10655; and
  - (d) have
    - (i) obtained a certificate of completion for an Advanced Liquefied Gas Tanker Safety Course, set out in TP 8129, from a school listed in TP 10655; or
    - (ii) a minimum of three months sea service on board a liquefied gas tanker having duties relating to the loading, discharging or transfer of cargo and cargo equipment within the five-year period before the date of the application. The cargo must have been a liquefied gas cargo.

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## **CHAPTER 28 - OIL TANKER, CHEMICAL TANKER AND LIQUEFIED GAS TANKER (LEVEL 2)**

### **GENERAL REQUIREMENTS OF APPLICANTS**

- 28.1 (1) These endorsements are provided in response to the requirements of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers 1978 (STCW'78) as amended in 1995, (STCW 95), and are available to holders of certificates of competency listed in section 28.2(1)(a).
- (2) Level II endorsement attests ability to take charge of the carriage of cargoes.

### **PART I - OIL TANKER, LEVEL 2**

- 28.2 (1) Every applicant for a certificate for Oil Tanker, Level II, shall:
- (a) hold a certificate as:
- (i) master mariner;
  - (ii) master, intermediate voyage;
  - (iii) first mate intermediate voyage;
  - (iv) master, local voyage;
  - (v) first mate, local voyage;
  - (vi) watchkeeping mate, ship;
  - (vii) restricted watchkeeping mate, ship;
  - (viii) master, local-voyage, steamship not exceeding 350 tons, or master, local-voyage tug;
  - (ix) master, ship not exceeding 1600 tons gross tonnage;
  - (x) first-class engineer, steamship;
  - (xi) first-class engineer, motor ship;
  - (xii) maintenance supervisor, MODU/surface;
  - (xiii) second-class engineer, steamship;
  - (xiv) second-class engineer, motor ship;
  - (xv) maintenance supervisor, MODU/self-elevating;
  - (xvi) third-class engineer, steamship;
  - (xvii) third-class engineer, motor ship;
  - (xviii) fourth-class engineer, steamship; or
  - (xix) fourth-class engineer, motor ship;
- (b) subject to subsection (2), hold a certificate for Oil Tanker, Level I;
- (c) obtain a medical certificate prescribed by the Crewing Regulations;
- (d) obtain a certificate of completion for an Advanced Oil Tanker Safety Course, set out in TP 8129, from a school listed in TP 10655;
- (e) obtain a certificate of completion for a Cargo and Emergency Management Course, set out in TP 8129, from a school listed in TP 10655; and
- (f) have a minimum of three months sea service within the five-year period before the date of the application as master, chief engineer, watchkeeping mate or engineer on board an oil tanker or chemical tanker while holding a certificate for Oil Tanker, Level I. The cargo must have been an oil or chemical cargo.
- (2) Not in use.


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## PART II - CHEMICAL TANKER, LEVEL 2

- 28.3 (1) Every applicant for an certificate for Chemical Tanker, Level II, shall:
- (a) hold a certificate listed in 28.2 (1) (a) (i) to (xix);
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) subject to subsection (2), hold a certificate for Chemical Tanker, Level I;
  - (d) obtain a certificate of completion for an Advanced Chemical Tanker Safety Course, set out in TP 8129, from a school listed in TP 10655;
  - (e) obtain a certificate of completion for a Cargo and Emergency Management Course, set out in TP 8129, from a school listed in TP 10655; and
  - (f) have a minimum of three months sea service within the five-year period before the date of the application as master, chief engineer, watchkeeping mate or engineer on board a chemical tanker while holding a certificate for Chemical Tanker, Level I. The cargo must have been a chemical cargo.
- (2) Not in use.

## PART III - LIQUEFIED GAS TANKER, LEVEL 2


- 28.4 (1) Every applicant for a certificate for Liquefied Gas Tanker, Level II, shall:
- (a) hold a certificate listed in 28.2 (1) (a) (i) to (xix);
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) subject to subsection (2), hold a certificate for Liquefied Gas Tanker, Level I;
  - (d) obtain a certificate of completion for an Advanced Liquefied Gas Tanker Safety Course, set out in TP 8129, from a school listed in TP 10655;
  - (e) obtain a certificate of completion for a Cargo and Emergency Management Course, set out in TP 8129, from a school listed in TP 10655; and
  - (f) have a minimum of three months sea service within the five-year period before the date of the application as master, chief engineer, watchkeeping mate or engineer on board a liquefied gas tanker while holding a certificate for Liquefied Gas Tanker, Level I. The cargo must have been a liquefied gas cargo.
- (2) Not in use.

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## CHAPTER 29 - CONTINUED PROFICIENCY CERTIFICATE FOR MASTERS, MATES, OFFSHORE INSTALLATION MANAGERS (OIM) AND BARGE SUPERVISORS

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 29.1 Every applicant for a Continued Proficiency Certificate as Master, Mate, Offshore Installation Manager or Barge Supervisor, shall hold a certificate as:
- (i) master mariner;
  - (ii) master, intermediate voyage;
  - (iii) first mate, intermediate voyage;
  - (iv) master, local voyage;
  - (v) first mate, local voyage;
  - (vi) watchkeeping mate, ship;
  - (vii) restricted watchkeeping mate, ship;
  - (viii) watchkeeping mate, MODU/surface;
  - (ix) watchkeeping mate, MODU/self-elevating;
  - (xi) watchkeeping mate, MODU/inland;
  - (xii) master, ships not more than 350 tons gross tonnage, or tug, local voyage;
  - (xiii) fishing master, class I;
  - (xiv) fishing master, class II;
  - (xv) fishing master, class III;
  - (xvi) fishing master, class IV;
  - (xvii) master, fishing vessel of not more than 100 tons gross tonnage;
  - (xviii) master, ship not exceeding 1600 tons gross tonnage;
  - (xix) offshore installation manager, MODU/surface;
  - (xx) offshore installation manager, MODU/self-elevating;
  - (xxi) offshore installation manager, MODU/inland;
  - (xxii) barge supervisor, MODU/surface;
  - (xxiii) barge supervisor, MODU/self-elevating;
  - (xxiv) barge supervisor, MODU/inland; or
  - (xxv) equivalent certificates issued in accordance with the Masters and Mates Examination Regulations, other than master of a small craft and master of a small passenger craft.
- 29.2 (1) Every applicant for a continued proficiency certificate who holds a certificate listed in 29.1 shall:
- (a) hold a medical certificate as prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) in the case of the holders of a certificate issued under the Marine Certification Regulations:
      - (A) Marine Emergency Duties Course, as set out in TP 4957, as required by the certificate held; and
      - (B) Simulated Electronic Navigation Course, as set out in TP 4958, as required by the certificate held; or

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- (ii) in the case of the holders of a certificate issued under the Masters and Mates Examination Regulations after September 12, 1967:
  - (A) Marine Emergency Duties Course, set out in TP4957, required to obtain an equivalent certificate under the Marine Certification Regulations; and
  - (B) Simulated Electronic Course, set out in TP 4948, required to obtain an equivalent certificate under the Marine Certification Regulations;
- (c) meet the requirements of one of the following (either i, ii or iii) within the five-year period preceding the date of issue of this certificate:
  - (i) fulfil the service requirements of either (A), (B) or (C):
    - (A) 12 months service on board a ship as master or mate in charge of the watch;
    - (B) 24 months service performing functions in any of the following marine positions:
      - (aa) shore captain, marine superintendent, operations manager in the employ of a ship owner or ship agent;
      - (bb) ship's pilot licensed by a pilotage authority and pilot superintendents;
      - (cc) marine surveyor engaged in the duties related to the survey or inspection of ships, their equipment or cargoes;
      - (dd) harbour, dock or berth masters or their deputies;
      - (ee) watchkeepers or supervisors in port operations, traffic or search and rescue centres;
      - (ff) hydrographic surveyors;
      - (gg) instructors and training officers in nautical subjects at a school listed in TP 10655;
      - (hh) examiners of masters and mates;
    - (ii) casualty investigators engaged in the duties related to the investigation of marine casualties;
    - (jj) persons engaged in the duties relating to marine emergency planning and operations; or
  - (C) within the 12-month period preceding the date of issue of this certificate:
    - (aa) 3 months service as master or mate on watch;
    - (bb) 3 months service as a supernumerary mate on watch if the continued proficiency certificate has expired; or
- (ii) pass a written and an oral examination set out in section 29.2 (6); or
- (iii) obtain a certificate of completion for a course in ship management as set out in subsection 29.3 at a school listed in TP 10655.

- (2) The MED and SEN courses which must have been completed for the issue of a Continued Proficiency Certificate are:

CERTIFICATE	SEN (Note (i))	MED
(a) MM / CFG / IMFG / ON1 / CN1, Master, Intermediate Voyage / Master, Local Voyage / CHT/ CHT 350 / CIW 350 / Master, Local Voyage 350	2	B1, B2, C & D
(b) ON2/CN2/ First Mate, Intermediate Voyage / First Mate, Local Voyage / 1MHT/ 1MIW / OIM / Barge Supervisor	1	B1, B2, C & D
(c) WKMS / WKMSR / WKM / WKM MODU / 2MFG / 2MHT / 2MIW	1	B1, B2 & C
(d) CMW	1	B1, B2, C & D (Note (iii))
(e) Fishing Master, Class IV / WKF / Fishing Master, Class III, Fishing Mate / Fishing Master, Service < 100 Tons Gross Tonnage	NIL	A1
(f) Fishing Master, Class II / Fishing Master, Restricted / Fishing Master	1	A1, B1 & B2
(g) Fishing Master, Class I	2	C & D

- Notes:
- (i) The former Radar Observer & Radar Simulator Courses will be considered as equivalent to the SEN I & SEN II Courses, respectively.
  - (ii) In order to receive a certificate of competency endorsed for STCW 95 compliance, an applicant who completed a Radar Observer, Radar simulator, SEN 1, SEN 2, course prior to September 1, 1989 must **either** complete an applicable SEN 1 or SEN 2, course implemented after September 1, 1989 **or** complete a stand-alone course in ARPA. A training certificate (EXN-24) for a stand-alone ARPA course from an approved Canadian marine institute issued before September 1, 1989 is acceptable for an STCW 95 endorsement.
  - (iii) SEN and MED requirements will be determined by the examiner and may be reduced depending on the ship's configuration, type of voyages and equipment carried on board.


- (3) not used.
- (4) not used.
- (5) not used.

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## PART II - EXAMINATIONS

- 29.2 (6) The examination required by subparagraph 29.2 (1) (c) (ii) consists of:
- (a) a written examination in subject 06, Navigation Safety, required for the certificate held;
  - (b) an oral examination on general seamanship, including changes that have occurred in the preceding five years in:
    - (i) buoyage system;
    - (ii) routing, traffic separation and VTS system/regulations;
    - (iii) watchkeeping practices and procedures;
    - (iv) SAR procedures and emergency management;
    - (v) regulations/codes respecting hazardous and dangerous cargoes;
    - (vi) meteorological information and services;
    - (vii) pollution legislation;
    - (viii) industrial/personnel safety regulations/codes;
    - (ix) navigation instruments; and
    - (x) radio and visual communications.



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### PART III - SYLLABUS OF EXAMINATION

29.3 The syllabus of the training course in Ship Management, required by subparagraph 29.2 (1) (c) (iii) is:

ITEM	COLUMN
1.	Safe Navigation and Anti-Collision Collision regulations and buoyage systems; routing systems and traffic separation schemes; passage planning; bridge procedures; exercise in practical navigation; principles of keeping a safe navigational watch; revision of chartwork exercises; practical operation of navigational equipment; ability to determine positions and compass error from celestial and terrestrial observations; search and rescue procedures.
2.	The Carriage and Handling of Cargo Principles of keeping a safe watch in port; exercises in the use of stability information on ships; methods of stress determination; modern ship types; design features related to cargo handling, seakeeping and safety; load/discharge procedures; appreciation of the statutory requirements and recommended codes relating to the carriage of grain, dangerous goods, chemicals in bulk, liquefied gases and other bulk cargoes.
3.	Operation of Ships Meteorological information and services; revision of communication by Morse and flag signals; safety and other certificates required to be carried by ships, and preparation for their renewal; merchant shipping legislation concerning the safety of the ship; legislation for the prevention of pollution; regulations concerned with watchkeeping, shipboard safety and emergency situations.
4.	Ship Personnel Matters Safety legislation and Safe Working Practices Regulations; manning qualifications, scales and training schemes; discipline and procedures; shipboard management; first aid/medical care aboard ship.

Note: The foregoing syllabus will also provide guidance of the subjects to be studied.

29.4 The service claimed under clause 29.2 (1) (c) (i) (C) shall:

- (a) have been performed in a supernumerary capacity as second OOW or in a similar capacity understudying the OOW;
- (b) be verified by the master on a Certificate of Watchkeeping Service, EXN-25; and
- (c) generally comply with the rules set out in Chapter 3 for acceptance of service for the certificate held.

**THE EXAMINATION AND CERTIFICATION  
OF**

**SEAFARERS**

**SECTION THREE OF FIVE**


**REVISION 04**

<b>Responsible Authority</b>	<b>Approval</b>
The Director, Marine Personnel Standards and Pilotage is responsible for this document, including any change, correction, or update.	<hr/> <p>Donald Roussel Director, Marine Personnel Standards and Pilotage Marine Safety</p> <p><b>Date signed:</b></p>

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31	EXAMINATIONS STEAM CERTIFICATE (Sec. 31.5)	1 April 1999	01
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31	EXAMINATIONS, STEAM & MOTOR CERTIFICATE (Sec. 31.5)	1 April 1999	01
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**Important :**


**This publication is subject to periodical reviews and it is updated accordingly /  
 Cette publication est sujette à des revues périodiques et elle est mise-à-jour en conséquence**

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## INTRODUCTION

This publication was prepared with input from various federal, provincial and industry organizations including:

- Canadian Marine Advisory Council
- Canadian Marine Training Institutions
- Canadian Ship Owners Association
- Canadian Petroleum Association
- Canadian Association of Oil Well Drilling Contractors
- Canadian Offshore Vessel Operators Association
- Canadian Institute of Marine Engineers
- Company of Master Mariners of Canada
- Canada-Newfoundland Offshore Petroleum Board
- Canada-Nova Scotia Offshore Petroleum Board
- Government of Newfoundland -Department of Mines and Energy
- Government of Nova Scotia -Department of Mines and Energy
- Government of Canada -Department of Energy, Mines and Resources
- National Energy Board


This publication is intended as a guide for the certification of officers and crews of ships and marine offshore drilling units.

**The contents of this publication reflect the requirements of the Marine Certification and Crewing Regulations. In case of conflict, the regulations take precedence.**

This publication is subject to ongoing review and amendment as a result of consultation with the Canadian Marine Advisory Council.


For ease of reference and to reduce printing costs this publication has been divided into five sections pertaining to specific areas of specialization as follows:

- Section 1: General Information
- Section 2: Deck Certificates
- Section 3: Engineering Certificates
- Section 4: Rating Certificates
- Section 5: Mobile Offshore Unit (MODU) Certificates.

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- TP 4958: Simulated Electronic Navigation (SEN) courses.
- TP 5562: Co-operative Cadet Training Program, Navigation.
- TP 8060: Training courses for Fishing Service Certificate, Master of Fishing Vessels 60 to 100 Tons.
- TP 8129: Tanker Safety courses.
- TP 8911: Three-year Marine Engineer course.
- TP 10655: Transport Canada-approved marine training courses.
- TP 10933: Engine-Room Rating training courses.
- TP 10934: Course for Certificate of Service, Master of Vessels of Not More Than 1600 Tons.
- TP 10935: Simulated Engine Room and Control Room course.
- TP 10936: Bridge Watchman training courses.
- TP 10937: Mobile Offshore Drilling Unit courses.
- TP 11130: Marine Cooking training course.
- TP 13008: Marine First Aid and Marine Medical Care training program.
- TP 13024: Ro-Ro Passenger Ship Personnel training standards.
- TP 13117: Bridge Resource Management.
- TP 13720: Practical Skills for Marine Engineers Training Course.
- TP 13721: Training Record Book (TRB) Requirements for Watchkeeping Engineer Candidates.

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## **CHAPTER 30 - FIRST-CLASS ENGINEER, MOTOR SHIP, AND FIRST-CLASS ENGINEER, STEAMSHIP**

### **PART I - GENERAL REQUIREMENTS OF APPLICANTS**

- 30.1 (1) Every applicant for a certificate as First-Class Engineer, Motor Ship or Steamship, shall:
- (a) obtain a medical certificate prescribed in the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957:
      - (A) with respect to survival craft
      - (B) with respect to marine fire fighting
      - (C) for officers, and
      - (D) for senior officers
    - (ii) Propulsion Plant Simulator Course Level II, set out in TP 10935; and
    - (iii) Marine First Aid Advanced Course, set out in TP 13008; and
  - (c) pass a written examination in each of the following subjects:
    - (i) Applied Mechanics;
    - (ii) Thermodynamics;
    - (iii) Electrotechnology;
    - (iv) Naval Architecture; and
    - (v) Engineering Knowledge, General.
- (2) Every applicant for a certificate as First-Class Engineer, Steamship, shall
- (a) complete the requirements set out in subsection 30.1 (1);
  - (b) pass a written examination in Engineering Knowledge, Steam; and
  - (c) pass an oral examination.
- (3) Every applicant for a certificate as First-Class Engineer, Motor Ship, shall
- (a) complete the requirements set out in subsection 30.1 (1);
  - (b) pass a written examination in Engineering Knowledge, Motor; and
  - (c) pass an oral examination.

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- 30.2 (1) The service required by an applicant for a First-Class Engineer, Steamship, or First-Class Engineer, Motor Ship, Certificate is 18 months as follows:
- (a) a minimum of nine months sea service while holding the certificate of Second-Class Engineer, Steamship, as an engineer officer in charge of the machinery on a steamship of not less than 1500 kW propulsion power where the applicant applies for a certificate as a First-Class Engineer, Steamship;
  - (b) a minimum of nine months sea service while holding the certificate of Second-Class Engineer, Motor Ship, as an engineer officer in charge of the machinery on a motor ship of not less than 1500 kW propulsion power where the applicant applies for a certificate as a First-Class Engineer, Motor Ship;
  - (c) a minimum of nine months sea service while holding the certificate as a second class engineer, motor ship, or as a maintenance supervisor in charge of the machinery on a MODU/surface of not less than 1 500 kW propulsion power; and
  - (d) the remaining service made up of any combination of the following, subject to any time limitations set out herein:
    - (i) service as an engineer officer on a motor ship, steamship or mobile offshore unit of not less than 1500 kW propulsion power; and
    - (ii) time spent at the marine department of a school listed in TP 10655, credited at a ratio of one day for every three days of attendance to a maximum of three months.

### **Steam and Motor Certificates**

- 30.3 (1) An applicant for a First-Class Engineer, Steamship or Motor Ship, Certificate shall have not less than 18 months sea service, as specified in section 30.2 (1) of this Schedule, while holding a Second-Class Certificate of which:
- (a) not less than nine months was in a steamship of not less than 1500 kilowatt propulsion power; and
  - (b) not less than nine months was in a motor ship of not less than 1500 kilowatt propulsion power.
- (2) Not in use.
- 30.4 Not in use.

**PART II - EXAMINATIONS**

30.5 (1) The following table lists the written and oral examinations for the First-Class Engineer Certificate, the qualifying service required before each may be attempted, and other requirements:

**Steam Certificate**

<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
Applied Mechanics	-	-
Thermodynamics	-	-
Electrotechnology	-	-
Naval Architecture	-	-
Engineering Knowledge, General	18 months	Second Class Certificate MED D, PPS Level 2
Engineering Knowledge, Steam	18 months including nine months Steam 1500 kW	Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General & Steam

**Motor Certificate**

<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
Applied Mechanics	-	-
Thermodynamics	-	-
Electrotechnology	-	-
Naval Architecture	-	-
Engineering Knowledge, General	18 months 1500 kW	Second Class Certificate MED D, PPS Level 2
Engineering Knowledge, Motor	18 months including nine months motor 1500 kW	Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General & Motor

**Motor Qualification to a Steam Certificate**

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, Motor	Nine months 1500 kW motor	First-Class Steam Certificate
Oral Examination	-	Pass Engineering Knowledge, Motor

**Steam Qualification to a Motor Certificate**

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, Steam	Nine months 1500 kW steam	First-Class Motor Certificate
Oral Examination	-	Pass Engineering Knowledge, Steam.

- (2) There are nine questions in each written paper, not more than six of which are to be answered within a maximum time of three and a half hours.
- (3) If more than the required number of questions on any paper are attempted, all the answers shall be marked and only the six questions awarded the lowest marks shall be taken to determine the overall result.
- (4) The knowledge, to be shown by an applicant for a First-Class Certificate shall be sufficient to enable the applicant to take overall charge of all engine room personnel, the safe operation and maintenance of the boilers and machinery of ships with a propulsion power of 3000 kilowatts or more, and the supervision of a ship undergoing survey and repair in dry-dock.

**PART III - VALIDITY OF CERTIFICATE**

30.6 The certificate of Marine Engineer, First-Class, is valid as chief engineer without restriction.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 30.7 Applied Mechanics

ITEM	COLUMN
1.	Statics Laws of equilibrium; moments and couples; polygon of forces; Rapson's slide.
2.	Friction Law of dry friction; friction angle; friction clutches; friction on inclined plane; friction on threads; work done against friction.
3.	Kinematics Linear and angular motion with constant acceleration; gravitational acceleration; velocity-time graphs; cams.
4.	Relative Velocity and Acceleration Effect of a current on the velocity and course of a ship; relative velocity between bodies moving in different planes.
5.	Dynamics Newton's law of motion; the force equation; Atwood machines; acceleration of connected bodies; effect of simple air resistance on motion under the effect of gravity; the torque equation; conservation of momentum; kinetic energy of translation and of rotation; flywheels; energy; conservation of energy; impulsive forces; centrifugal force; Porter governor with sleeve friction; simple harmonic motion; simple pendulum; simple vibrations; dynamic balancing of masses rotating in one plane; basic dynamics of the engine mechanism; use of piston velocity and acceleration formulae; derivation of piston displacement formulae.
6.	Machines Velocity ratio; mechanical advantage; efficiency.
7.	Stress and Strain Direct stress and strain and modulus of elasticity; shear stress and strain and modulus of rigidity; stresses on oblique planes; strength of simple connections such as cottered or screwed joints; resilience due to direct stress, suddenly-applied loads.
8.	Compound Bars Effects of direct loading and temperature changes.
9.	Beams Shear force and bending moments diagram for cantilevers and simply-supported beams; stresses in beams of simple section; use of simple deflection formulae.
10.	Torsion Torsion equations for solid and hollow round shafts; torsion of shaft fitted with liner; horsepower transmitted; close-coiled helical spring.
11.	Struts Eccentric loading of short columns; use of strut formulae.
12.	Thin Shells Stresses in thin shells; design of riveted joints; use of boiler shell design formulae.
13.	Hydrostatics Flotation in two liquids of different specific gravities; total force and centre of pressure on immersed surfaces such as tanks and bulkheads.
14.	Hydraulics Bernoulli's equation applied to simple flow problems; venturi meter; flow through orifices under constant head; force exerted by a jet on a flat surface perpendicular to the jet; blade-angle diagrams for a centrifugal pump; simple flow problems relating to automated control circuits.

### 30.8 Thermodynamics

ITEM	COLUMN
1.	<p>Elements</p> <p>Expansion of solids and liquids, including coefficient of apparent cubical expansion; first and second laws of thermodynamics and their application to steady flow conditions; formulae for work done associated with the formula <math>PV^n = C</math>.</p>
2.	<p>Heat Transfer</p> <p>Conduction (use of log mean temperature difference); radiation; Stefan-Boltzmann law.</p>
3.	<p>Properties of Steam</p> <p>Enthalpy; internal energy; volume; use of steam tables and entropy charts.</p>
4.	<p>Mixtures</p> <p>Heat and temperature problems involving two or more substances; throttling and separating calorimeters.</p>
5.	<p>Gases</p> <p>Boyle's law; Charles' law; characteristic equation; relations between P, V and T when <math>PV^n = C</math>; determination of n from graph connecting P and V; proof of the formula <math>C_p - C_v = R</math>; calculations for expansions and compressions in air compressors, internal combustion engines, rotary compressors, vane and blade types, air pumps and air storage; simple applications of Dalton's law of partial pressures.</p>
6.	<p>Gas Cycles</p> <p>Use of entropy charts; constant volume cycle; diesel cycle; open and closed cycles for gas turbines; indicated and brake thermal efficiencies; mechanical efficiency; overall efficiency; Morse test.</p>
7.	<p>Expansion of Steam</p> <p>Throttling; hypothetical PV diagrams; work done; m.e.p., diagram factor, including effect of clearance; compounding; mean referred pressure; total power; combined diagrams.</p>
8.	<p>Steam Cycle</p> <p>Use of entropy charts; basic Rankine cycle; heat drop in reciprocating engines and turbines; effect on thermal efficiency of such modifications as superheating, exhaust turbine and regenerative feed heating; equivalent of evaporation; efficiencies.</p>
9.	<p>Density and Scale</p> <p>Basic calculations on the effect of condenser leakage and impure feed on the density and scale in boilers; basic calculations on evaporator performance.</p>

### 30.9 Electrotechnology

ITEM	COLUMN
1.	The Electric Circuit Superposition and Thevenin's theorems in network problems; circuits involving non-linear elements.
2.	Electromagnetism Electromagnetic induction, magnetic circuit, mutual inductance; energy stored in an electric field; treatment of voltage and current charges in an electric circuit involving inductance and resistance; time constants, B/H and B/Ampere turns-per-metre curves and their effect on simple magnetic circuits involving an air gap; qualitative treatment of hysteresis.
3.	Electrostatics Types of capacitors; simple-series and parallel circuits involving capacitors; electric force and electric flux density, relative permittivity, charging and discharging currents of a capacitor connected in series with a resistor across a DC supply; energy stored in a capacitor; generation of static electricity.
4.	Electronics Characteristics of junction transistors; effect of voltage feedback on amplifier gain, input-output impedances; equivalent circuits; rectification; simple treatment of thyristors and zener diodes.
5.	Alternating Current Theory for three-phase systems; current and voltage relationships; current, voltage, power and power factor applied to RLC circuits; the impedance triangle; power-factor improvement; resonance; star and delta systems.
6.	DC Machines Armature reaction; speed control; efficiency; application to a Ward Leonard system; suitability of DC motors for various types of work; motor starters; automatic types, relay and solid state; calculations on starters.
7.	AC Machines The principles, constructional details and protection of salient pole, cylindrical and brushless alternators; EMF equation and automatic voltage regulation for alternators; production of rotating magnetic fields; relation between frequency, number of poles and speed of a machine; principles, construction details and protection of induction motors; slip, rotor EMF and frequency; torque/speed curves; wound, slip-ring, cage and double-wound types; starting methods; principles and construction details of single-phase transformers; EMF equation and efficiency; auto and current transformers; magnetic amplifiers, static and rotating; motor starters.
8.	Propulsion Types using DC and AC machines; electric drives, starting methods; speed control; advantages and disadvantages of electrical propulsion; effects of stalling propulsion motors in ice; static and rotating control using pulse modulation and magnetic amplifiers.



### 30.10 Naval Architecture

ITEM	COLUMN
1.	General Wetted surface formulae; Simpson's rules applied to second moments of areas, centroids and centres of pressure; shearing force and bending moment of loaded ship in still water.
2.	Transverse Stability Moment of statical stability; GZ curves; cross curves of stability; hydrostatic curves commonly supplied to ship; effect of free liquid surface and subdivision of tanks; dangers due to water accumulation during firefighting; practical requirements to ensure stability at sea; theory of free surface stabilization.
3.	Longitudinal Stability Longitudinal BM and GM and statical stability; centre of flotation and its calculation; moment to change trim by one centimetre; stability during grounding, ice breaking and dry-docking.
4.	Draught, Trim and Heel Changes due to adding or removing fuel ballast or cargo; changes due to alteration in density of water; changes due to bilging of compartments, using the lost-buoyancy and added-mass methods; forces on rudder and stress in rudder stock; heel when turning, including effect of centrifugal force and force on rudder.
5.	Resistance and Propulsion Derivation of admiralty and fuel coefficient; law of corresponding speeds; Froude's law of comparison; simple problems on the prediction of full-scale resistance from model experiments; problems on propellers involving the use of wake factor, $e_p$ , $d_p$ , QPC, thrust and power; qualitative treatment of cavitation.
6.	Ship Construction Forces on ship under various conditions, including the effect of panting and pounding; construction of all parts of steel ships; use of high-tensile steel and aluminium; structural fire-protection arrangements; dry-docking; design features of ships for general and specialized trades; design features for operating in ice.
7.	Ship Tonnage Measurement and Classification Meaning of classed and unclassed ships; common terms used in measurement of modern steel ships; common terms used in tonnage measurements (e.g., gross tonnage, net tonnage, propelling power allowance).
8.	Loadline Common terms, markings and main criteria used in assignment of freeboards; maintenance of conditions of assignment.
9.	Damage Control Counter ballasting, temporary patching, structural reinforcing, temporary and semi-permanent shoring.

### 30.11 Engineering Knowledge, General

ITEM	COLUMN
1.	<p>General</p> <p>Applicants may be required to illustrate their answers by means of freehand sketches.</p>
2.	<p>Material Treatment</p> <p>The general effects of various heat treatments on the physical properties of materials commonly used in the construction of marine engines and boilers, and the physical tests to which these materials are normally subjected.</p>
3.	<p>Heat and combustion</p> <p>Physical and chemical properties of steam, fuel, lubricants and other liquids, gases and vapours used in machinery on board ship.</p>
4.	<p>Instrumentation</p> <p>Use, constructional details and operational principles involved in the action of the pressure gauge, thermometer, pyrometer, barometer, salinometer, hydrometer and other meters commonly used in remote monitoring of systems by engineers on board ship.</p>
5.	<p>Corrosion</p> <p>Causes, effects and usual remedies for encrustation and corrosion; feed-water blow densities and electrolysis.</p>
6.	<p>Marine Engines</p> <p>Constructional details and operational principles of marine engines; methods of determining their propulsion power output; principles of working and methods of calibration of dynamometers and torsion meters.</p>
7.	<p>Machinery Management</p> <p>The methods of dealing with wear and tear of machinery and boilers; alignment of machinery parts; correction of defects due to flaws in material or accident; temporary or permanent repairs in the event of derangement or total breakdown.</p>
8.	<p>Pump Systems</p> <p>Constructional details and principles of action of pumps fitted in ships; general requirements concerning feed, fuel, bilge and ballast pumping systems.</p>
9.	<p>Steering Gears</p> <p>The constructional arrangement, operational details and working of steering engines and gears, refrigerating machinery, hydraulic and other auxiliary machinery, and such steam and internal combustion engines as are used for emergency and auxiliary machinery on board ship.</p>
10.	<p>Power Balance</p> <p>Application of the indicator; calculation of mean pressure and kilowatt propulsion power; variation of pressure in the cylinder as shown by indicator diagrams; the recognition of irregularities in the running of engines from indicator diagrams; the rectification of these irregularities; illustration, by means of sketches, of the change produced in the diagram due to an alteration in the setting or working of the valves or any other factors.</p>

11.	<p>Fire Prevention</p> <p>Precautions against fire or explosions due to oil or gas; flash point; explosive properties of gas or vapour given off by fuel or lubricating oils when mixed with a quantity of air; the danger of leakage from oil tanks, pipes, gas producers and vaporizers, particularly in bilges and other unventilated spaces; the action of wire-gauze diaphragms and the places where such devices should be fitted.</p>
12.	<p>Hazards of Coal</p> <p>Spontaneous combustion of coal; explosive properties of gas given off by coal.</p>
13.	<p>Fire Detection</p> <p>Maintenance on board of fixed methods of dealing with fire; chemical and physical action, maintenance of mechanical and chemical fire extinguishers and other firefighting appliances, respirators and safety lamps; detection meters.</p>
14.	<p>Toxic Materials</p> <p>Toxic and other dangerous properties of substances used in marine practices; maintenance of plant and equipment associated with the carriage of dangerous goods.</p>
15.	<p>Management</p> <p>Administrative duties of a chief engineer; organization of his/her staff for emergency duties and the use of safety equipment, organization of repairs and surveys; training of staff for both normal and emergency duties, including first aid relative to machinery space injuries, functions and use of lifesaving appliances and the supervision of staff in the absence of ideal safe working conditions.</p>
16.	<p>Fundamentals of Automation Instrumentation</p> <p>Periodically unattended machinery space, techniques and work practices, bridge control and monitoring systems.</p>

### 30.12 Engineering Knowledge, Steam

ITEM	COLUMN
1.	<p>Steam Engines</p> <p>The methods of constructing marine steam engines and boilers, the processes to which the several parts are submitted, or which are incidental to their manufacture, and the methods employed in fitting the machinery on board ship.</p>
2.	<p>Auxiliary Machinery</p> <p>The various types of propelling and auxiliary machinery now in use, the functions of each important part, and the attention required by the different parts of the machinery on board ship.</p>
3.	<p>Setting Valves</p> <p>The methods of testing and altering the setting of the steam admission and exhaust valves, and the effect produced in the working of the engine by definite alterations in the settings of the valves.</p>
4.	<p>Water Treatment</p> <p>The constructional details and working of evaporators, feed-water heaters and feed-water filters.</p>
5.	<p>Marine Boilers</p> <p>Various modern designs; the prevention of movement of boilers when vessels are pitching or rolling; the determination by calculation of suitable working pressure for boilers of given dimensions.</p>


6.	<p>Boiler Mountings</p> <p>Use and management of boiler fittings and mountings, with special reference to water gauges and safety valves; precautions necessary when raising steam and operating stop valves, with particular reference to the danger arising from water-hammer action.</p>
7.	<p>Combustion Control</p> <p>Constructional details, operation and maintenance of installations generally employed for assisting draught, superheating steam and burning coal or oil fuel.</p>
8.	<p>Fundamentals of Automated Boiler Control</p> <p>Monitoring and recording devices, pneumatic and industrial electronics and the use of Boolean algebra in control circuits.</p>

### 30.13 Engineering Knowledge, Motor

ITEM	COLUMN
1.	<p>Marine Engines</p> <p>Principles underlying the working of internal combustion engines; the differences between various types of engines; constructional details of internal combustion engines in general use.</p>
2.	<p>Oil Fuel and Lubrication</p> <p>Nature and properties of the fuel and lubricating oils generally used in internal combustion engines; the supply of air and fuels to cylinders of engines of different types; the constructional details of apparatus for carburetting or atomizing the fuel; the means of cooling the cylinders and pistons; constructional details and working of air compressors.</p>
3.	<p>Construction of Engines</p> <p>Methods of constructing marine internal-combustion engines; the processes to which the several parts are submitted or which are incidental to their manufacture, and the methods employed in fitting the machinery on board ship.</p>
4.	<p>Starting and Reversing</p> <p>Arrangements and the various operations connected therewith.</p>
5.	<p>Machinery Management</p> <p>The attention required for the operation and maintenance of the various parts of machinery; the use and management of valves, pipes, connections and safety devices employed.</p>
6.	<p>Corrective Maintenance</p> <p>Enumeration and description of defects arising from working of machinery; the remedy for such defects.</p>
7.	<p>Construction of Auxiliaries</p> <p>Constructional details and management of auxiliary steam boilers, their fittings and mountings, with special reference to water gauges and safety valves; construction details and management of auxiliary machinery; draught, combustion equipment, oil fuel equipment.</p>
8.	<p>Fundamentals of Automated Controls</p> <p>Monitoring and recording devices, pneumatic and industrial electronics, and the use of Boolean algebra in control circuits.</p>

### 30.14 Oral Examination


ITEM	COLUMN
1.	<p>General</p> <p>The oral examination will be based upon:</p> <ul style="list-style-type: none"> <li>(a) the practical-knowledge subjects of the examination, and will include questions on the management of engines and boilers at sea, the duties of the supervising engineer, the work to be done on engines, boilers and auxiliary machinery in port, and the periodic examination of the working parts;</li> <li>(b) the casualties that may occur to machinery and boilers at sea and how these casualties may be prevented and remedied; and</li> <li>(c) the subjects that relate to the general aspects of regulations, international requirements and ship's business.</li> </ul>
2.	<p>Regulations and Ship's Business</p> <p>Every applicant shall possess:</p> <ul style="list-style-type: none"> <li>(a) a knowledge of national and international maritime law embodied in agreements and conventions as they affect the specific obligations and responsibilities of the engineering department, particularly those concerning safety and the protection of the marine environment;</li> <li>(b) knowledge of the methods and aids to prevent pollution of the environment by ships; regulations to be observed to prevent pollution of the marine environment; effects of marine pollution on the environment;</li> <li>(c) general knowledge of marine insurance and its interrelationship with charter parties, bills of lading and the <i>Marine Liability Act</i>, including: <ul style="list-style-type: none"> <li>• knowledge of general, particular average and York/Antwerp rules;</li> <li>• knowledge of charter parties and bills of lading with respect to international marine laws;</li> <li>• statutory and contractual requirements as to sea worthiness; and</li> <li>• deviation and its effect on various contracts; functions and jurisdiction of IMO, ILO and the SOLAS Convention, including articles, regulations and resolutions; and</li> </ul> </li> <li>(d) knowledge of the general organization of ship management, including: <ul style="list-style-type: none"> <li>• crew welfare and training, Occupation Health and Safety Regulations;</li> <li>• crew representation and rights under the CSA;</li> <li>• accounting;</li> <li>• vessel traffic management;</li> <li>• pollution of the environment, responsibilities and abilities;</li> <li>• the use of consular offices;</li> <li>• tonnage certificates;</li> <li>• charter parties and bills of lading; the marine insurance contract and its relationship to the ship, and responsibility to owners and underwriters.</li> </ul> </li> </ul>

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	<b>Marine Safety</b>	<b>Approved by:</b> AMSP	<b>Revision No:</b> 04	<b>Page:</b> 1 of 14
<b>TP 2293 E</b>		<b><i>THE EXAMINATION AND CERTIFICATION OF SEAFARERS</i></b>		

## CHAPTER 31 - SECOND -CLASS ENGINEER, MOTOR SHIP, AND SECOND-CLASS ENGINEER, STEAMSHIP

### PART I- GENERAL REQUIREMENTS OF APPLICANTS

- 31.1 (1) Every applicant for a certificate as Second-Class Engineer, Steamship or Motor Ship, shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2);
      - (C) Officer Certification (C); and
      - (D) Senior Officer (D);
    - (ii) Propulsion Plant Simulator Course Level II, set out in TP 10935;
    - (iii) Marine First Aid Advanced Course, set out in TP 13008; and
  - (c) pass a written examination in each of the following subjects:
    - (i) Applied Mechanics;
    - (ii) Thermodynamics;
    - (iii) Electrotechnology;
    - (iv) Naval Architecture;
    - (v) either
      - (A) Blueprint Interpretation and Sketching; or
      - (B) Drawing;
    - (vii) Engineering Knowledge, General.
- (2) Every applicant for a certificate as Second-Class Engineer, Steamship, shall:
- (a) complete the requirements set out in section 31.1(1);
  - (b) pass a written examination in Engineering Knowledge, Steam; and
  - (c) pass an oral examination.

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<b>TP 2293 E</b>	<b><i>THE EXAMINATION AND CERTIFICATION OF SEAFARERS</i></b>			

- (3) Subject to subsection (4), every applicant for a certificate as Second-Class Engineer, Motor Ship, shall:
  - (a) complete the requirements set out in section 31.1(1);
  - (b) pass a written examination in Engineering Knowledge, Motor; and
  - (c) pass an oral examination.
- (4) An applicant who holds a certificate as Maintenance Supervisor, MODU/Self-Elevating Unlimited, may be granted a certificate as Second-Class Engineer, Motor Ship, after completing a minimum of six months sea service as an engineer officer in charge of the machinery on a motor ship of not less than 750 kW propulsion power.

31.2 The service required by an applicant for a Second-Class Certificate, Motor or Steam, is 60 months service as follows:

- (a) a minimum of 12 months service after obtaining the necessary service for the Third-Class Certificate, as follows:
  - (i) a minimum of six months sea service as:
    - (A) as an engineer officer in charge of the watch or as designated duty engineer in a periodically unmanned engine room of a steamship of not less than 750 kW propulsion power where the applicant applies for a certificate as Second-Class Engineer, Steamship;
    - (B) as an engineer officer in charge of the watch or as designated duty engineer in a periodically unmanned engine room of a motor ship of not less than 750 kW propulsion power where the applicant applies for a certificate as Second-Class Engineer, Motor Ship; or
    - (C) as an engineer officer in charge of the watch or as designated duty engineer in a periodically unmanned engine room of a MODU/self elevating of not less than 750 kW propulsion power; and
  - (ii) the remaining time made up of any combination of the following service, subject to any time limitations set out therein:
    - (A) engineer officer on a motor ship, MODU or a steamship of not less than 750 kW propulsion power; or
    - (B) time spent at the marine department of a school listed in TP 10655, credited at a ratio of one day for every three days attendance to a maximum of three months.

31.3 **Not in use.**

31.4 **Not in use.**

## PART II - EXAMINATIONS

31.5 The following table lists the written and oral examinations for the Second-Class Engineer Certificate, the qualifying service required before each may be attempted, and other requirements:

### Steam Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Applied Mechanics	-	-
Thermodynamics	-	-
Blue Print Interpretation & Sketching or Drawing	-	-
Electrotechnology	-	-
Naval Architecture	-	-
Engineering Knowledge General	60 months	MED A1, B1, B2, C and D, PPS Level 2, Skills Training, TRB.
Engineering Knowledge Steam	60 months including six months steam service 750 kW	Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General and Steam.



### Motor Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Applied Mechanics	-	-
Thermodynamics	-	-
Blue Print Interpretation & Sketching or Drawing	-	-
Electrotechnology	-	-
Naval Architecture	-	-
Engineering Knowledge, General	60 months	MED A1, B1, B2, C and D, PPS Level 2, Skills Training, TRB
Engineering Knowledge, Motor	60 months including six months motor service 750 kW	Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General & Motor

### Motor with Steam Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, Motor	Six months 750 kW	Second-Class Steam Certificate
Oral Examination	-	Pass Engineering Knowledge, Motor

### Steam with Motor Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, Steam	Six months 750 kW	Second-Class Motor Certificate
Oral Examination	-	Pass Engineering Knowledge, Steam

- 31.6 (1) Each written examination paper, except Drawing, shall be of a maximum duration of three and a half hours. The Drawing examination paper shall be of a maximum duration of six hours.
- (2) The examination of Electrotechnology and Naval Architecture shall be composed of mathematical and descriptive questions of which one or more may be compulsory, and will be so marked.
- (3) There shall be nine questions on each paper, not more than six of which are to be answered, except Blue Print Interpretation and Sketching or Drawing, where an applicant shall be given a choice of subjects.
- (4) If more than the required number of questions in any paper are attempted, all the answers shall be marked and the six questions with the lowest marks awarded shall be taken to determine the overall result.
- (5) Not in use.
- (6) The knowledge to be shown by an applicant for a Second-Class Certificate or for an endorsement on a certificate shall be that required:
- (a) as a watchkeeping engineer officer for the safe use, operation and maintenance of boilers and machinery; and
- (b) as a chief engineer officer, to take charge of the engine-room staff and the main propulsion and auxiliary machinery of ships as per Section 31.6(7)(b)

### PART III - VALIDITY OF CERTIFICATE

31.7 The certificate as a Marine Engineer, Second-Class, is valid as:

- (a) second engineer without restriction; and
- (b) chief engineer, with the following limitations:

	Foreign Going Home-Trade I	Home-Trade II (Canadian Ports)	Home-Trade III (Canadian Ports)	Inland I Inland II Minor Waters I	Minor Waters II Home Trade IV
Pass Vessels	Not over 3000 kW	Not over 4000 kW	Not over 4000 kW	Not over 4000 kW	Any power
Non-Pass Vessels	Not over 3000 kW	Not over 5000 kW	Not over 7000 kW	Not over 7000 kW	Any power
Tow Boats	Not over 3000 kW	Not over 6000 kW	Not over 7000 kW	Not over 7000 kW	Any power
Fishing Vessels	Not over 5000 kW				

**PART IV - SYLLABUSES OF EXAMINATIONS**

**31.8 Applied Mechanics**

<b>ITEM</b>	<b>COLUMN</b>
1.	<p><b>Statics and Forces</b>            Statics; force as a vector; triangle and polygon forces; resultant and equilibrant of a system of concurrent coplanar forces; equilibrium of three coplanar forces; moment of a force; couples; moments of areas and volumes; centroids and centres of gravity (limited to geometrical shapes); conditions of equilibrium of solids; necessary force applied parallel to an inclined plane to pull body up or down the plane or to hold it stationary (including effect of friction); work done at uniform speed up the plane.</p>
2.	<p><b>Friction</b>            Coefficient of friction; friction angle; energy and power loss due to friction in simple bearings.</p>
3.	<p><b>Kinematics</b>            Linear motion; graphs and equations for displacement, speed, velocity and uniform acceleration; velocity as a vector; relative velocities in one plane only; angular motion; equations for displacement, velocity and uniform acceleration.</p>
4.	<p><b>Dynamics</b>            Work and power; problems with constant force or force with linear variation; energy; potential energy; kinetic energy of translation; Newton's laws of motion; conservation of momentum; centrifugal force and its application to conical pendulum, unloaded governor, curved tracks and machine parts; stress in thin rim due to centrifugal action.</p>
5.	<p><b>Machines</b>            Simple lifting machine; graphs of load effort and load efficiency; linear law; velocity ratio, mechanical advantage and efficiency of the following machines: wheel and axle, differential wheel and axle, rope-pulley blocks, differential-pulley blocks, screw jack, Warwick screw, hydraulic jack, worm-driven chain blocks and single- and double-purchase crab winches; reduction gearing.</p>
6.	<p><b>Stress and Strain</b>            Direct stress and strain; modulus of elasticity; shear stress and strain; modulus of rigidity; factor of safety; stress due to restricted expansion or contraction of single members.</p>
7.	<p><b>Beams</b>            Shearing force and bending moment diagrams for cantilevers and simple supported beams with concentrated, uniformly-distributed loads; stress due to bending.</p>
8.	<p><b>Torsion</b>            Strength and stiffness of solid or hollow shafts; stress due to torsion; power transmitted by shafts and coupling bolts.</p>
9.	<p><b>Thin shells</b>            Circumferential and longitudinal stress in thin cylindrical shells subject to internal pressure.</p>
10.	<p><b>Hydrostatics</b>            Equilibrium of floating bodies; variation of fluid pressure with depth; total force due to liquid pressure on immersed plane surfaces, horizontal or vertical; centre of pressure on a rectangular vertical plane surface or triangular plane surface, both with one edge parallel to the surface of the liquid.</p>
11.	<p><b>Hydraulics</b>            Full-bore flow of liquid through pipes under constant head; flow through orifice; coefficients of velocity, contraction of area and discharge.</p>

### 31.9 Thermodynamics

ITEM	COLUMN
1.	Heat Temperature and its measurement; absolute temperature; specific heat capacity; specific enthalpy of evaporation and fusion; problems involving changes of phase and not more than three substances; linear, superficial and volumetric expansion due to temperature changes; coefficients and the relationship between them.
2.	Basic Thermodynamic Principles Properties of working substances and the first law of thermodynamics; flow and non-flow processes and their application to steady-flow and non-flow processes.
3.	Heat Transfer Qualitative treatment of heat transfer by conduction, convection and radiation; laws of conduction and thermal conductance and applications to problems.
4.	Gases Laws Boyle's and Charles' laws for perfect gases; characteristic equation; constant R and its use in simple problems; isothermal, adiabatic and polytrophic processes; relationships between pressure, temperature and volume; work done; change in internal energy; specific heat Cp and Cv and the relationship between them.
5.	Ideal Gas Cycles Constant volume cycles; diesel cycle; dual cycle; air standard efficiency.
6.	IC Engines Elementary principles and cycles of operation; actual indicator diagrams; mean effective pressure; work done, power developed, indicated and brake thermal efficiencies, mechanical efficiency, overall efficiency; fuel consumption; energy balance chart.
7.	Air compressors Elementary principles and cycles of operation; calculation of work done; indicator diagrams, reciprocating and rotating machines.
8.	Properties of steam Dryness fraction; superheated steam; internal energy; enthalpy; specific volume; steam tables; throttling; separating and throttling calorimeters; use of steam tables and charts.
9.	Steam Plant Advantages of using steam expansively; thermal, mechanical and overall efficiencies of prime movers; boiler efficiency, heat balance for engine and boiler trials; change in dissolved solids in boilers and evaporators due to contaminated feed and effect of blowing down; elementary principles of steam turbines, including simple velocity diagrams for impulse and reaction turbines; force and work done on turbine blades.
10.	Combustion Solid and liquid fuels; calorific value; chemical equations for complete combustion; theoretical minimum air required; excess air effect.
11.	Refrigeration Vapour-compression cycle; refrigerating effect; cooling load; use of tables of properties of refrigerants; coefficient of performance.

### 31.10 Blueprint Interpretation and Sketching

ITEM	COLUMN
1.	<p>General</p> <p>The Blueprint Interpretation and Sketching paper will demonstrate, by attempting written answers of the descriptive or sketch type, the ability of the applicant to read and interpret blueprints and technical drawings by:</p> <ul style="list-style-type: none"> <li>(i) locating specific features of objects described on a blueprint or drawing;</li> <li>(ii) extracting dimensions, identifying fabrication tolerances and processes as indicated on the blueprint or drawing in the manufacture or maintenance of components;</li> <li>(iii) explaining the location of specific items on the blueprint or drawing, and their relationship to the whole system or machine indicated on the blueprint or drawing having auxiliary or sectional views;</li> <li>(iv) obtaining required information from the blueprint or drawing, using graphic symbology, title blocks, material lists, drawing notes, callouts, and change systems;</li> <li>(v) describing conventional screw-thread forms, bearings, fillets, rounds, holes, fasteners, keys, gears, springs, splines and serrations to ensure understanding of these conventions; and</li> <li>(vi) making freehand technical sketches using multi-view orthographic, one- and two-point perspective, and isometric projections. The subject to be drawn may be either an item included on a blueprint or a machinery part viewed and measured by the applicant. The completed drawing must be accurately proportioned by the applicant, lettered and dimensioned, using only pencils, eraser and graph or squared paper.</li> </ul>
2.	<p>The applicant at the time of examination will be given blueprints and objects or drawings selected from the following: detail drawings, assembly drawings, schematics, block diagrams, exploded pictorial drawings (as used for machinery drawings), graphic piping diagrams and symbols, ship's electrical distribution drawings, component schematics, wiring connections, power panel, instrumentation and control diagrams, fluid power drawings (hydraulic and pneumatic), welding blueprints, sheet-metal blueprints and special ship drawings (shell expansions and general arrangements).</p>

### 31.11 Drawing

ITEM	COLUMN
1.	<p>General</p> <p>The Drawing paper shall consist of a test of the applicant's ability to produce a satisfactory general-assembly drawing embodying the principles of projection. and displaying his/her knowledge of marine engineering. Applicants will be asked to draw a plan, elevation. section or combination of these views of a piece of marine machinery from information supplied in the form of a dimensional pictorial drawing of individual components. All the required information for the completion of the drawing shall be given in the question paper.</p>
2.	<p>Engineering Knowledge</p> <p>The assembled machinery must be able to perform the intended function with respect to size shape and material employed; parts shown must be capable of being removed; and proper clearances, value lifts etc. duly allowed for.</p>
3.	<p>Proper Use Paper</p> <p>Choice of suitable scale and view positions, so as to make optimum use of the paper.</p>
4.	<p>Proper Use of Types of Lines</p> <p>Thickness and types of lines to indicate: visible outlines; dimension, projections, extension, hatching and leader lines; lines showing hidden details, portions to be removed; centre lines, pitch circles; cutting or viewing planes lines; lines showing irregular boundaries, short breaks; long break lines.</p>
5.	<p>Printing</p> <p>Major and functional dimensions in millimetres: valve lift, working clearances or other relevant functional dimensions, neat figures and printing readable without having to turn to the finished drawing.</p>
6.	<p>Views of View Projection</p> <p>Views drawn as instructed and complete; relative position of views, first- and third-angle projection.</p>
7.	<p>Drawing Correctly, According to Information</p> <p>Scale used and stated; sectioned as required; materials; title block.</p>

### 31.12 Electrotechnology

ITEM	COLUMN
1.	The Electric Circuit Units (ampere, ohm, volt); difference between electromotive force and potential difference; Ohm's law; Kirchoff's laws; simple-series and parallel circuits involving EMF current and resistances; non-linear resistors in parallel with constant value resistors; power and energy; specific resistance; temperature coefficient of resistance; conductor resistance, effect of length, area, material and temperature; DC 2 wire distribution system; types of insulation; Wheatstone network bridge, slide-wire bridge; applications to steering gears, resistance pyrometers, strain gauges etc.
2.	Electrolytic Action and Secondary Cells Theory of electrolytic dissociation applied to common solutions; uses of electrolysis; secondary cells (acid or alkaline); construction and principles; maintenance, charging; watt-hour and ampere-hour efficiencies.
3.	Electromagnetism Electromagnetic induction, simple magnetic circuit; simple magnetic theory; magnetic field; lines of force; field strength; field intensity; magnetic fields due to current in straight conductors, loops, coils and solenoids; relative directions of current and field; Faraday's and Lenz's laws; magnitude and direction of induced EMF force produced on a current-carrying conductor; flux density; effect of iron; magneto motive-force (m.m.f.); permeability; reluctance; simple magnetic circuit, typical B/H and u/B curves.
4.	Electronics Qualitative treatment of atomic structure and bonding; semi-conductors; junction diodes, junction transistors and their operating characteristics; simple transistor circuits; conduction in gases, insulators, semi-conductors and conductors; photo-electric effect.
5.	Alternating-Current Theory Simple continuous periodic waves: frequency, amplitude, instantaneous, maximum r.m.s. and average values, form factor; phasor representation of AC quantities; phase difference; the inductor, inductance and its effect on the circuit; the capacitor, capacitance and its effect on the circuit; simple-series and parallel circuits; relationship between resistance, reactance and impedance; simple treatment of power factor; power in single-phase AC circuit.
6.	Instruments Qualitative treatment of the principles and functions of AC and DC, indicating instruments and relays; uses of shunts and series resistances to increase the range; rectifiers and transducers.
7.	Distribution Systems Systems for AC and DC shipboard installations; protective devices such as fuses, circuit breakers, earth lamps; cable material and installation; connection of shore supply; operation and testing by standard methods, maintenance of additional and control equipment to be observed during testing, and evaluation of test results.
8.	DC Machines The principles, constructional details and protection of DC-series, shunt and compound-wound motors and generators; self-excitation, EMF and load-voltage equations; load characteristics; methods of voltage control, paralleling procedures and load sharing for generators; need for and types of starter, speed and torque equations; speed control of DC motors.
9.	AC Machines Simple explanation of the principles, constructional details and protection of alternators, squirrel-cage induction motors and single-phase transformers; parallel running and synchronising theory.
10.	Propulsion Principles and operation of electric propulsion, construction details, control of excitation, killer circuits, connection of armatures, monitoring and control of field current, basic circuitry.

### 31.13 Naval Architecture

ITEM	COLUMN
1.	General Displacement, wetted surface, block, mid-section, prismatic and water plane area coefficient; tonne per centimetre immersion; application of Simpson's rules to areas, moment of area, volumes and moment of volume.
2.	Draught and Buoyancy Alteration of mean draught due to change in density of water; buoyancy and reserve buoyancy; effect of bilging amidship compartments.
3.	Transverse Stability Centre of gravity; centre of buoyancy; metacentre; shift of centre of gravity due to addition or removal of mass, transverse movement of mass, suspended mass; stability at small angles of heel (given the second moment of area of the water plane or formulae); the inclining experiment, hydrostatic curves and stability curves.
4.	Resistance and Propulsion Comparison of skin frictional resistance of hull with model at different speeds; $R^f = f.S.V^n$ and residual resistance; admiralty and fuel coefficients; relation between speed of vessel and fuel consumption with constant displacement and assuming that resistance varies as (speed) <sup>2</sup> Yn; elementary treatment of propeller and simple problems on pitch, pitch ratio, apparent slip, real slip, wake, thrust and power.
5.	Structural Strength Simple problems on strength of structural members to resist liquid pressure; loading due to head of liquid.
6.	Ship Construction Common terms used in the measurement of steel ships (e.g., length between perpendiculars, breadth overall, moulded depth, draught and freeboard); definitions of shipbuilding terms in general use; descriptions and sketches of structural members in ordinary types of steel ships; water-tight doors, hatches, rudders, bow thrusters, propellers, watertight bulk-heads, double bottoms. anchors and cables. Descriptive treatment of effect of free surface of liquids on stability; arrangements for the carriage of dangerous goods in bulk, strengthening of vessels for navigation in ice, welding in steel ships.
7.	Ventilation Arrangements Natural and mechanical ventilation for pump rooms in tankers and for holds and oil fuel tanks, accommodation and machinery spaces.
8.	Tanks Fore and aft peak tanks, double bottom and deep tank filling and pumping arrangements; compartmental drainage; levelling arrangements for damaged side compartments.
9.	Inspection Underwater parts of a ship in dry-dock; provision of fire protection, security arrangements.

### 31.14 Engineering Knowledge, General

ITEM	COLUMN
1.	Materials The general effects of various treatments on the physical and chemical properties of materials commonly used in the construction of marine engines and boilers, and the physical tests to which these materials are normally subjected.
2.	Heat and Combustion The properties of steam, fuel, lubricants and other liquids, gases and vapours used in machinery on board ship.
3.	Instruments The use, construction details and principles involved in the action of the pressure gauge, thermometer, pyrometer, barometer, salinometer, hydrometer and other meters commonly used by engineers on board ship.
4.	Water Treatment The causes, effects and usual remedies for encrustation and corrosion; feed-water, blow densities and electrolysis.

5.	Principles of Marine Engines Constructional details and working principles of marine engines; methods of determining their kilowatt power; the principles of working and methods of calibration of dynamometers and torsion meters mounted on ships.
6.	Practice The methods of dealing with wear and tear of machinery and boilers; the alignment of machinery parts; the correction of defects due to flaws in material or accident; temporary or permanent repairs in the event of derangement or total breakdown; detection of machinery malfunction; location of faults and actions to prevent damage.
7.	Pumps and Systems Constructional details and principles of action of pumps fitted in ships; general requirements concerning feed, fuel, bilge and ballast pumping systems.
8.	Auxiliary Machinery The constructional arrangement, operation and maintenance of steering engines and gears, refrigerating machinery, hydraulic and other auxiliary machinery, and such steam and internal combustion engines as are used for emergency and auxiliary machinery on board ship; deck machinery and cargo-handling machines.
9.	Power Transmission Construction details, alignment, lubrication, expansion, clearances and wear allowances of thrust blocks, shafting, bearings, stern tubes, propellers, nozzles, thrusters and ship side fittings.
10.	Prevention Precautions against fire or explosions due to oil or gas; flash point; explosive properties of gas or vapour given off by fuel or lubricating oils when mixed with a quantity of air; the danger of leakage from oil tanks, pipes, gas producers and vaporizers, particularly in bilges and other unventilated spaces; vaporizers, particularly in bilges and other unventilated spaces; the action of wire-gauze diaphragms and the places where such devices should be fitted.
11.	Coal Fuel Spontaneous combustion of coal; explosive properties of gas given off by coal dust creating explosive material.
12.	Fire Detection Methods of dealing with fire; action and maintenance of mechanical and chemical fire extinguishers and other firefighting appliances; respirators and safety lamps; smoke and heat detectors; sprinkler systems, wet and dry valves; permanently-fixed gas-smothering systems and methods of activating; dangers of smothering gas to life.
13.	Safe Working Practices Mechanical safety in overhauling work shops, protective equipment, lifting-tackle safety and tests, precautions and tests when entering tanks; first aid related to injuries that may be expected in machinery spaces, use of first aid equipment and methods of obtaining second aid.
14.	Cold Weather Practices Special arrangements for operation in waters with ice; lay out and operation of ice-related shipboard systems, cold weather lay-up.
15.	Control Systems Automation and instrumentation in block diagrams, periodically unattended machinery spaces, techniques and work practices, bridge control, remote-control stations, system monitoring.
16.	Pollution Prevention Devices to prevent pollution from oil, sewage, air; regulations to be observed regarding pollution.
17.	Maintenance Routine maintenance, prevention of damage to machinery, preventive maintenance, corrective maintenance, planned maintenance, record keeping relating to maintenance, deployment of human resources for effective maintenance and repair.
18.	Lifesaving Appliance Operation and maintenance of lifesaving appliance; launching and retrieval machinery.
19.	Damage Control Methods of damage control, with specific reference to action to be taken in the event of flooding of seawater into the machinery spaces.



20.	<p>Electrical Safety</p> <p>Safe operation and maintenance of electrical and control equipment, precautions to be observed to prevent injury to personnel and machine, methods of cleaning and drying of equipment, particularly equipment flooded by seawater.</p>
21.	<p>Non-Destructive Testing</p> <p>An awareness of non-destructive testing, to include: magna flux, dye penetrants, ultra sonics, nuclear, vibration analysis, spectronic oil analysis for wear indication, z-ray, and thermographs.</p>

### 31.15 Engineering Knowledge, Steam


ITEM	COLUMN
1.	<p>Construction of Steam Machinery</p> <p>The methods of constructing marine steam-engines and boilers, the processes and tests to which the several parts are submitted or which are incidental to their manufacture, and the methods employed in fitting the machinery on board ship.</p>
2.	<p>Types of Machinery</p> <p>The various types of propelling and auxiliary machinery now in use, the functions of each important part and the attention required by the different parts of the machinery on board ship.</p>
3.	<p>Steam Pumps</p> <p>Operation and maintenance of simplex, duplex and multi-stage centrifugal pumps.</p>
4.	<p>Feed-Water Systems</p> <p>The constructional details and working of evaporators, feed-water heaters and feed-water filters, contamination from lube oil and fuel oil.</p>
5.	<p>Marine Boilers</p> <p>Marine boilers of various modern designs; the prevention of movement of boilers when vessels are pitching or rolling; the determination by calculation of suitable working pressure for boilers of given dimensions.</p>
6.	<p>Boiler Fittings</p> <p>The functions and maintenance of boiler fittings and mountings, with special reference to water gauges, safety valves, and programmers; precautions necessary when raising steam and operating stop valves, with particular reference to the danger arising from water-hammer action.</p>
7.	<p>Combustion</p> <p>Constructional details, operation and maintenance of installations generally employed for assisting draught, superheating steam and burning coal or oil fuel.</p>
8.	<p>Power Transmission</p> <p>Construction details, operation and maintenance of reduction gearing, thrust systems and lubricating systems, inspection, evaluation of visible signs of deterioration of wearing surfaces.</p>
9.	<p>Lubricating System</p> <p>Operation and maintenance of open and closed lubrication systems, testing for contamination, lubricating oil consumption and factors leading to over-consumption.</p>

### 31.16 Engineering Knowledge, Motor

ITEM	COLUMN
1.	Construction of Marine Machinery The design considerations and operation of internal combustion engines; the differences between various types of engines; constructional details of internal combustion engines in general use.
2.	ICE Systems The nature and properties of the fuel and lubricating oils generally used in internal combustion engines; the supply of air and fuels to cylinders of engines of different types; the means of cooling the cylinders and pistons; constructional details and working of air compressors.
3.	Construction of IC Engines The methods of constructing marine internal combustion engines; the processes to which the several parts are submitted or which are incidental to their manufacture, and the methods employed in fitting the machinery on board ship.
4.	Starting and Reversing Systems Starting and reversing arrangements and the various operations connected therewith.
5.	Operation and Maintenance The attention required for the operation and maintenance of the various parts of machinery; the use and management of valves, pipes, connections and safety devices employed.
6.	Defects and Remedies Enumeration and description of defects arising from working of machinery; the remedy for such defects.
7.	Auxiliary Boilers Operation and maintenance of auxiliary steam boilers, their fittings and mountings, with special reference to water gauges, safety valves, and programmers; constructional details and management of auxiliary machinery; draught, combustion equipment, oil fuel equipment.
8.	Compressed Air Systems The care and maintenance of air compressors, receivers and coolers.
9.	Power Transmission Operation and maintenance of reduction gears, reverse gearing, thrust systems, lubrication, clutching, evaluation of visible signs of deterioration.
10.	Lubricating Systems Operation and maintenance of closed lubrication systems, testing for contamination, factors leading to over consumption, symptoms and remedies.

### 31.17 Oral Examination


ITEM	COLUMN
1.	<p>General</p> <p>Practical knowledge subjects, including questions on the management of engines and boilers at sea, the duties of the supervising engineer, the work to be done to engines, boilers and auxiliary machinery in port, and the periodical examination of the working parts.</p>
2.	<p>Casualties</p> <p>Machinery and boiler casualties that may occur at sea and how these casualties can be prevented and remedied.</p>
3.	<p>Safe Ship Management</p> <p>The general aspects of regulations, international requirements and ship's business, including:</p> <ul style="list-style-type: none"> <li>(a) knowledge of the <i>Canada Shipping Act</i> relating to: <ul style="list-style-type: none"> <li>(i) engagement and discharge of seafarers, in and/or out of Canada,</li> <li>(ii) rights of seafarers,</li> <li>(iii) maintenance of discipline,</li> <li>(iv) registration of ships,</li> <li>(v) port wardens and steamship inspectors,</li> <li>(vi) wrecks, salvage and casualties,</li> <li>(vii) coasting trade of Canada,</li> <li>(viii) provisions, health and accommodation,</li> <li>(ix) distressed seafarers, and</li> <li>(x) limitation of liability;</li> </ul> </li> <li>(b) custom house and immigration procedures, coasting licence and regulations;</li> <li>(c) Quarantine Regulations, de-rat certificates;</li> <li>(d) <i>Marine Liability Act</i>;</li> <li>(e) tonnage certificates;</li> <li>(f) charter parties and bills of lading;</li> <li>(g) noting and extending protest;</li> <li>(h) Canadian Labour Code, as applicable to shipping;</li> <li>(i) basic knowledge of the marine insurance contract and its relationship to the master's and ship officer's responsibility to owners and underwriters;</li> <li>(j) Shipping Casualties Reporting Regulations;</li> <li>(k) Potable Water Regulations;</li> <li>(l) Medical Examination of Seafarers Regulations;</li> <li>(m) Foreign-Going, Home-Trade, Inland Waters and Minor Waters Voyage Regulations;</li> <li>(n) Safety and Inspection Certificate Regulations;</li> <li>(o) Port State Control inspections, documentation, crew certificates, certificate endorsements, crew list; and</li> <li>(p) pollution prevention, MARPOL, emergency management, prevention of vital system failure, international conventions, safe ship management.</li> </ul>

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## CHAPTER 32 - THIRD-CLASS ENGINEER, MOTOR SHIP, AND THIRD-CLASS ENGINEER, STEAMSHIP

### PART I -GENERAL REQUIREMENTS OF APPLICANTS

- 32.1 (1) Every applicant for a certificate as Third-Class Engineer, Steamship or Motor Ship, shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957, for:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2);
      - (C) Officer Certification (C); and
      - (D) Senior Officer(D);
    - (ii) Propulsion Plant Simulator Course Level I, set out in TP 10935;
    - (iii) Marine First Aid Advanced Course, set out in TP 13008; and
  - (c) pass written examinations in the following subjects:
    - (i) Mathematics
    - (ii) Applied Mechanics;
    - (iii) Thermodynamics;
    - (iv) Electrotechnology; and
    - (v) Engineering Knowledge, General.
- (2) Every applicant for a certificate as a Third-Class Engineer, Steamship, shall:
- (a) complete the requirements set out in section 32.1(1);
  - (b) pass a written examination in Engineering Knowledge, Steam; and
  - (c) pass an oral examination.
- (3) Every applicant for a certificate as a Third-Class Engineer, Motor Ship, shall:
- (a) complete the requirements set out in section 32.1(1);
  - (b) pass a written examination in Engineering Knowledge, Motor; and
  - (c) pass an oral examination.
- (4) An applicant who holds a certificate issued before January 3, 1994, may be issued a certificate as Third-Class Engineer, Steamship or Motor Ship, after:
- (a) passing a written examination in each of the following:
    - (i) Thermodynamics;
    - (ii) Electrotechnology; and

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(b) passing an oral examination.

32.1 (5) The service required by an applicant for a Third-Class Certificate, Steam or Motor, is 48 months service as follows:

(a) after completing the service for the appropriate Fourth-Class Certificate, Steam or Motor, Chapter 33;

(b) a minimum of six months sea service:

(i) as an engineer officer or engineer on the watch on a steamship of not less than 350 kW propulsion power where the applicant applies for a certificate as a Third-Class Engineer, Steamship; or

(ii) as an engineer officer or engineer on the watch on a motor ship or MODU of not less than 350 kW propulsion power when the applicant applies for a certificate as a Third-Class Engineer, Motor Ship; and

(c) the remaining time made up of any combination of the following service, subject to any time limitations set out therein:

(i) engineer officer or engineer on day work on a ship to a maximum of three months;

(ii) engineer officer or engineer fitting out, laying up or overhauling on a ship to a maximum of six weeks in any one year, to a maximum of three months;

(iii) engineer officer or engineer on a non-propelled motor or steam dredge, drill rig, floating elevator or similar ship, the main engine of which is not less than 450 kW power;

(iv) engine-room rating or engine-room assistant on the watch in the engine room of a steamship or motor ship of not less than 350 kW propulsion power, to be credited at a rate of one day for every three days of service, (up to 6 months maximum); and

(v) time spent at the marine department of a school listed in TP 10655 to be credited at a ratio of one day for every three days attendance, to a maximum of three months.

32.2 Not in use.

32.3 (1) For a Third-Class Motor with Steam Certificate of a higher grade, an applicant shall have served for not less than six months in the engine room of a motor ship of not less than 350 kilowatt propulsion power as an engineer officer or engineer on watch.

(2) For a Third-Class Steam with Motor Certificate of a higher grade, an applicant shall have served for not less than six months in the engine room of a steamship of not less than 350 kilowatt propulsion power as an engineer officer or engineer on watch.

32.4 Not in use.

### **Chief Engineer Certificate**

32.5 For a Chief Engineer Certificate, an applicant shall hold a Third-Class Certificate, and have served, since qualifying for a Fourth-Class Second Engineer Endorsement, for not less than 24 months as engineer or engineer officer on watch in the engine room of a motor ship or steamship, as appropriate, of not less than 750 kilowatt propulsion power, and shall have successfully completed an approved Marine Emergency Duties D Course and Propulsion Plant Simulator Level 2 Course.

## PART II - EXAMINATIONS

32.6 The following table lists the written and oral examinations for the Third-Class Engineer Certificate, the qualifying service required before each may be attempted, and other requirements:

### Steam Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Mathematics	-	-
Applied Mechanics	-	-
Thermodynamics	-	-
Electrotechnology	-	-
Engineering Knowledge, General	48 months	MED C & D, PPS Level 1, *Skills Training, *TRB.
Engineering Knowledge, Steam	48 months including six months Steam 350 kW	Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General and Steam

\* These items are not required for applicants holding a Fourth-Class Engineering Certificate.

### Motor Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Mathematics	-	-
Applied Mechanics	-	-
Thermodynamics	-	-
Electrotechnology	-	-
Engineering Knowledge, General	48 months	MED C & D, PPS Level 1, *Skills Training, *TRB.
Engineering Knowledge, Motor	48 months including six months Motor 350 kW	Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General and Motor

\* These items are not required for applicants holding a fourth-Class Engineering Certificate.

#### Motor with a Steam Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, Motor	Six months 350 kW	Third-Class Steam Certificate
Oral Examination	-	Pass Engineering Knowledge, Motor

#### Steam with a Motor Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, Steam	Six months 350 kW	Third-Class Motor Certificate
Oral Examination	-	Pass Engineering Knowledge, Steam

#### Chief Engineer Certificate

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
No examination	24 months (12 months 750 kW)	MED D, Third-Class Certificate issued after January 3, 1994, PPS Level 2.

- 32.7 (1) Each written examination paper shall be of maximum duration of three and a half hours.
- (2) All papers consist of nine questions, six of which shall be attempted by the applicant.
- (3) If more than the required number of questions are answered in any paper, all the answers shall be marked and only the required number of questions awarded the lowest marks shall be taken to determine the overall result.
- (4) The knowledge to be shown by an applicant for a Third-Class Certificate or for an endorsement on a certificate shall be that required:
- (a) as a watchkeeping engineer officer for the safe use, operation and maintenance of the boilers and machinery; and
  - (b) as a chief engineer officer, and as second engineer officer, to take charge of the engine-room staff and the main propulsion auxiliary machinery of ships as per section 32.7(5)(i) and 32.7(5)(ii).

**PART III - VALIDITY OF CERTIFICATE**

32.7 (5) The Certificate as a Marine Engineer Third Class is valid as:

- (i) Watchkeeping Engineer without restrictions.
- (ii) Second Engineer (if issued after January 3, 1994) on any ship less than 3000 kW and on passenger ships more than 4000 kW between Canadian ports.
- (iii) Chief Engineer, with the following restrictions:

	<b>Foreign Going Home-Trade I</b>	<b>Home-Trade II</b>	<b>Home-Trade III</b>	<b>Inland I Inland II Minor Waters I</b>	<b>Minor Waters II Home Trade IV</b>
Pass Vessels	Not Applicable	Not over 1000 kW	Not over 1000 kW	Not over 1000 kW	Not over 1500 kW
Non-Pass Vessels	Not Applicable	Not over 2000 kW	Not over 2000 kW	Not over 2000 kW	Not over 4000 kW
Tow Boats	Not Applicable	Not over 2000 kW	Not over 4000 kW	Not over 4000 kW	Not over 5000 kW
Fishing Vessels	Not over 2000 kW				

32.7 (6) Chief Engineer Certificate validity:

	<b>Unrestricted Voyage</b>	<b>Intermediate Voyage</b>	<b>Local Voyage</b>	<b>Minor Waters Voyage</b>
Pass Vessels	Not applicable	Not over 1000 kW	Not over 1000 kW	Not over 1500 kW
Non-Pass Vessels	Not over 2000 kW	Not over 2000 kW	Not over 2000 kW	Not over 4000 kW
Fishing	Not over 2000 kW			



## PART IV - SYLLABUSES OF EXAMINATIONS

### 32.8 Mathematics

ITEM	COLUMN
1.	General The setting out of calculations, extraction and cancellation of common factor, significant figures, degree of accuracy.
2.	Arithmetic Averages, percentages, ratio, proportions, variation direct and inverse.
3.	Logarithms Use of tables, square roots, reciprocals, use of logarithms for multiplication, division, powers and roots.
4.	Algebra Indices, including fractional and negative types; use of common logarithms for multiplication, division, powers and roots; use of Napierian logarithms; simplification and division of algebraic functions; re-arrangement of formulae; factorisation; algebraic fractions; squares and cubes of polynomials such as $(a + b)^2$ and $(a + b)^3$ ; simple equations; quadratic equations and solution by factorisation or by completing the square, proof of general formula for solution; simultaneous equations; complex quantities, their representation on Argand diagrams.
5.	Graphics Graphical work; the graph $y = ax + b$ , either from calculated values or from experimental results; calculation of constants from graphs; graphical solution of simple simultaneous equations involving two unknowns; graph of $y = ax^2 + bx + c$ and graphical solution of equation $ax^2 + bx + c = 0$ .
6.	Geometry Properties of triangles; Pythagorean theorem; sum of the angles; relation between exterior and interior angles; isosceles and equilateral triangles; similar and congruent triangles.
7.	Trigonometry Measurement of angles in degrees and radians; complementary and supplementary angles; sine, cosine and tangent of angles up to 360 degrees; sine and cosine rules and their application of the solution of triangles; solution of simple trigonometric equations; expansion of $\sin(A + B)$ and $\cos(A + B)$ ; graphs of $\sin \theta$ , $\cos \theta$ and $a \sin \theta + b \cos \theta$ .
8.	Mensuration Areas of triangle, polygon, parallelogram, trapezium, circle, properties of chords and tangents; angles in the same segment; angles at centre and circumference, sector and segment of a circle and ellipse; areas of oblique sections of regular solids of uniform cross section; area and mean height by mid-ordinate rule and by Simpson's rule.
9.	Ratios and Volumes Ratio of areas of similar figures; volumes and surface areas of prisms, pyramids, frustums, spheres, cylinders and cones; ratio of masses and volumes of similar solids; solids of revolution.

### 32.8A Applied Mechanics

ITEM	COLUMN
1.	Vectors The vector representation of forces; triangle of forces; resultant and equilibrant of a system of concurrent co-planar forces; couples.
2.	Moments and Centroids The principle of moments, application to simply-supported beams and ranked levers; centre of area; centre of gravity.
3.	Displacement Displacement, time, speed, velocity and acceleration.
4.	Forces Force, moment of force, torque, work, energy and power.
5.	Simple Machines Simple machines, velocity ratio, mechanical advantage, efficiency.
6.	Friction Friction, laws for dry surfaces, coefficient of friction (horizontal plane only).
7.	Stress and Strain Direct stress and strain, Hooke's law, modulus of elasticity, elastic limit, UTS, yield stress, limit of proportionality, safety factor, shear stress.
8.	Density and Pressure Relative density; variation of fluid pressure with depth; Archimedes' principles.
9.	Elementary Stability Elementary treatment of transverse stability, centre of buoyancy, centre of gravity and metacentre (box shape only); transverse movement of masses across deck.

### 32.9 Thermodynamics

ITEM	COLUMN
1.	Introduction S. I., Metric and Imperial units. Conversion of units from one system to another. Temperature and its measurement; scales; significance of absolute temperature; heat as energy, first law of thermodynamics and mechanical equivalent of heat (conservation of energy applied to heat and work); fuels, calorific value, flashpoint.
2.	Thermal Properties Expansion and contraction of solids, liquids and gases; change of phase; specific enthalpy of fusion, evaporation; properties of working fluids air, steam and freon.
3.	Perfect Gas Laws Compression and expansion of gases; gas laws; Boyle's law, Charles' law.
4.	Heat Transfer Specific heat capacity, heat transfer by conduction, convection and radiation; effect of insulation.
5.	Thermal Relations The indicator diagram, power developed, fuel consumption including understanding of principles of combustion; insufficient, minimum and excess air.

### 32.10 Electrotechnology

ITEM	COLUMN
1.	Introduction Simple electric circuit; chemical, magnetic and thermal effects of electric current; Ohm's Law; series and parallel circuits; electromotive force, voltage; units of current, resistance, voltage, energy, simple AC circuit, Wheatstone bridge.
2.	Properties of Conductors Distribution of current in circuits; resistance of conductor, variation with dimensions, material, temperature; temperature coefficient of resistance; insulators.
3.	Storage Cells Secondary cells (acid and alkali); construction; capacity, ampere hour.
4.	Switchboards Construction and operation of switchboard.
5.	Introduction to Electronics P-N junction, rectifiers, switching.
6.	Instruments Moving coil, moving iron (repulsion type).
7.	Magnetism Magnetic field, lines of force; field due to current in a straight conductor; motor and generator principle, commutation; speed control of motors; starter AC and DC; alternators and AC motors.

### 32.11 Engineering Knowledge, General

ITEM	COLUMN
1.	Communications Ability to transmit information relating to machinery components by means of simple drawings with supplementary notes and specifications.
2.	Manufacturing Processes Knowledge of the methods or manufacture of the various machinery components and the effects of various treatments on the physical properties of the materials commonly used.
3.	Boilers Constructional details and management of auxiliary boilers, including firing arrangements and boiler mountings; boiler water testing and treatment.
4.	Steering Gear Construction, arrangement and working of steering gears and telemotors.
5.	Pumps Constructional details and principles of action of pumps; general requirements for pumping systems.
6.	Firefighting Equipment Fire prevention and detection; firefighting equipment, its use, construction and maintenance.
7.	Safe Working Practices Safe working practices in machinery rooms and other enclosed spaces.
8.	Management of Electrical Equipment Safe and efficient operation and maintenance of electrical equipment;
9.	Propeller Shaft System Constructional details of shafting, stern tubes, stern bushings and methods of securing them; constructional details of controllable pitch and fixed pitch propellers, and propeller shafts.
10.	Rudders Methods of supporting the rudder, constructional details of rudder and pintles.

11.	Hydraulic Systems Principles of operation and maintenance of pneumatic, hydraulic and electronic governors.
12.	Refrigeration Systems Working principles of operation and maintenance of refrigeration systems.
13.	Ship Construction Elementary knowledge of ship construction and terminology used.
14.	Deck Machinery Operations and maintenance of cargo handling equipment and deck machinery.

### 32.12 Engineering Knowledge, Steam

ITEM	COLUMN
1.	Principles and Construction of Boilers Working principles and constructional details of water-tube and fire-tube boilers and their mountings.
2.	Fuel and Fuel Systems Fuel systems operation and maintenance; properties of fuel used in marine boilers.
3.	Boiler Feed-Water Feed systems and water treatment.
4.	Construction of Steam Engines The construction and operation of steam reciprocating engines and turbines and associated equipment and systems.
5.	Lubrication Properties of lubricating oils used in reciprocating steam engines and turbines.
6.	Management of Steam Engines Operation and maintenance of reciprocating steam engines and turbines; determination of engine power.
7.	Automation and Alarms A general understanding of the basic operation and maintenance of automatic control and alarm systems, in particular, definitions.
8.	Faults and Prevention Location of common faults of machinery and plant in machinery spaces, and action necessary to prevent damage.


### 32.13 Engineering Knowledge, Motor

ITEM	COLUMN
1.	Principles and Construction of ICES Working principles and constructional details of marine diesel engines, gears, clutches and associated equipment and their seatings.
2.	Cooling Systems Cooling systems for diesel engines and their protection from damage by freezing and corrosion.
3.	Oil Fuel and Lubrication Fuel and lubricating oil systems; the properties of fuel and lubricating oil used in diesel engines.
4.	Compressed Air Systems Constructional details and working principles of compressed air systems; starting and reversing systems for diesel engines.
5.	System Control Diesel engine controls, protective devices and remote sensing and monitoring.

6.	Management of Diesel Engines Operation and maintenance of diesel engines; determination of engine power.
7.	Power Balance Adjusting of fuel pumps, injectors, valves and power balancing of diesel engines.
8.	Automation and Alarms A general understanding of the basic operation of automatic controls and alarms, in particular definitions.

### 32.14 Oral Examination


ITEM	COLUMN
1.	General Practical knowledge, with particular reference to the applicant's answers in the written examination; may include questions on the water gauge and safe working practices.
2.	Ship's Business Subjects related to general aspects of regulations and ship's business, including: <ul style="list-style-type: none"> <li>(a) Oil Pollution Prevention Regulations extended to include interpretations and ship's responsibilities under them;</li> <li>(b) the organization of crew for emergencies, drills and routine operations and maintenance;</li> <li>(c) ship's responsibilities under: <ul style="list-style-type: none"> <li>(i) Boat and Fire Drill Regulations; and</li> <li>(ii) Crewing Regulations;</li> </ul> </li> <li>(d) the <i>Canada Shipping Act</i> and regulations made thereunder with respect to: <ul style="list-style-type: none"> <li>(i) grades and classes of certificates or competency;</li> <li>(ii) rights of holders of certificates;</li> <li>(iii) offences relating to certificates;</li> <li>(iv) losses of certificates;</li> <li>(v) seafarers rights concerning wages;</li> <li>(e) official and ship's logbooks and their entries under all conditions; and</li> <li>(f) <i>Canada Labour Code</i>, Occupational Health and Safety Regulations.</li> </ul> </li> </ul>

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## CHAPTER 33 - FOURTH-CLASS ENGINEER, MOTOR SHIP, AND FOURTH-CLASS ENGINEER, STEAMSHIP

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 33.1 (1) Every applicant for a certificate as a Fourth-Class Engineer, Steamship or Motor Ship, shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957, for:
      - (A) Basic Safety (A1);
      - (B) Survival Craft (B1);
      - (C) Marine Fire Fighting (B2); and
      - (D) Officer Certification (C);
    - (ii) Propulsion Plant Simulator Course Level I, set out in TP 10935;
    - (iii) Marine First Aid Advanced Certificate, set out in TP 13008; and
    - (iv) Skills Training Course.
- (2) Notwithstanding section 33.15 complete the following service:
1. obtain a certificate of completion for the course, set out in TP 8911, at a school listed in TP 10655; or
  2. 36 months service as follows:
    - (a) subject to section 33.3, a minimum of six months sea service
      - (i) as engineer on watch, engine-room rating on watch, engine-room assistant on watch or assistant engineer officer on a steamship of not less than 225 kW propulsion power where the applicant applies for a certificate as a Fourth-Class Engineer, Steamship; or
      - (ii) as engineer, engine-room rating, engine-room assistant on watch or assistant engineer officer on a motor ship or MODU of not less than 225 kW propulsion power where the applicant applies for a certificate as a fourth class engineer, motor ship;
    - (b) a credit of six months for completion of the Skills Training Course set out in TP 13720 from a school listed in TP 10655; and
    - (c) (i) the remaining time of any combination of service from the following categories, namely:
      - (A) fitting, erecting or repairing machinery for a maximum of 12 months;
      - (B) metal turning to a maximum of 12 months;
      - (C) brass finishing to a maximum of nine months;

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- (D) pattern making to a maximum of nine months;
- (E) planing, slotting, shaping, milling to a maximum of nine months;
- (F) tool room to a maximum of nine months;
- (G) smith work to a maximum of four months;
- (H) welding to a maximum of four months;
- (I) working in a drawing office as mechanical or electrical draughtsman engaged on arrangement, detail or design drawings to a maximum of 12 months;
- (J) a certificate of completion for a three-year diploma course in mechanical or electrical engineering from a school listed in TP 10655, which gives equivalent of 24 months of service;
- (K) the equivalent of three months of service for each course in applied mechanics, thermodynamics, machine design, electrotechnology, chemistry, or naval architecture successfully completed from a school listed in TP 10655;
- (L) engineer or assistant engineer officer at sea on day work, to a maximum of 24 months;
- (M) engineer, assistant engineer officer, engine-room watch rating, engineer assistant or electrician during the fitting out or laying up of a ship to a maximum of six weeks in any one year of fitting-out or laying-up time, to a maximum of six months;
- (N) engineer, engine-room watch rating or assistant engineer officer on watch on a non-propelled motor dredge, drill rig, floating elevator or similar ship, the main engine of which is not less than 375 kW power, to a maximum of 24 months;
- (O) pumpman on an oil tanker, to a maximum of 24 months;
- (P) water tender on a ship having three or more boilers, to a maximum of 18 months;
- (Q) engineer, engine-room watch rating, assistant engineer or engineer assistant on watch on a non-propelled steam dredge, drill rig, floating elevator or similar ship, the main engine of which is not less than 375 kW power, or the boiler of which has a total heating surface of no less than 92.9 m<sup>2</sup>, to a maximum of 24 months;
- (R) engine-room watch rating or engineer assistant on watch on a towed barge or similar ship, the boilers of which have a total heating surface of not less than 92.9 m<sup>2</sup>, to a maximum of 24 months;
- (S) tunnelman on a self-unloading bulk cargo ship, to a maximum of nine months;
- (T) electrician on watch in an engine room of an electrically-propelled ship, to a maximum of 24 months;

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- (U) electrician on watch or on day work during the maintenance and repair of the electrical machinery of a ship having a rated generator capacity of not less than 300 kW power, to a maximum of 24 months; and
- (V) time spent at the marine department of a school listed in TP 10655, to be credited in the ratio of one day for every three days of attendance to a maximum of three months.

33.2 The sea service referred to in paragraph 33.1(2)2.(a) is demonstrated by completion of an approved Training Record Book conforming to TP 13721.


### **Steam Certificate and Motor Certificate**

- 33.3 For a Fourth-Class Steam Certificate and Fourth-Class Motor Certificate, an applicant shall complete the service required by section 33.1(2) 1. or 33.1(2) 2. provided that not less than six months of the total sea service was performed in a steamship of not less than 225 kilowatt propulsion power, and that not less than six months of the total sea service was performed in a motor ship of not less than 225 kilowatt propulsion power.
- 33.4 (1) For a Fourth-Class Motor with a Steam Certificate of a higher grade, an applicant shall have served on watch in the engine room of a motor ship of not less than 225 kilowatt propulsion power for not less than six months as an engineer or an engine-room assistant or engine-room rating.
- (2) For a Fourth-Class Steam with a Motor Certificate of a higher grade, an applicant shall have served on watch in the engine room of a steamship of not less than 225 kW propulsion power for not less than six months as an engineer or an engine-room assistant or engine-room rating.
- (3) For an Electrical Certificate with a Fourth-Class or Third-Class Steam, Motor or Combined Certificate, an applicant shall have served not less than six months at sea as an engineer or electrician in a ship having a rated generator capacity of not less than 300 kilowatt.

### **Second Engineer Certificate**

- 33.5 An applicant for a Second Engineer Endorsement on a Fourth-Class Certificate shall have served for not less than 12 months as an engineer officer or assistant engineer officer on watch of a steamship or motor ship, as appropriate, of not less than 750 kilowatt propulsion power, and no further examination is required for the Second Engineer.



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## PART II - EXAMINATIONS

33.6 (1) The following table lists the written and oral examinations for the Fourth-Class Engineer Certificate, the qualifying service required before each may be attempted, and other requirements:

### Steam Certificate

<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
Engineering Knowledge, General	36 months	MED B & C PPS Level I, Skills Training, TRB.
Engineering Knowledge, Steam	36 months	MED B & C Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General and Steam

### Motor Certificate

<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
Engineering Knowledge, General	36 months	MED B & C PPS Level I, Skills Training, TRB.
Engineering Knowledge, Motor	36 months	MED B & C Pass Engineering Knowledge, General
Oral Examination	-	Pass Engineering Knowledge, General and Motor

### Motor with a Steam Certificate


<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
Engineering Knowledge, Motor	Six months	Fourth class Steam Certificate
Oral Examination	-	Pass Engineering Knowledge, Motor

### Steam with a Motor Certificate

<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
Engineering Knowledge, Steam	Six months	Fourth class Motor Certificate
Oral Examination	-	Pass Engineering Knowledge, Steam

### Fourth Class with Electrical Certificate

<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
Engineering Knowledge, Electrotechnology	Six months 300 kW	Fourth Class Steam or Motor
Oral Examination	-	Pass Engineering Knowledge, Electrotechnology

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### Second Engineer Certificate

<b>EXAMINATION</b>	<b>QUALIFYING SERVICE</b>	<b>OTHER REQUIREMENTS</b>
No Examination	12 months 750 kW	Fourth Class Steam or Motor Certificate

- 33.6 (2) An applicant shall be allowed three and a half hours to complete the paper for each subject referred to in subsection (1).
- (3) The written examination for a certificate or an endorsement other than an electrical endorsement shall be an examination in which the applicant attempts to select, from a number of given alternatives, the correct answer to each question.
- (4) In the written examination there shall be a number of multiple choice type questions to test the candidates knowledge in General Engineering Knowledge, and Engineering Knowledge, Steam and Motor:
- 33.7 (1) The knowledge to be shown by an applicant for a Fourth-Class Certificate or for an endorsement on a certificate shall be sufficient to ensure the safe and efficient operation, surveillance and running maintenance of ships' machinery.

### MANDATORY QUESTION

- (2) Every applicant for a Fourth-Class Motor, Steam or Combined Certificate is required to prove to the satisfaction of the examiner that he/she is capable of checking, by a safe method, the water level in boilers that are being prepared to raise steam, under pressure, or in the process of being shut down.

### PART III - VALIDITY OF CERTIFICATE

33.8 The certificate as a Marine Engineer, Fourth-Class, is valid as:

- (1) watchkeeping engineer, without restriction; and
- (2) second engineer on a non-passenger ship of not over 2000 kW propulsion power.

Note: Must hold Fourth-Class Certificate for 12 months before sailing as second engineer.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 33.9 Engineering Knowledge, General

ITEM	COLUMN
1.	<p>Construction and Safe Use of Hand Tools</p> <p>Including hammers, screwdrivers, wrenches, drift punches, chisels, hand saws and blades, files, hand shears and snips, twist drills, reamers, countersinks, taps and dies, layout tools, portable power grinders, portable power chippers.</p>
2.	<p>Construction and Safe Use of Power Tools</p> <p>Including drill press, fixed grinder, metal turning lathe, simple milling machine, surface grinder, cut-off saw, valve grinder, gas welding equipment, electric welding equipment.</p>
3.	<p>Materials of Construction</p> <p>Materials and the ability to distinguish between the following common types: steel, cast iron, copper, zinc, brass, aluminium, plastics, resins.</p>
4.	<p>Physical Sciences</p> <p>Mathematics: fundamental arithmetical operations and percentages, measurement by gauge and standard international units of length, mass, area, volume, pressure and temperature.</p> <p>Mechanics: force, friction, energy, power, the use of a level wheel and axle.</p> <p>Principles, construction and operation of instruments and equipment for measuring and testing: bi-metallic thermometer, thermo-couple, liquid in glass container, resistance thermometer, thermistor (thermally sensitive resistor), manometer, barometer (mercury and aneroid), pressure gauge (bourdon, scheffer, differential), piezoelectric sensor transducer, strain gauge, level gauge (float, sight, glass, probe, remote, pneumatic), flow meters (mechanical, rotometer, float, venturi), speed meters (tachogenerator, mechanical counter), torque meter.</p>
5.	<p>Recognition of Fire Hazards</p> <p>Storage and handling of flammable liquids used for testing, cleaning, painting; lubrication additives and fuel additives; storage and handling of flammable solids used for jointing, cleaning and shoring.</p>
6.	<p>Identification and Maintenance</p> <p>Portable fire extinguishers, fire hydrants, hoses and nozzles, fire doors, water-tight doors, ventilation closures; detection devices, alarms, alarm systems; fire pumps; breathing apparatus, sprinkler and smothering systems.</p>
7.	<p>Preventive Maintenance</p> <p>Lifeboat engines, lifeboats, davits and winches.</p>
8.	<p>Safe Working Practices</p> <p>Work procedures and precautions necessary to prevent hazards; maintenance of safe working conditions; rigging, slinging and handling of heavy machinery parts.</p>
9.	<p>Pollution Prevention</p> <p>Basic principles of pollution-prevention laws and regulations applicable to Canadian ships; pollution-prevention procedures, including bunkering operations, the discharge of bilge and ballast water, and the operation of oily-water separators.</p>

10.	<p><b>Pumps</b></p> <p>The construction, operation and maintenance of reciprocating pumps, centrifugal pumps, screw-displacement gear pumps, injectors, ejectors.</p>
11.	<p><b>Piping</b></p> <p>The construction, operation and maintenance of steam and feed-water systems, bilge and ballast systems, fuel lubricating oil systems, valves, drains, traps and other fittings; precautions to be observed in the operation of piping systems with regard to pipe expansion, water hammer, cross connections, venting and overflow, routine pumping operations.</p>
12.	<p><b>Power Transmissions</b></p> <p>Thrust with respect to intermediate and propeller shafts, thrust with respect to intermediate and propeller shaft bearing alignment, couplings, gear types, gear trains.</p>
13.	<p><b>Steering Gears:</b></p> <p>Mechanical and hydraulic steering gears, emergency steering arrangements, starting power steering gears, routine checks of steering gears, operation of steering gears.</p>
14.	<p><b>Underwater Fittings</b></p> <p>Rudders; fixed, variable and controllable-pitch propellers, stern glands; sea suction and discharge valves; mounting items on the hull.</p>
15.	<p><b>Deck Machinery</b></p> <p>Windlass, capstan, winch.</p>
16.	<p><b>Fuels, Auxiliary Machinery</b></p> <p>All types of fuels used on ships; storage, transfer, heating filtration and purification of fuels.</p>
17.	<p><b>Lubricants</b></p> <p>The storage, transfer, heating, cooling, filtration, purification and disposal of lubricants; types of lubricants; application of lubricants.</p>
18.	<p><b>Electricity and Magnetism</b></p> <p>Fundamentals: definitions of current, voltage, resistance and power; direct and alternating current; conductors; insulators; wet and dry cells; identification of simple circuits.</p> <p>Measurement and protective devices: voltmeter, ammeter, ohmmeter, ground lights, fuses, circuit breakers.</p> <p>Generators, alternators and motors: construction and operation of direct-current machines; construction and operation of alternating-current machines; basic maintenance procedures.</p> <p>Electric circuits: alarm circuits, navigation-light circuits, main- and emergency-light and power circuits, basic maintenance procedures.</p>
19.	<p><b>Hydraulic Systems</b></p> <p>Pumps, motors, piping, fittings, control devices, hydraulic fluids, packings, seals.</p>
20.	<p><b>Pneumatic Systems</b></p> <p>Compressors, air receivers, heat exchangers, filters, piping, fittings, control devices; precautions and safeguards necessary to prevent fires and explosions.</p>
21.	<p><b>Refrigeration</b></p> <p>Types, properties and hazards of refrigerants; construction and operation of refrigeration systems.</p>

22.	<b>Auxiliary Boilers and Equipment</b> Types and construction of boilers; safety and operating procedures; mountings, fittings, fuel system, feed system, heat exchangers, filters, feed pumps and traps.
23.	<b>Auxiliary Internal Combustion Engines</b> Fuel systems, including fuel pumps, injectors and carburettors; basic construction and operating procedures, cooling and lubricating systems; starting devices and ignition systems; recognition and correction of malfunctions; precautions and safeguards necessary to prevent crankcase explosions.
24.	<b>Watchkeeping Procedures</b> Routine associated with taking over and accepting a watch; recording of significant gauge readings and understanding their importance to routine duties during a watch; recording of accident to machinery and hull; duties when handing over a watch; recording and calculation of ship's fuel supply; routine starting and stopping of machinery, emergency stopping of machinery.

Note: This is a written multiple-choice question examination.

### 33.10 Engineering Knowledge, Motor

ITEM	COLUMN
1.	<b>Compression Ignition Engines</b> Methods of supercharging, turbocharging and scavenging; general principles of construction and operation of two-stroke and four-stroke cycle engines; methods of starting and reversing; power transmission systems, including couplings and clutches on gears; applications of the compression ignition system in a single- and multiple-engine and diesel electric installation.
2.	<b>Lubrication Systems</b> The construction, operation and maintenance of purifiers; lubricants and lubricant additives; pumps; piping; heat exchangers; filters.
3.	<b>Cooling Systems</b> Air and liquid cooling, pumps, piping and heat exchangers, temperature control and expansion arrangements.
4.	<b>Fuel</b> Types of fuels and fuel additives; heating of fuels; filtration and purification of fuels; piping of fuels; fuel injection pumps and fuel injectors.
5.	<b>Governors</b> General principles, construction, operation and maintenance of mechanical, hydraulic, electronic and pneumatic governors.
6.	<b>Maintenance</b> Overhaul repair, adjustment, lay up, preventive maintenance (including running repairs recognition and correction of malfunctions) of engines, transmissions and interrelated systems (including lubrication, cooling, fuel, compressed air and exhaust systems).

Note: This is a written multiple-choice question examination.


### 33.11 Engineering Knowledge, Steam

ITEM	COLUMN
1.	<p>Fire-Tube and Water-Tube Boilers</p> <p>Construction: method of joining parts by riveting, welding, threading and bolting, staying and expanding parts of the boiler; insulating and brickwork.</p> <p>Mountings: safety valves, water gauges, main and auxiliary steam and feed-water valves, blowdown valves, connections for valves, fittings for gauges and regulating devices.</p> <p>Air pre-heaters: types, construction, operation, maintenance.</p> <p>Economizers: types, construction, operation, maintenance.</p> <p>Superheaters: types, construction, operation, maintenance.</p> <p>Operation and maintenance: opening up, cleaning and preparation for inspection and lay up; raising steam; steaming; blowing down; scumming; shutdown; water-gauge readings and testing for accuracy; high and low water levels; priming and foaming; combustion of fuels; oil fuel burners and controls, precautions to be observed; basic principles of boiler and feed-water treatment.</p>
2.	<p>Steam Plant Ancillary Equipment</p> <p>Construction, operation and maintenance of oil fuel pumps, feed-water pumps, injectors, combustion air fans, blowers, steam separators, steam traps, feed-water heaters and filters, cooling and circulating water pumps, condensers, air pumps, air ejectors, evaporators, distillers.</p>
3.	<p>Reciprocating Engines</p> <p>The construction, operation and maintenance of different types of reciprocating engines, their governors and lubricating systems.</p>
4.	<p>Steam Turbines</p> <p>The principles of construction, operation and maintenance of different types of turbines, power transmission systems (including couplings, gears and turbo-electric installations) and governors.</p>
5.	<p>Lubrication Systems</p> <p>The construction, operation and maintenance of purifiers, pumps, piping, heat exchangers and filters.</p>

Note: This is a written multiple-choice question examination.

### 33.12 Oral Examination

ITEM	COLUMN
1.	<p>General</p> <p>The subject matter of any of the questions contained in the examinations set out in sections 33.9, 33.10 and 33.11 of the regulations written by the applicant; checking by safe method the water level and boilers that are being prepared to raise steam, under pressure, or in the process of being shut down.</p>
2.	<p>Laws</p> <p>Parts II and VIII of the <i>Canada Shipping Act</i>; Safe Working Practices Regulations; Oil Pollution Prevention Regulations; Boat and Fire Drill Regulations; Crewing Regulations; <i>Canada Labour Code-Part II and Marine Occupational Safety and Health Regulations</i>; <i>Criminal Code</i> as it relates to the operation of a ship.</p>

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## SKILLS TRAINING

33.13 Skills Training Course outline is contained in TP 13720.

33.14 Proof of completion of the required skills training may be in the form of diplomas from approved schools or certificates of apprenticeship. Each submission of alternate proof of completion will be evaluated by the Board on its own merits, bearing in mind the Subject Items of 33.13.

## PART V

### Special Agreement


33.15 Following agreement was reached with marine industry to give special consideration to persons who have gained pre-requisite skills in work shops of an engine manufacturer by giving it equivalency to shore-based qualifying service, as set out in the Marine Certification Regulations.

### Requirements

- (1) For equivalent service, applicants must have served at least 30 months as a mechanic in a work shop of a marine engine manufacturer engaged in the building or re-building of diesel engines, such as agents for Caterpillar Corporation, General Motors Corporation, Cummins Corporation, MAK Corporation, etc.
- (2) Applicants must meet the requirements of Marine Emergency Duties, Medical Examination Standard, Propulsion Plant Simulator Course and successful passing of the examinations.

### Administration

- (1) Upon completion of the requirements in 33.15 (1) and 33.15 (2), an Examiner's certificate may be issued that would entitle the holder to act as a watchkeeping engineer or assistant engineer under supervision of a senior/second or chief engineer of a ship engaged on local voyages.
- (2) The Examiner's certificate will be marked as not valid for ships on foreign-going and home-trade I voyages.
- (3) STCW Certificate will not be issued.
- (4) Upon completion of six months sea service, a permanent Fourth-Class Certificate is to be issued with an STCW Certificate, and no further examination will be required.
- (5) The Examiner's certificate in (2) will become invalid upon completion of six months sea service.
- (6) All sea service is to be submitted in the form of a testimonial.

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## CHAPTER 34 - CHIEF ENGINEER, MOTOR-DRIVEN FISHING VESSEL

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 34.1 (1) Every applicant for a certificate as Chief Engineer of a Motor-Driven Fishing Vessel shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957, for:
      - (A) Survival Craft (B1); and
      - (B) Marine fire Fighting (B2);
    - (ii) Propulsion Plant Simulator Course Level I, set out in TP 10935; and
    - (iii) Marine First Aid Advanced Course, set out in TP 13008;
  - (c) pass a written examination in each of the following subjects:
    - (i) Mathematics
    - (ii) Applied Mechanics;
    - (iii) Thermodynamics;
    - (iv) Electrotechnology;
    - (v) Engineering Knowledge, General; and
    - (vi) Engineering Knowledge, Motor; and
  - (d) pass an oral examination.
- (2) The service required by an applicant for Chief Engineer of a Motor Driven Fishing Vessel is 48 months service as follows:
- (a) completion of service for the appropriate Fourth-Class Steam or Motor Certificate (Chapter 33);
  - (b) a minimum of six months sea service as engineer officer or engineer on the watch on a motor ship or MODU of not less than 350 kW propulsion power; and
  - (c) the remaining time made up of any combination of the following service, subject to any time limitations set out therein:
    - (i) engineer officer or engineer on day work on a ship, to a maximum of three months;
    - (ii) engineer officer or engineer fitting out, laying up or overhauling on a ship, to a maximum of six weeks in any one year, to a maximum of three months;
    - (iii) engineer officer or engineer on a non-propelled motor or steam dredge, drill rig, floating elevator or similar ship, the main engine of which is not less than 450 kW power;




- (iv) engine-room rating or engine-room assistant on watch in the engine room of a steamship or motor ship of not less than 350 kW propulsion power, to be credited one day for every three days of service; and
- (v) time spent at the marine department of a school listed in TP 10655, to be credited at the ratio of one day for every three days attendance, to a maximum of three months.

## PART II - EXAMINATIONS

34.2 The following table lists the examinations for the Chief Engineer of a Motor-Driven Fishing Vessel Certificate, the qualifying service required before each may be attempted, and other requirements.

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Mathematics		-
Applied Mechanics		-
Thermodynamics		-
Electrotechnology		-
Engineering Knowledge, General	48 months	MED C PPS Level I
Engineering Knowledge, Motor	-	Pass Engineering Knowledge, General and Motor
Oral Examinations	-	-

- 34.3 (1) Each written examination paper shall be of a maximum duration of three and a half hours.
- (2) All papers consist of nine questions, six of which shall be attempted by the applicant.
  - (3) If more than the required number of questions are answered in any paper, all the answers shall be marked and only the required number of questions awarded the lowest marks shall be taken to determine the overall result.
  - (4) The engineering knowledge to be shown by an applicant for a certificate as a Chief Engineer of a Motor-Driven Fishing Vessel shall be sufficient to enable him/her to take charge of and operate safely the machinery and auxiliaries, including the heating boilers, that are normally found in a motor-driven fishing vessel of up to 2 000 kilowatt propulsion power operating on any voyage.

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### PART III - VALIDITY OF CERTIFICATE

- 34.3 (5) The certificate of Chief Engineer of a Motor-Driven Fishing Vessel is valid as chief engineer of a motor-driven fishing vessel of not more than 2000 kilowatt propulsion power on any voyage.

### PART IV - SYLLABUSES OF EXAMINATIONS

#### 34.4 Mathematics

ITEM	COLUMN
1.	General The setting out of calculations, extraction and cancellation of common factor, significant figures, degree of accuracy.
2.	Arithmetic Averages, percentages, ratio, proportions.
3.	Logarithms Use of tables, square roots, reciprocals; use of logarithms for multiplication, division, powers and roots.
4.	Algebra Indices, including fractional and negative types; use of common logarithms for multiplication, division, powers and roots; use of Napierian logarithms; simplification and division of algebraic functions; re-arrangement of formulae; factorisation; algebraic fractions; squares and cubes of polynomials such as $(a + b)^2$ and $(a + b)^3$ ; simple equations; quadratic equations and solution by factorisation or by completing the square, proof of general formula for solution; simultaneous equations; complex quantities, their representation on Argand diagrams.
5.	Graphics Graphical work; the graph $y = ax + b$ , either from calculated values or from experimental results; calculation of constants from graphs; graphical solution of simple simultaneous equations involving two unknowns; graph of $y = ax^2 + bx + c$ and graphical solution of equation $ax^2 + bx + c = 0$ .
6.	Geometry Properties of triangles; Pythagorean theorem; sum of the angles; relation between exterior and interior angles; isosceles and equilateral triangles; similar and congruent triangles.
7.	Trigonometry Measurement of angles in degrees and radians; complementary and supplementary angles; sine, cosine and tangent of angles up to 360 degrees; sine and cosine rules and their application of the solution of triangles; solution of simple trigonometric equations; expansion of $\sin(A + B)$ and $\cos(A + B)$ ; graphs of $\sin \theta$ , $\cos \theta$ and $a \sin \theta + b \cos \theta$ .
8.	Mensuration Areas of triangle, polygon, parallelogram, trapezium, circle, properties of chords and tangents; angles in the same segment; angles at centre and circumference, sector and segment of a circle and ellipse; areas of oblique sections of regular solids of uniform cross section; area and mean height by mid-ordinate rule and by Simpson's rule.
9.	Ratios and Volumes Ratio of areas of similar figures; volumes and surface areas of prisms, pyramids, frustums, spheres, cylinders and cones; ratio of masses and volumes of similar solids; solids of revolution.

### 34.4A Applied Mechanics

ITEM	COLUMN
1.	Vectors The vector representation of forces; triangle of forces; resultant and equilibrant of a system of concurrent co-planar forces; couples.
2.	Moments and Centroids The principle of moments, application to simply-supported beams and ranked levers; centre of area; centre of gravity.
3.	Displacement Displacement, time, speed, velocity and acceleration.
4.	Forces Force, moment of force, torque, work, energy and power.
5.	Simple Machines Simple machines, velocity ratio, mechanical advantage, efficiency.
6.	Friction Friction, laws for dry surfaces, coefficient of friction (horizontal plane only).
7.	Stress and Strain Direct stress and strain, Hooke's law, modulus of elasticity, elastic limit, UTS, yield stress, limit of proportionality, safety factor, shear stress.
8.	Density and Pressure Relative density; variation of fluid pressure with depth; Archimedes' principles.
9.	Elementary Stability Elementary treatment of transverse stability, centre of buoyancy, centre of gravity and metacentre (box shape only); transverse movement of masses across deck.


### 34.5 Thermodynamics

ITEM	COLUMN
1.	Introduction Temperature and its measurement; scales; significance of absolute temperature; heat as energy, first law of thermodynamics and mechanical equivalent of heat (conservation of energy applied to heat and work); fuels, calorific value, flashpoint.
2.	Thermal Properties Expansion and contraction of solids, liquids and gases; change of phase; specific enthalpy of fusion, evaporation; properties of working fluids air, steam and freon.

3.	Perfect Gas Laws Compression and expansion of gases; gas laws; Boyle's law, Charles' Law.
4.	Heat Transfer Specific heat capacity, heat transfer by conduction, convection and radiation; effect of insulation.
5.	Thermal Relations The indicator diagram, power developed, fuel consumption including understanding of principles of combustion; insufficient, minimum and excess air.
6.	Refrigeration Vapour-compression cycle, refrigeration effect, cooling load, use of properties of refrigerants, coefficient of performance, cargo cooling and blast freezers.

### 34.6 Eletrotechnology

ITEM	COLUMN
1.	Introduction Simple electric circuit; chemical, magnetic and thermal effects of electric current; Ohm's law; series and parallel circuits; electromotive force, voltage; units of current, resistance, voltage, energy, simple AC circuit, Wheatstone bridge.
2.	Properties of Conductors Distribution of current in circuits; resistance of conductor, variation with dimensions, material, temperature; temperature coefficient of resistance; insulators.
3.	Storage Cells Secondary cells (acid and alkali); construction; capacity, ampere hour.
4.	Switchboard Construction and operation of switchboard.
5.	Introduction to Electronics P-N junction, rectifiers, switching.
6.	Instruments Moving coil, moving iron (repulsion type).
7.	Magnetism Magnetic field; lines of force; field due to current in a straight conductor; motor and generator principle; commutation; speed control of motors; starter AC and DC; alternators and AC motors.

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### 34.7 Engineering Knowledge, General


ITEM	COLUMN
1.	<p>Communications</p> <p>Ability to transmit information relating to machinery components by means of simple drawings with supplementary notes and specifications.</p>
2.	<p>Manufacturing Processes</p> <p>Knowledge of the methods of manufacture of the various machinery components and the effects of various treatments on the physical properties of the materials commonly used.</p>
3.	<p>Boilers</p> <p>Constructional details and management of auxiliary boilers, including firing arrangements and boiler mountings; boiler water testing and treatment.</p>
4.	<p>Steering Gears</p> <p>Construction, arrangement and working of steering gears and telemotors.</p>
5.	<p>Pumps</p> <p>Constructional details and principle of action of pumps; general requirements for pumping systems.</p>
6.	<p>Firefighting</p> <p>Fire prevention and detection; firefighting equipment, its use, construction and maintenance.</p>
7.	<p>Safe Working Practices</p> <p>Safe working practices in machinery rooms and other enclosed spaces.</p>
8.	<p>Management of Electrical Equipment</p> <p>Safe and efficient operation and maintenance of electrical equipment.</p>
9.	<p>Propeller Shaft System</p> <p>Constructional details of shafting, stern tubes, stern bushings and methods of securing them; constructional details of controllable- and fixed-pitch propellers and propeller shafts.</p>
10.	<p>Rudders</p> <p>Methods of supporting the rudder, constructional details of rudder and pintles.</p>
11.	<p>Hydraulic Systems</p> <p>Principles of operation and maintenance of pneumatic, hydraulic and electronic governors.</p>
12.	<p>Refrigeration Systems</p> <p>Working principles of operation and maintenance of refrigeration systems.</p>
13.	<p>Ship Construction</p> <p>Elementary knowledge of ship construction, stability book and terminology used.</p>
14.	<p>Deck Machinery</p> <p>Operation and maintenance of cargo handling equipment and deck machinery.</p>

### 34.8 Engineering Knowledge, Motor

ITEM	COLUMN
1.	Principles and Construction of ICEs Working principles and constructional details of marine diesel engines, gears, clutches and associated equipment and their seatings.
2.	Cooling Systems Cooling systems for diesel engines and their protection from damage by freezing and corrosion.
3.	Oil Fuel and Lubrication Fuel and lubricating oil systems; properties of fuel and lubricating oil used in diesel engines.
4.	Compressed Air Systems Constructional details and working principles of compressed air systems; starting and reversing systems for diesel engines.
5.	System Control Diesel engine controls, protective devices and remote sensing and monitoring.
6.	Management of Diesel Engines Operation and maintenance of diesel engines; determination of engine power.
7.	Power Balance Adjusting of fuel pumps, injectors, valves and power balancing of diesel engines.
8.	Automation and Alarms A general understanding of the basic operation of automatic controls and alarms, in particular definitions.

### 34.9 Oral Examination

ITEM	COLUMN
1.	General Practical knowledge, with particular reference to the applicant's answers in the written examination; may include questions on the water gauge and safe working practices.
2.	Ship's Business Subjects relating to the general aspects of regulations and ship's business, including: Oil Pollution Prevention Regulations extended to include interpretations and ship's responsibilities under them; organization of crew for emergencies, drills and routine operations and maintenance; ship's responsibilities under Boat and Fire Drill Regulations, Crewing Regulations, and Ship's Deck Watch Regulations; <i>Canada Shipping Act</i> and regulations made thereunder with respect to grades and classes of certificates of competency, rights of holders of certificates, offences relating to certificates, losses of certificates, and seafarers' rights concerning wages; official and ship's logbooks, and their entries under all conditions; <i>Canada Labour Code</i> , Occupation Health and Safety Regulations.

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## CHAPTER 35 - WATCHKEEPING ENGINEER, MOTOR-DRIVEN FISHING VESSEL

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 35.1 (1) Every applicant applying for a certificate as Watchkeeping Engineer of a Motor-Driven Fishing Vessel shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Course, set out in TP 4957, for;
      - (A) Survival Craft (B1); and
      - (B) Marine Fire Fighting (B2);
    - (ii) Propulsion Plant Simulator Course Level 1, set out in TP 10935; and
    - (iii) Marine First Aid Basic Course, set out in TP 13008.
  - (c) pass a written examination in each of the following subjects:
    - (i) Engineering Knowledge, General; and
    - (ii) Engineering Knowledge, Motor; and
  - (d) pass an oral examination.
- (2) The service required by an applicant for a Watchkeeping Engineer Certificate is as follows:
- (a) obtain:
    - (i) a certificate of completion for a Diesel Engine Course of nine months duration from a school listed in TP 10655; and
    - (ii) a minimum of three months service as set out in subsection (2)(b); or
  - (b) complete 12 months service as follows:
    - (i) a minimum of six months sea service as an engineer, assistant engineer, engine-room watch rating or engineer assistant on watch in the engine room of a motor ship of not less than 125 kW propulsion power; and
    - (ii) the remaining time made up of any combination of the following service:
      - (A) the manufacture or repair of internal combustion engines or other marine machinery; and
      - (B) the overhaul of the propulsion machinery of motor ships of not less than 125 kW propulsion power.

## PART II - EXAMINATIONS

35.2 The following table lists the written and oral examinations for the Watchkeeping Engineer of a Motor-Driven Fishing Vessel Certificate, the qualifying service required before each may be attempted, and other requirements:

EXAMINATION	QUALIFYING SERVICE	OTHER REQUIREMENTS
Engineering Knowledge, General	as Part I	MED B1 MED B2
Engineering Knowledge, Motor	as Part I	PPS Level I MED B1 MED B2
Oral Examinations	-	Pass Engineering Knowledge, General and Motor

- 35.3 (1) An applicant shall be allowed three and a half hours to complete the paper for each subject.
- (2) The written examination for a certificate shall be an examination in which the applicant attempts to select, from a number of given alternatives, the correct answer to each question.
- (3) In the written examination there shall be at least:
- (a) 60 questions in the Engineering Knowledge, General, paper; and
  - (b) 60 questions in the Engineering Knowledge, Motor, paper.
- (4) The knowledge to be shown by an applicant for a Watchkeeping Engineer Certificate shall be sufficient to ensure the safe and efficient operation, surveillance and running maintenance of ship's machinery normally found in a motor driven fishing vessel of up to 2000 kilowatt propulsion power operating on any voyage.
- (5) The written examination is a multiple choice examination similar to that for a Fourth-Class Engineer Certificate, but with fewer questions.

## PART III - VALIDITY OF CERTIFICATE

- 35.4 (1) The Certificate of Watchkeeping Engineer of a Motor-Driven Fishing Vessel is valid as a second engineer or a watchkeeping engineer on a motor-driven fishing vessel of not more than 2000 kilowatt propulsion power on any voyage.

### **Mandatory Question**

- (2) Every applicant for a Watchkeeping Engineer of a Motor-Driven Fishing Vessel Certificate is required to prove to the satisfaction of the examiner that he/she is capable of checking, by a safe method, the water level in boilers that are being prepared to raise steam, under pressure, or in the process of being shut-down.



## PART IV- SYLLABUSES OF EXAMINATIONS

### 35.5 Engineering Knowledge, General

ITEM	COLUMN
1.	<p>Hand Tools</p> <p>Construction and safe use of the following hand tools:</p> <ul style="list-style-type: none"> <li>- hammers;</li> <li>- screwdrivers;</li> <li>- wrenches;</li> <li>- drift punches;</li> <li>- chisels;</li> <li>- hand saws and blades;</li> <li>- files;</li> <li>- hand shears and snips;</li> <li>- twist drill;</li> <li>- reamers and countersinks;</li> <li>- taps and dies;</li> <li>- layout tools; and</li> <li>- portable power tools, drills, grinders and chippers.</li> </ul>
2.	<p>Power Tools</p> <p>Construction and safe operation of the following power tools:</p> <ul style="list-style-type: none"> <li>- drill press;</li> <li>- fixed grinder;</li> <li>- metal turning lathe;</li> <li>- simple milling machine;</li> <li>- surface grinder;</li> <li>- cut-off saw;</li> <li>- valve grinder; and</li> <li>- welding equipment, gas and electric.</li> </ul>
3.	<p>Materials of Construction</p> <p>The use of materials and the ability to distinguish between the following common types:</p> <ul style="list-style-type: none"> <li>- steel;</li> <li>- cast iron;</li> <li>- copper;</li> <li>- zinc;</li> <li>- brass;</li> <li>- aluminium; and</li> <li>- plastics and resins.</li> </ul>
4.	<p>Physical Science</p> <p>Mathematics: fundamental arithmetical operations and percentages; measurement of length, mass, area, volume, and of pressure and temperature, in SI units (gauge readings).</p> <p>Mechanics: force, friction, energy, power; simple machines (lever, wheel and axle).</p> <p>Principles, construction and operation of the more usual instruments employed for the control and operation of ship's machinery: measuring temperature, pressure, mass, length and thickness; measuring voltage, current and resistance; testing for contamination of oil and water; testing combustion products.</p>
5.	<p>Fire Prevention, Detection and Extinguishing</p> <p>The chemistry of fire; recognition of fire hazards; identification, maintenance and use of portable fire extinguishers, fire hydrants, hoses and nozzles, fire doors and water-tight doors, ventilation closures, detection devices, alarms and alarm systems, fire pumps, breathing apparatus, sprinkler and smothering systems, and remote emergency stops for machinery</p>

6.	Lifesaving The use of life jackets, lifeboats, inflatable life rafts, and distress signals; emergency duties, stations and drills.
7.	Basic First Aid Treatment for sudden illness and accidents, including cuts, burns, fractures and asphyxia.
8.	Safe Working Practices Work procedures and precautions necessary to prevent hazards and maintain safe working conditions.
9.	Pollution Prevention Basic principles of pollution-prevention laws and regulations applicable to Canadian ships; pollution-prevention procedures, including bunkering operations, the discharge of bilge and ballast water, and the operation of oily-water separators.
10.	Pumps and Piping Construction, operation and maintenance of reciprocating pumps, centrifugal pumps, screw-displacement and gear pumps, injectors and ejectors; piping systems, including steam and feed-water system (auxiliary boilers), bilge and ballast systems, fuel and lubricating oil systems, valves, drains, traps and other fittings, the precautions to be observed in the operation of piping systems with regard to pipe expansion, water hammer, cross connections, venting and overflow, and routine pumping operations.
11.	Power Transmission Thrust, intermediate and propeller shafts; thrust, intermediate and propeller shaft bearings; alignment; couplings; gear types and systems.
12.	Steering Gear Common types of steering gear; emergency steering arrangements; starting, checks and operation.
13.	Underwater Fittings Rudders; fixed, variable and controllable-pitch propellers; stern glands; sea suction and discharge valves, mountings on the hull.
14.	Deck Machinery Windlass, capstan and winch.
15.	Fuels Types of fuel; storage, transfer, heating, cooling, filtration, and purification of fuels.
16.	Lubricants Types and application of lubricants; storage, transfer, heating, cooling, filtration, purification and disposal of lubricants.
17.	Electricity and Magnetism Fundamentals: direct and alternating current; definitions of current, pressure, resistance, and power; conductors and insulators; wet and dry cells; identification of simple circuits. Measurement and protective devices: voltmeter, ammeter, ohmmeter; ground lights, fuses and circuit breakers. Generators, alternators and motors: construction and operation of AC machines; basic maintenance procedures. Electric circuits: alarm circuits, navigation light circuits, main and emergency light and power circuits, and basic maintenance procedures.
18.	Hydraulic Systems Pumps, motors, piping, fittings and control devices; hydraulic fluids; packings and seals.
19.	Pneumatic Systems Compressors, air receivers, heat exchangers, filters, piping, fittings and control devices; precautions and safeguards necessary to prevent fires and explosions.
20.	Refrigeration Construction and operation of refrigeration systems; types, properties and hazards of refrigerants; systems, including quick freeze, coolers, direct and indirect.
21.	Auxiliary Boilers and Equipment Types and construction of boilers; operating and safety procedures; mountings and fittings; fuel system; feed system; and heat exchangers.


22.	Auxiliary Internal Combustion Engines Basic construction and operating procedures; cooling and lubrication systems; fuel system, including fuel pumps, injectors and carburettor; starting devices and ignition systems; recognition and correction of malfunctions; and precautions and safeguards necessary to prevent crankcase explosions.
23.	Watchkeeping Procedures Routine associated with taking over and accepting a watch; recording of significant gauge readings and understanding their importance; routine duties during a watch; recording of accidents to machinery and hull; duties when handing over a watch; recording and calculation of ship's fuel supply; routine starting and stopping of machinery; and emergency stopping of machinery.

### 35.6 Engineering Knowledge, Motor

ITEM	COLUMN
1.	Compression Ignition Engines General principles of construction and operation of two stroke and four stroke cycle engines; methods of supercharging, turbocharging and scavenging; methods of starting and reversing; power transmission systems, including couplings, clutches and gears; applications of the compression ignition engine in a single- and multiple engine installation and a diesel electric installation.
2.	Lubrication Systems Lubricants and lubricant additives; pumps, piping, heat exchangers and filters; and the construction, operation and maintenance of purifiers.
3.	Cooling Systems Air and liquid cooling; pumps, piping and heat exchangers; and temperature control and expansion arrangements.
4.	Fuel Fuels and fuel additives; heating, filtration and purification; piping; and injection pumps and injectors.
5.	Governors General principles, construction, operation, and maintenance of mechanical, hydraulic, electronic and pneumatic governors.
6.	Maintenance Overhaul, repair, adjustment and lay-up of engines, transmission and interrelated systems, including lubrication, cooling, fuel, compressed air and exhaust systems; and preventive maintenance, including running repairs and recognition and correction of malfunctions.

### 35.7 Oral Examination

ITEM	COLUMN
1.	The oral examination for a Watchkeeping Engineer of a Motor-Driven Fishing Vessel will be based on practical knowledge, safe working practices and Oil Pollution Prevention, and may include references to the applicant's answers in the written examination.

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## **CHAPTER 36 - RESTRICTED ENGINEER, MOTOR SHIP**

### **PART I - GENERAL REQUIREMENTS OF APPLICANTS**


- 36.1 (1) Every applicant for a certificate as a Restricted Engineer, Motor Ship, shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for Small Vessel Safety course (MED-A2) of the Marine Emergency Duties Course, set out in TP 4957, from a school listed in TP 10655; and
  - (c) pass an oral examination.
- (2) The applicant must be the engineer designate on a motor-propelled passenger ship of less than 750 kW propulsion power that requires an engineer.
- (3) There is no service qualification required by an applicant for a certificate as Restricted Engineer.

### **PART II - EXAMINATIONS**

- 36.2 For a Restricted Engineer Certificate there shall be an oral examination in engineering knowledge, sufficient to demonstrate to the examiner that the applicant has the knowledge to operate with safety the machinery and equipment of the ship for which the certificate is requested.

### **PART III - VALIDITY OF CERTIFICATE**

- 36.3 The certificate of Restricted Engineer is valid as engineer on a specific passenger vessel of not more than 750 kW propulsion power making Home-Trade class III, IV, Inland or Minor Water voyages.

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#### PART IV - SYLLABUS OF EXAMINATION

##### 36.4 Oral Examination

ITEM	COLUMN
1.	General principles of operation and maintenance of the machinery fitted in the ship.
2.	Elementary principles of gasoline or diesel engine ignition systems where gasoline or diesel engines are fitted.
3.	Operation of wet batteries.
4.	Charging and operation of fire extinguishers; use of fire hoses and nozzles.
5.	General precautions to be taken against the risk of fire.
6.	General principles of operation of heating boilers, where fitted.
7.	The dangers associated with the use of gasoline or diesel fuel in ships.
8.	Emergency stations, mustering passengers, alarms, procedures.
9.	Operation of life saving appliance, including methods and location of stowage.
10.	Pollution prevention and protection of the environment.

## CHAPTER 37 - CHIEF ENGINEER, STEAMSHIP, AND CHIEF ENGINEER, MOTOR SHIP

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

#### Steamship

- 37.1 Every applicant for a certificate as Chief Engineer, Steamship, shall:
- (a) hold a certificate as Third-Class Engineer, Steamship;
  - (b) obtain a certificate of completion for the Senior Officer (D) of the Marine Emergency Duties Courses, set out in TP 4957, at a school listed in TP 10655;
  - (c) have served 24 months as an engineer or engineer officer on watch in the engine room of a steamship of not less than 750 kW propulsion power; and
  - (d) hold a certificate in Propulsion Plant Simulator Course Level II.


#### Motor Ship

- 37.2 Every applicant for a certificate as Chief Engineer, Motor Ship, shall:
- (a) hold a certificate as Third-Class Engineer, Motor Ship;
  - (b) obtain a certificate of completion for the Senior Officer (D) of the Marine Emergency Duties Course, set out in TP 4957, at a school listed in TP 10655;
  - (c) have served 24 months as an engineer or engineer officer on watch in the engine room of a motor ship of not less than 750 kW propulsion power; and
  - (d) hold a certificate in Propulsion Plant Simulator Course Level II.

### PART II - EXAMINATIONS

- 37.3 (1) No further examination is required where the applicant passed the examinations of Thermodynamics and Electrotechnology for the certificate issued after January 3, 1994.
- (2) For the applicant holding a Third-Class Certificate, where the examinations of Thermodynamics and Electrotechnology were not passed for the certificate issued before January 3, 1994, examination in the following subjects is required:


EXAMINATION	QUALIFICATION SERVICE	OTHER REQUIREMENTS
Thermodynamics Electrotechnology	(24 months)	MED C + D Third Class (>750 kW) Certificate issued before January 3, 1994.

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**PART III - VALIDITY OF CERTIFICATE**

37.4 A Chief Engineer Certificate is valid as chief engineer on:

Vessel	Unlimited Voyaging
Passenger	Not applicable
Non-Passenger	Not over 2000 kW power
Fishing	Not over 2000 kW power

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## **CHAPTER 38 - SECOND ENGINEER, STEAMSHIP, AND SECOND ENGINEER, MOTOR SHIP**

### **PART I - GENERAL REQUIREMENTS OF APPLICANTS**

#### **Steamship**

- 38.1 Every applicant for a certificate as Second Engineer, Steamship, shall:
- (a) hold a certificate as Fourth-Class Engineer, Steamship; and
  - (b) have served as engineer, engineer officer, engine-room rating or engine-room assistant for a period of at least 12 months on watch in the engine room of a steam ship of not less than 750 kW propulsion power.

#### **Motor Ship**

- 38.2 Every applicant for a certificate as Second Engineer, Motor Ship, shall:
- (a) hold a certificate as Fourth-Class Engineer, Motor Ship; and
  - (b) have served as engineer, engineer officer, engine-room rating or engine-room assistant for a period of at least 12 months on watch in the engine room of a motor ship of not less than 750 kW propulsion power.

### **PART II - EXAMINATIONS**

- 38.3 No further examinations are required.

### **PART III - VALIDITY OF CERTIFICATE**

- 38.4 A certificate as a Fourth-Class Engineer with a Second Engineer Certificate is valid for unrestricted watchkeeping and as second engineer officer of a non-passenger vessel not exceeding 2000 kW propulsion power making an unrestricted voyage.



## CHAPTER 39 - ELECTRICIAN

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 39.1 (1) Every applicant for an Electrician Certificate shall:
- (a) hold a certificate as Fourth-Class Engineer, Steamship or Motor Ship;
  - (b) have a minimum of six months sea service as an engineer officer or electrician on a ship having a rated generator capacity of not less the 300 kW;
  - (c) pass a written examination in Second Class Electrotechnology; and
  - (d) pass an oral examination.

### PART II - EXAMINATIONS

- 39.2 (1) An applicant is not entitled to attempt the examination referred to in paragraphs 39.1 (1)(c) and (d) until the applicant has completed the service requirements set out in paragraph 39.1 (1)(b).
- (2) Answers to questions in the examination referred to in paragraph 39.1 (1)(c) shall consist of mathematical computations, sketches, and written descriptions.
  - (3) A successful applicant for the Electrician Certificate will also receive an exemption from the Electrotechnology examinations for a Second-Class Engineer Certificate.
- 39.3 (1) The following table lists the written and oral-examinations for the Electrician Certificate, the qualifying service required before each may be attempted, and other requirements.

EXAMINATIONS	QUALIFYING SERVICE	OTHER REQUIREMENTS
Electrotechnology (2nd Class)	6 months > 300 kW generated power	Fourth-Class Steam, Motor
Oral	-	Pass Electrotechnology

- (2) An applicant shall be allowed three and a half hours to complete the paper for each subject referred to in subsection (1).
- (3) The written examination for an Electrician Certificate shall consist of nine questions, of which six shall be attempted. If more than six questions are answered, all the answers shall be marked and only the six questions awarded the lowest marks taken to determine the overall result.
- (4) The knowledge to be shown by an applicant for an Electrician Certificate shall be sufficient to ensure the safe and efficient operation, surveillance and running maintenance of ship's machinery.

### PART III - VALIDITY OF CERTIFICATE

- 39.4 The Electrician Certificate is valid as an electrician on a vessel making any voyage.

## PART IV - SYLLABUSES OF EXAMINATIONS


### 39.5 Electrotechnology

Companion to Section 31.12

ITEM	COLUMN
1.	The Electric Circuit Units, ampere, ohm, volt; difference between electromotive force and potential difference; Ohm's law; Kirchoff's laws; simple series and parallel circuits involving EMF current and resistances; non-linear resistors in parallel with constant value resistors; power and energy; specific resistance; temperature coefficient of resistance; conductor resistance, effect of length, area, material and temperature; DC 2 wire distribution system; types of insulation; Wheatstone network bridge, slide wire bridge; applications to steering gears, resistance pyrometers, strain gauges, etc.
2.	Electrolytic Action and Secondary Cells Theory of electrolytic dissociation applied to common solutions; uses of electrolysis; secondary cells (acid or alkaline); construction and principles; maintenance, charging; watt- and ampere-hour efficiencies.
3.	Electromagnetism Electromagnetic induction, simple magnetic circuit; simple magnetic theory; magnetic field; lines of force.; field strength and intensity; magnetic fields due to current in straight conductors, loops, coils and solenoids; relative directions of current and field; Faraday's and Lenz's laws; magnitude and direction of induced EMF produced on a current carrying conductor; flux density; effect of iron; magneto motive-force (m.m.f.); permeability; reluctance; simple magnetic circuit, typical B/H and u/B curves.
4.	Electronics Qualitative treatment of atomic structure and bonding; semi-conductors; junction diodes, junction transistors and their operating characteristics; simple transistor circuits; conduction in gases, insulators, semi-conductors and conductors; photo-electric effect.
5.	Alternating Current Theory Simple continuous periodic waves, frequency, amplitude, instantaneous, maximum r.m.s. and average values, form factor; phasor representation of AC quantities; phase difference; the inductor; inductance and its effect on the circuit; the capacitor; capacitance and its effect on the circuit; simple series and parallel circuits; relationship between resistance, reactance and impedance; simple treatment of power factor; power in single-phase AC circuit.
6.	Instruments Qualitative treatment of the principles and functions of AC and DC indicating instruments and relays; uses of shunts and series resistances to increase the range; rectifiers and transducers.
7.	Power Distribution Systems for AC and DC shipboard installations; protective devices such as fuses, circuit breakers, earth lamps; cable material and installation; connection of shore supply; operation, testing by standard methods and maintenance of additional and control equipment to be observed during testing, and evaluation of test results.
8.	DC Machine The principles, constructional details and protection of DC series, shunt and compound-wound motors and generators; self-excitation, EMF and load voltage equations; load characteristics; methods of voltage control, paralleling procedures and load sharing for generators; need for and types of starter, speed and torque equations, speed control of DC motors.
9.	AC Machines Simple explanation of the principles, constructional details and protection of alternators, squirrel-cage induction motors and single-phase transformers; parallel running and synchronising theory.
10.	Propulsion Principles and operation of electric propulsion, construction details, control of excitation, killer circuits, connection of armatures, monitoring and control of field current, basic circuitry.

#### Oral Examination

**39.6** The oral examination will be based on practical knowledge, with particular reference to the applicant's answers in the written examination, and will include questions on safe working practices.

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## CHAPTER 40 - CONTINUED PROFICIENCY FOR ENGINEER OFFICER

### PART I - CERTIFICATES


40.1 Every applicant for a continued proficiency certificate as Engineer shall hold a certificate as:

- (i) First-Class Engineer, Steamship;
- (ii) First-Class Engineer, Motor Ship;
- (iii) Maintenance Supervisor, MODU/Surface;
- (iv) Second-Class Engineer, Steamship;
- (v) Second-Class Engineer, Motor Ship;
- (vi) Maintenance Supervisor, MODU/Self-Elevating;
- (vii) Third-Class Engineer, Steamship;
- (viii) Third-Class Engineer, Motor Ship;
- (ix) Fourth-Class Engineer, Steamship;
- (x) Fourth-Class Engineer, Motor Ship;
- (xi) Chief Engineer, Motor-Driven Fishing Vessel;
- (xii) Watchkeeping Engineer, Motor-Driven Fishing Vessel; or
- (xiii) set out in the Marine Engineer Examination Regulations, 1961.

### PART II - GENERAL REQUIREMENTS OF APPLICANTS

40.2 Every applicant for a continued proficiency certificate as Engineer, shall:

- (a) obtain a medical certificate prescribed by the Crewing Regulations;
- (b) obtain a certificate of completion for the Marine Emergency Duties Course, set out in TP 4957, from a school listed in TP 10655, as follows:
  - (i) for a certificate as Chief Engineer, Motor-Driven Fishing Vessel, or Watchkeeping Engineer, Motor-Driven Fishing Vessel, Survival Craft (B1) and Marine Fire Fighting (B2);
  - (ii) for a certificate as Fourth-Class Engineer, Steamship, or Fourth-Class Engineer, Motor Ship, Survival Craft (B1), Marine Fire Fighting (B2) and Officer Certification (C);
  - (iii) for certificates as First-Class Engineer, Steamship; First-Class Engineer, Motor Ship; Maintenance Supervisor, MODU/Surface; Second-Class Engineer, Steamship; Second-Class Engineer, Motor Ship; Maintenance Supervisor, MODU/Self-Elevating; Third-Class Engineer, Steamship; Third-Class Engineer, Motor Ship; Officer Certification (C) and Senior Officer (D);
- (c) obtain a certificate of completion for a Simulated Engine Room and Control Room Course, set out in TP 10935, as follows:
  - (A) for certificates as First-Class Engineer, Steamship; First-Class Engineer, Motor Ship; Maintenance Supervisor, MODU/Surface; Second-Class Engineer, Steamship; Second-Class Engineer, Motor Ship; Chief Engineer Third-Class Steamship or Motor Ship; Maintenance Supervisor, MODU/Self-Elevating; Level II and

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- (B) for certificates as Third-Class Engineer, Steamship; Third-Class Engineer Motor Ship; Fourth-Class Engineer, Steamship; Fourth-Class Engineer, Motor Ship; Chief Engineer, Motor-Driven Fishing Vessel; or Second Watchkeeping Engineer, Motor-Driven Fishing Vessel; Level I; and
- (d) meet the following qualifications within the five-year period preceding the date of issue of this certificate:
  - (i) subject to clause (C), complete
    - (A) 12 months service as an engineer officer; or
    - (B) 24 months service performing functions in marine-related positions as follows:
      - (aa) marine engineer superintendent or operating engineer manager in the employ of a ship owner or ship agent;
      - (bb) marine surveyor engaged in the duties related to the survey inspection of ships, their equipment or cargoes;
      - (cc) instructors and training officers in marine-engineering subjects at a school listed in TP 10655;
      - (dd) examiner of applicants for certificates of competency or qualifications;
      - (ee) casualty investigators engaged in the duties related to the investigation of marine casualties; or
    - (C) within the 12-month period preceding the date of issue of this certificate:
      - (aa) 3 months service as an engineer officer;
      - (bb) 3 months service in a supernumerary capacity carrying out the duties of an engineer officer if the continued proficiency certificate has expired; or
  - (ii) obtain a certificate of completion for a course from a school listed in TP 10655 in:
    - (aa) Naval Architecture;
    - (bb) Automation, Control and Instrumentation;
    - (cc) Marine Power Systems; or
  - (iii) pass a written examination in general engineering knowledge at the appropriate level; or
  - (iv) pass an oral examination.


**THE EXAMINATION AND CERTIFICATION  
OF  
SEAFARERS  
SECTION FOUR OF FIVE  
REVISION 04**

<p><b>Responsible Authority</b></p> <p>The Director, Marine Personnel Standards and Pilotage is responsible for this document, including any changes, corrections, or updates.</p>	<p><b>Approval</b></p> <hr/> <p style="text-align: center;">Donald Roussel Director, Marine Personnel Standards and Pilotage Marine Safety</p> <p><b>Date signed:</b></p>
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43	GENERAL REQUIREMENTS OF APPLICANTS 43.1 (3)	1 April, 1999	01	
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45	Sec. 45.1(d)	September 24, 2002	02	
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46	Sec. 46.2 (b)	September 24, 2002	02	
46	Sec. 46.2 (d)	September 24, 2002	02	
46	Sec. 46.3 (b)	September 24, 2002	02	
46	Sec. 46.4	September 24, 2002	02	
46	Sec. 46.7	September 24, 2002	02	
46	Sec. 46.8	September 24, 2002	02	
48	Ch. 48	December 10, 2002	03	
49	Ch. 49	December 10, 2002	03	
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**Important :**


**This publication is subject to periodical reviews and it is updated accordingly /  
Cette publication est sujette à des revues périodiques et elle est mise-à-jour en conséquence**

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## INTRODUCTION

This publication was prepared with input from various federal, provincial and industry organizations including:

- Canadian Marine Advisory Council
- Canadian Marine Training Institutions
- Canadian Ship Owners Association
- Canadian Petroleum Association
- Canadian Association of Oil Well Drilling Contractors
- Canadian Offshore Vessel Operators Association
- Canadian Institute of Marine Engineers
- Company of Master Mariners of Canada
- Canada-Newfoundland Offshore Petroleum Board
- Canada-Nova Scotia Offshore Petroleum Board
- Government of Newfoundland -Department of Mines and Energy
- Government of Nova Scotia -Department of Mines and Energy
- Government of Canada -Department of Energy, Mines and Resources
- National Energy Board


This publication is intended as a guide for the certification of officers and crews of ships and marine offshore drilling units.

**The contents of this publication reflect the requirements of the Marine Certification and Crewing Regulations. In case of conflict, the regulations take precedence.**

This publication is subject to ongoing review and amendment as a result of consultation with the Canadian Marine Advisory Council.

For ease of reference and to reduce printing costs this publication has been divided into five sections pertaining to specific areas of specialization as follows:

- Section 1: General Information
- Section 2: Deck Certificates
- Section 3: Engineering Certificates
- Section 4: Rating Certificates
- Section 5: Mobile Offshore Unit (MODU) Certificates.

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## BIBLIOGRAPHY

- TP 4957: Marine Emergency Duties (MED) training program.
- TP 4958: Simulated Electronic Navigation (SEN) courses.
- TP 5562: Co-operative Cadet Training Program, Navigation.
- TP 8060: Training courses for Fishing Service Certificate, Master of Fishing Vessels 60 to 100 Tons.
- TP 8129: Tanker Safety courses.
- TP 8911: Three-year Marine Engineer course.
- TP 10655: Transport Canada-approved marine training courses.
- TP 10933: Engine-Room Rating training courses.
- TP 10934: Course for Certificate of Service, Master of Vessels of Not More Than 1600 Tons.
- TP 10935: Simulated Engine Room and Control Room course.
- TP 10936: Bridge Watchman training courses.
- TP 10937: Mobile Offshore Drilling Unit courses.
- TP 11130: Marine Cooking training course.
- TP 13008: Marine First Aid and Marine Medical Care training program.
- TP 13024: Ro-Ro Passenger Ship Personnel training standards.
- TP 13117: Bridge Resource Management.
- TP 13720: Practical Skills for Marine Engineers Training Course.
- TP 13721: Training Record Book Requirements for Watchkeeping Engineer Candidates.




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## CHAPTER 41 - ABLE SEAMAN

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 41.1 (1) Every applicant for a certificate as Able Seaman shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain certificates of completion from a school listed in TP 10655 for the following Marine Emergency Duties Courses, set out in TP 4957:
    - (i) Basic Safety (A1);
    - (ii) Survival Craft (B1); and
    - (iii) Marine Fire Fighting (B2)
  - (c) obtain a First Aid Basic (Emergency) Certificate, as set out in TP 13008; and
  - (d) pass an examination.
- (2) The service required by an applicant for a certificate as Able Seaman is 36 months on board a ship in a deck-related capacity.

### PART II - EXAMINATION

- 41.2 The applicant shall undergo a written, oral and practical examination in general seamanship.

### PART III - VALIDITY OF CERTIFICATE


- 41.3 The certificate for Able Seaman is valid as an able seaman on any vessel making any voyage and also has validity as an additional person forming part of the deck watch, provided he/she fully meets the eyesight requirements prescribed by the Crewing Regulations.

## PART IV - SYLLABUS OF EXAMINATION


### 41.4 General Seamanship

ITEM	COLUMN
1.	<p>Navigation</p> <p>Identification of fog signals and vessel types under the Collision Regulations; identification of navigational aids and their reporting in terms of degrees on the bow; compass markings in the 360-degree notation and cardinal points of the compass; steering orders and responses; the effect of magnetic material on the magnetic compass; controls and operation of the automatic helmsman; effect of wind, draft and trim on steering.</p>
2.	<p>Ground Tackle</p> <p>Anchors and associated equipment, including: names of parts of stocked and stockless anchors; chain cable and shackles; chain cable markings and reporting; cable stowage; fittings between cable locker and hawse pipe; common terms used in anchor work; terms associated with lead of cable; anchoring in an emergency; heaving up and securing cable; terms pertaining to a vessel at anchor; anchoring in shallow or deep water.</p>
3.	<p>Mooring</p> <p>Use, care and storage of mooring lines, including: types of lines used for mooring and their characteristics; naming of various mooring lines and orders; making fast on shore bollards being used by another ship; types of fairleads and mooring leads, their construction, naming and use; tending of mooring lines on rise and fall of tide and in locks; use of rat-guards, fenders, heaving lines, rope and chain stoppers; correct stowage of mooring lines and gear for sea; use of moorings on the bight and doubling up; use of mooring wire rope reels; use of, handling and securing of insurance wire; use of, handling and securing of towing wires.</p>
4.	<p>Deck Machinery</p> <p>Use and care in use of: electrical, hydraulic and steam winches, ordinary and self-tensioning; windlasses and capstans, including brakes; derrick and topping lift winches; electrical and hydraulic deck cranes; self-unloading machinery; hatch opening systems; engine telegraphs; main and emergency steering gears; valves and drain cocks.</p>
5.	<p>Cargo</p> <p>Preparation of cargo compartments for bulk, general or liquid bulk cargoes, namely: cleaning of holds, tanks, bilges, bilge drain wells or strum boxes; bilge pumping arrangements; dunnaging of holds and protection of bilges; gas freeing, and cleaning tanks and tank lines; valve opening and closing procedure; testing lines, pumps and valves; familiarity with commonly used terms.</p>
6.	<p>Safety Working Practices</p> <p>Safe practices in working cargo, namely: keeping decks and coamings uncluttered; following proper methods of stripping hatches and hatch-closing appliances; use of guard rails; battening down and securing cargo by shores, tomes or lashings; entering or working in tanks or confined spaces; use of warning signs, notices and signals; restricting the use of matches, smoking, open lights, portable lights and electric cables and ships W/T or R/T installations when working or transferring inflammable liquids; fitting bonding cables, towing wires, spark arresters, scupper plugs, drip trays and hose connections; opening cargo tanks, Butterworth and ullage hatches, and the use of flammable traps; use of non-sparking tools; readiness of breathing apparatus.</p>

7.	<p>Staging</p> <p>The rigging of stages and boatswain's chair, their uses and safety practices followed in their use.</p>
8.	<p>Ladders and Gangways</p> <p>Preparing and rigging pilot ladders and gangways, including: stowing arrangements; arrangement when bunkering and storing; tending on rise and fall of tide; safety nets, their rigging and uses.</p>
9.	<p>Joining Ship</p> <p>Responsibilities of a seaman on joining a ship, with emphasis on: familiarization with general layout of the ship; location details and working of all deck machinery; familiarization with cargo gear, closing appliances; sounding pipes, air pipes and scuppers; familiarization with the scheme for identifying lines and valves; location, details of bunkering connection and procedure; familiarization with the ventilation system; location of bilge lines, drain wells and non-return valves; general arrangement of rudders and propellers.</p>
10.	<p>Terminology</p> <p>Shipboard terminology, including: names and functions of various parts of a ship; arrangement and responsibilities of different departments at sea, at anchor and in port; general authorities, responsibilities and duties of the various members of the crew.</p>
11.	<p>Flags</p> <p>Use of national and courtesy ensigns, house flags, single-letter flag signals, flags at half and full mast, dipping of ensign to men of war.</p>
12.	<p>Fibre Ropes</p> <p>Make up of natural and synthetic fibre ropes, with reference to: fibre used, yarns, number of strands, lay and core, and their measurement.</p>
13.	<p>Knots and Splices</p> <p>Basic knots and their uses, gripping, splicing, seizing, whipping, raking, worming and parcelling.</p>
14.	<p>Wire Ropes</p> <p>Make up of wire ropes, including: crucible, flexible and extra-flexible wires; the heart and its function; coiling and uncoiling a wire rope; the preservation, treatment and measurement of standing and running rigging; splicing and the use of marline spike, vice and seizing.</p>
15.	<p>Strength of Ropes</p> <p>Strength of ropes and wires, namely: breaking strength, safe working load and proof load, without any calculations; elasticity and relative strengths of different types of ropes and wires.</p>
16.	<p>Blocks and Tackle</p> <p>Construction, use and care of blocks and purchases, including: names of parts; understanding of when they are used to advantage or disadvantage; types of blocks and purchases; reeving of purchases; friction and power gained, without any calculations.</p>
17.	<p>Standing and Running Rigging</p> <p>Standing and running rigging and their uses, including: names and construction; main parts of a derrick and attachments; main parts of a mast and attachments; rigging of lifelines and catwalks.</p>
18.	<p>Heavy Lift Tackle</p> <p>Rigging booms for single and union work and heavy lifts, including: positioning of guys and preventers; a general appreciation of the stresses on various parts of a boom system during working; topping and lowering procedure, and correct use of cleats, snatch and lead blocks.</p>

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19.	<b>Deck Cranes</b> Use of deck cranes; safe working practices; lubrication and safe operation; hand signals and communications.
20.	<b>Cargo Care</b> Care of cargo with relation to cargo sweat, ship sweat, use of ventilation, and reading of cargo thermometer and hygrometer.
21.	<b>Working Barges and Scows</b> Securing barges and scows for towing alongside, astern or pushing ahead, with precaution against chafing and girding.
22.	<b>Ship's Markings</b> Ship's markings and reading and recording measurements.

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## CHAPTER 42 - BRIDGE WATCHMAN

### PART I - GENERAL REQUIREMENTS OF APPLICANTS


- 42.1 (1) Every applicant for a certificate as Bridge Watchman shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
    - (i) Basic Safety (A1);
    - (ii) Survival Craft (B1); and
    - (iii) Marine Fire Fighting (B2);
  - (c) obtain a First Aid Basic (Emergency) Certificate, set out in TP 13008; and
  - (d) pass an examination in General Seamanship.
- (2) An applicant must
- (a) obtain
    - (i) a certificate of completion for a course in Bridge Watchman, set out in TP 10936, from a school listed in TP 10655; and
    - (ii) a minimum of two months sea service in navigational watchkeeping duties, including a minimum of eight hours of steering the ship, substantiated by testimonial; or
  - (b) complete a minimum of six months service on board ship in navigational watchkeeping duties, including a minimum of eight hours of steering the ship, substantiated by testimonial (Appendix G).

### PART II - EXAMINATION

- 42.2 Applicants shall undergo a written examination.

### PART III - VALIDITY OF CERTIFICATE

- 42.3 The certificate for a Bridge Watchman is valid as an additional person forming part of the deck watch, as required by the Crewing Regulations.


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## PART IV - SYLLABUS OF EXAMINATION

### 42.4 Written examination

ITEM	COLUMN
1.	Steering Steering duties, including: difference between a magnetic and gyro compass; steering and complying with helm orders (a minimum of eight hours training to include altering course and steadying of ship's head by land marks and compass); change-over from automatic pilot to hand steering and vice versa, and hand, telemotor and electrical controls for steering gears; proper procedure when relieving or being relieved at the wheel.
2.	Lookout Keeping a lookout, with emphasis on: reporting in degrees or points sightings and sound signals; recognition of ships' navigation lights and sound signals, fixed and floating aides to navigation, and distress signals (both sight and sound).
3.	Detached Duties Detached duties, including: operation of vessel's internal communications systems; general alarm and other signals used on board ship; pyrotechnic distress signals; understanding orders and being understood by the OOW in matters relevant to watchkeeping duties; maintaining a deck logbook and engine movement book, and their purpose; elementary understanding of signalling and flag work.
4.	General Knowledge General seamanship knowledge, including: shipboard terms and ability to express oneself using nautical terminology; understanding the names and functions of various parts of a ship (construction and equipment); recognition and names of various types of vessels; recognition and names of various types of rope; making knots, hitches, bends and whippings; different make-up of wire rope and an appreciation of its uses; use of bulldog clips to join wire; types of chains, shackles and slips; types of windlasses; joining shackles and markings of anchor cable; signals required in anchor work (bell and anchor ball or light); markings on the hand lead and ability to cast correctly; internal sounding of holds, tanks and bilges; ability to read draft markings.
5.	Seaman's Obligations Seamen's responsibilities and the necessity for discipline on board ship.
6.	Safe Working Practices Potentially hazardous working conditions on board; recognition of worn out or dangerous equipment; conditions that would lead to injury or loss of life; safe working procedures.



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## CHAPTER 43 - ENGINE-ROOM ASSISTANT

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 43.1 (1) Every applicant for a certificate as Engine-Room Assistant shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
    - (i) Basic Safety (A1);
    - (ii) Survival Craft (B1); and
    - (iii) Marine Fire Fighting (B2);
  - (c) obtain a First Aid Basic (Emergency) Certificate, set out in TP 13008; and
  - (d) pass an oral examination.
- (2) The service required by an applicant for examination for an Engine-Room Assistant Certificate is 12 months, service as follows:
- (a) six months service, with:
    - (i) a minimum of three months as an engine-room watch rating or engine-room assistant in the engine room of a steamship or motor ship, or in the boiler room of a steamship; and
    - (ii) the remaining time made up of any combination of the service, subject to any time limitations set out in Chapter 33, section 33.1(2); and
  - (b) by acquiring:
    - (i) six months service as an engine-room watch rating or an engineer assistant on watch on a steamship of not less than 225 kW propulsion power; or
    - (ii) six months in the successful completion of a course in practical skills for marine engineers, set out in TP 8911, at a school listed in TP 10655.
- (3) Not in use.

## PART II - EXAMINATION

- 43.2 (1) For an Engine-Room Assistant Certificate, there shall be an oral examination to determine that the applicant possesses sufficient knowledge and skills to perform, with safety, the duties of an engine-room assistant, including those duties related to the safe operation and running maintenance of machinery.
- (2) The examination referred to in section 43.1(1)(d) shall consist of 10 questions on any of the subjects referred to under the "Column" heading in section 43.4..

## PART III - VALIDITY OF CERTIFICATE


- 43.3 The certificate as an Engine-Room Assistant is valid as assistant to the engineer on watch as required by the Crewing Regulations.

## PART IV - SYLLABUS OF EXAMINATION

### 43.4 Oral Examination

ITEM	COLUMN
1.	Personal Safety Firefighting, basic first aid, personal survival techniques, health hazards and personal safety.
2.	Communications Understanding orders and being understood in matters relevant to the applicant's duties.
3.	Watchkeeping Engine-room watchkeeping procedures, methods of recording events, and carrying out a watch routine.
4.	Safe Working Practices Safe working practices as related to engine-room operations.
5.	Terminology Terms used in machinery spaces and the names of machinery and equipment relative to the applicant's duties.
6.	Environmental Protection Basic environmental protection procedures.
7.	Communication Systems The use of appropriate internal communication systems.
8.	Escape Routes Typical escape routes from machinery spaces.

9.	Alarms Engine-room alarm systems and distinguishing between various alarms, with special reference to fire extinguishing gas alarms.
10.	Location of Fire Equipment Typical location and use of firefighting equipment in the machinery spaces.
11.	External Stops Typical location and operation of external emergency machinery stops and fuel valve extensions.
12.	General The basic functions, operations and running maintenance of main propulsion and auxiliary machinery.
13.	Instruments Reading indicating instruments related to watchkeeping duties and understanding the significance of the readings.
14.	Tools Use of hand tools and portable power tools and the safety precautions to be observed in their use.
15.	Pumping Systems The function, operation and maintenance of the various types of pumping systems.
16.	Environmental Protection Equipment The operation and maintenance of environmental protection equipment.
17.	Supervision Understanding and being understood by the engineer in charge of the watch.
18.	Boilers Safe operation and emergency stopping of boilers; maintaining correct water levels and steam pressures.

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## CHAPTER 44 - ENGINE-ROOM RATING

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 44.1 (1) Every applicant for a certificate as Engine-Room Rating shall:
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
    - (i) Basic Safety (A1);
    - (ii) Survival Craft (B1); and
    - (iii) Marine Fire Fighting (B2);
  - (c) obtain a First Aid Basic (Emergency) Certificate, set out in TP 13008; and
  - (d) pass an oral examination.
- (2) The service required by an applicant for an Engine-Room Rating Certificate is six months as follows:
- (a) (i) not less than three months service as an engine-room rating or engine-room assistant in the engine room of a steamship or motor ship, or in the boiler room of a steamship; and
  - (ii) the remaining time composed of any combination of service, subject to time limitations, if any, set out in Chapter 33, section 33.1(2)(c); or
  - (b) (i) a certificate of successful completion of a course in Engine-Room Rating duties at a school listed in TP 10655; and
  - (ii) not less than three months service as an engine-room rating or engine-room assistant.
- (3) Not in use.

### PART II - EXAMINATION

- 44.2 (1) For an Engine-Room Rating Certificate, there shall be an oral examination to determine that the applicant possesses sufficient knowledge and skill to perform, with safety, the duties of an engine-room rating.
- (2) The examination referred to in Section 44.1(1)(d) shall consist of 10 questions on any of the subjects referred to under the "Column" heading in section 44.4.

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### PART III - VALIDITY OF CERTIFICATE

- 44.3 The certificate as an Engine-Room Rating is valid as a rating forming part of an engine room watch, as required by the Crewing Regulations.

### PART IV - SYLLABUS OF EXAMINATION

#### 44.4 Oral Examination

ITEM	COLUMN
1.	<p>General</p> <p>The particular needs of the engine room in which the applicant intends to serve.</p>
2.	<p>Knowledge and Skills</p> <p>Including:</p> <ul style="list-style-type: none"> <li>- fire-fighting, basic first aid, personal survival techniques, health hazards and personal safety;</li> <li>- the ability to understand orders and be understood in matters relevant to the applicant's duties;</li> <li>- engine-room watchkeeping procedures, methods of recording events and ability to carry out a watch routine appropriate to his/her duties;</li> <li>- safe working practices, as related to engine-room operations;</li> <li>- the terms used in machinery spaces and the names of machinery and equipment relative to his/her duties;</li> <li>- basic environmental protection procedures;</li> <li>- the use of appropriate internal communication systems;</li> <li>- typical escape routes from machinery spaces;</li> <li>- engine-room alarm systems and the ability to distinguish between various alarms, with special reference to fire extinguishing gas alarms; and</li> <li>- typical location and use of firefighting equipment in machinery spaces, and typical location and operation of external emergency machinery stops and fuel valve extensions.</li> </ul>
3.	<p>Boilers</p> <p>Safe operation and emergency stopping of boilers, and maintaining the correct water levels and steam pressures.</p>

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## CHAPTER 45 - SHIP'S COOK

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 45.1 Every applicant for a certificate as Ship's Cook shall:
- (a) complete one month service on board a ship as ship's cook or cook's helper;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a certificate of completion for each of the following Marine Emergency Duties Courses, set out in TP 4957, from a school listed in TP 10655:
    - (i) Basic Safety (A1);
    - (ii) Survival Craft (B1); and
    - (iii) Marine Fire Fighting (B2);
  - (d) obtain a Marine First Aid Advanced Certificate, set out in TP 13008; and
  - (e) subject to section 45.3, pass an examination.

### PART II - EXAMINATIONS

- 45.2 The applicant shall undergo a written and practical examination consisting of:
- (a) true and false questions;
  - (b) preparing a day's menu for a specified number of people from a list of supplies; and
  - (c) preparing lunch or dinner for a specified number of people in a given time.
- 45.3 Applicants will be exempted from the requirements of the practical examination referred to in section 45.2 (b) and (c) if they produce a diploma from an approved school listed in TP 10065.

### PART III - VALIDITY OF CERTIFICATE

- 45.4 The certificate as Ship's Cook is valid as a ship's cook on vessels making foreign or home-trade voyages extending south of 36 degrees north latitude, as required by the Crewing Regulations.
- 45.5 Not used.


## PART IV - SYLLABUS OF EXAMINATION

### 45.6 Oral Examination

ITEM	COLUMN
1.	Storage and sanitation of shipboard foods.
2.	Use and care of equipment.
3.	Methods of retaining nutritive value.
4.	Cooling temperatures and cooking time.
5.	Method of serving.
6.	Size of serving.
7.	Seasoning.
8.	Garnishes.
9.	Use of leftovers.
10.	Personal hygiene.
11.	Food-borne diseases.
12.	Dishwashing procedures.
13.	Galley sanitation.
14.	Galley safety rules.
15.	Menu planning.
16.	Galley work schedule.
17.	Food service.
18.	Soups and sauces (hot and cold).
19.	Meat and Poultry Butchering; cookery (including carving), gravies, and stuffings.
20.	Seafood Preparation and Cookery Batters and breading, and use of leftovers.
21.	Vegetables Preparation for cooking; various methods of cooking, and simple sauces.

22.	Salads Salad dressings, sandwiches, relishes, cocktails, and hors d'oeuvres.
23.	Breakfasts Eggs, breakfast cereals, juices, toast, beverages (hot and cold), care of dairy products.
24.	Supper Dishes Italian pastas, cheese dishes, casserole dishes, etc.
25.	Breads Breads, rolls and quick breads.
26.	Cakes, cookies, doughnuts, and icings.
27.	Pastry Crusts and shells, fillings, and meringues.
28.	Desserts Custards, gelatine desserts, puddings (hot and cold), and sweet sauces.
29.	Fruits Cooking of fruits.
30.	Dish sanitation.



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## **CHAPTER 46 - PROFICIENCY IN SURVIVAL CRAFT AND RESTRICTED PROFICIENCY IN SURVIVAL CRAFT**

### **PART I - GENERAL REQUIREMENTS OF APPLICANTS**

- 46.1 Every applicant for a certificate of Proficiency in Survival Craft shall:
- (a) complete the applicable sea service set out in section 46.2 (b) or 46.3 (a); and
  - (b) obtain a medical certificate prescribed by the Crewing Regulations.

#### **Unrestricted**

- 46.2 An applicant is not entitled to receive a certificate of Proficiency in Survival Craft, Unrestricted, until he/she:
- (a) acquire six months of service on a ship and provide the examiner with a certificate of the applicant's successful completion, at a recognized institution, within the five years before the date of the application, of courses in marine emergency duties with respect to survival craft;
  - (b) if the applicant successfully completed, at a recognized institution, more that five years before the date of the application, courses in marine emergency duties with respect to survival craft, provide proof of six months of relevant service on a sip within the five years before the application; and
  - (c) obtains a Marine First Aid Advanced Certificate, set out in TP 13008;

#### **Restricted**

- 46.3 An applicant is not entitled to receive a certificate of Proficiency in Survival Craft, Restricted, until he/she:
- (a) completes one month service on board the ship on which the applicant is employed and applies for a certificate of proficiency in Survival Craft, Restricted;
  - (b) obtains a Marine First Aid Basic Certificate, set out in TP 13008; and
  - (c) passes a practical examination in the use of the lifesaving equipment and survival craft on the ship for which the certificate has been applied.

### **PART II - EXAMINATIONS**

- 46.4 The applicant shall undergo a written, oral and practical examination at the appropriate level.

### PART III - VALIDITY OF CERTIFICATES


- 46.5 A Proficiency in Survival Craft, Unrestricted, Certificate has validity on all types of lifesaving appliances and has no restrictions as to its period of validity.
- 46.6 A Proficiency in Survival Craft, Restricted, Certificate has validity only with respect to the ship specified in the certificate on types of lifesaving appliances the applicant has served on and was examined in and has no restrictions as to its period of validity.

### PART IV- SYLLABUS OF EXAMINATION

#### 46.7 Oral Examination

An applicant for a certificate of qualifications for Proficiency in Survival Craft (Restricted) will be required to have knowledge of only those subjects in 1 to 16 below that are pertinent to the lifesaving equipment and survival craft on board the ship in which he/she is serving.

ITEM	COLUMN
1.	Special duties assigned to each crew member, as indicated in the master list, including the differences between the signals calling all crew to survival craft and to fire stations.
2.	Construction and outfit survival, and individual items of their equipment.
3.	Particular characteristics and facilities of survival craft.
4.	Various types of devices used for launching survival craft.
5.	Method of launching survival craft into a rough sea.
6.	Action to be taken after leaving the ship.
7.	Handling survival craft in rough weather.
8.	Use of painter, sea anchor and all other equipment.
9.	Apportionment of food and water in survival craft.
10.	Methods of helicopter rescue, including the dangers of static electricity.
11.	Use of the first aid kit and resuscitation techniques.
12.	Radio devices carried in survival craft, including emergency position-indicating radio beacons.
13.	Effects and prevention of hypothermia; use of protective covers and protective garments.
14.	Methods of starting and operating a survival craft engine and its accessories, together with the use of fire extinguisher provided.
15.	Use of emergency boats and motor lifeboats for marshaling liferafts, and rescue of survivors and persons in the sea.
16.	Beaching a survival craft.

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## CHAPTER 47 - PROFICIENCY IN OIL TANKERS, CHEMICAL TANKERS AND LIQUEFIED GAS TANKERS


### PART I - GENERAL REQUIREMENTS OF APPLICANTS

#### **Oil Tankers**

- 47.1 Every applicant for a certificate of Proficiency in Oil Tankers shall
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655.
    - (i) Marine Emergency Duties Courses set out in TP 4957 for Marine Fire Fighting (B2);
    - (ii) Basic Oil Tanker Course set out in TP 8129; and
    - (iii) First Aid Basic (Emergency) Course set out in TP 13008.
- 47.2 An applicant who has completed a minimum of six months service as a pumpman or watchkeeper designated to assist the officer in immediate charge of cargo operations on board oil tankers or chemical tankers within the previous five years before the date of application may be considered to have met the requirements of subparagraph 47.1 (b) (ii).

#### **Chemical Tankers**

- 47.3 Every applicant for a certificate of Proficiency in Chemical Tankers shall
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses set out in TP 4957 for Marine Fire Fighting (B2);
    - (ii) Basic Chemical Tanker course set out in TP 8129; and
    - (iii) First Aid Basic (Emergency) course set out in TP 13008.
- 47.4 An applicant who has completed a minimum of six months service as a pumpman or watchkeeper designated to assist the officer in immediate charge of cargo operations on board chemical tankers within the previous five years before the date of application may be considered to have met the requirements of subparagraph 47.3 (b) (ii).


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### **Liquefied Gas Tankers**

- 47.5 Every applicant for a certificate of Proficiency in Liquefied Gas Tankers shall
- (a) obtain a medical certificate prescribed by the Crewing Regulations;
  - (b) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses set out in TP 4957 for Marine Fire Fighting (B2);
    - (ii) Basic Liquefied Gas Tanker course set out in TP 8129; and
    - (iii) First Aid Basic (Emergency) course set out in TP 13008.
- 47.6 An applicant who has completed a minimum of six months service as a pumpman or watchkeeper designated to assist the officer in immediate charge of cargo operations on board liquefied gas tankers within the previous five years before the date of application may be considered to have met the requirements of subparagraph 47.5 (b) (ii).

### **PART II - VALIDITY OF CERTIFICATES**


- 47.7 A certificate of Proficiency in Oil Tankers, Chemical Tankers or Liquefied Gas Tankers is valid as a rating assisting the officer in charge of cargo operation relating to the type of vessel for which he/she holds the certificate, as required by the Crewing Regulations.

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## **CHAPTER 48 – PROFICIENCY IN FAST RESCUE BOATS**

### **PART I – GENERAL REQUIREMENTS OF APPLICANTS**

- 48.1 Every applicant for a certificate of proficiency in fast rescue boats shall,
- (a) obtain a medical certificate prescribed by the Crewing Regulations.
  - (b) provide the examiner with a certificate of the applicant's successful completion, at a recognized institution, of courses in
    - (i) marine emergency duties with respect to survival craft, and
    - (ii) proficiency in fast rescue boats; and
  - (c) provide proof of six months sea service in deck related duties if an endorsement under the STCS 95 convention is required.

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## CHAPTER 49 – RO-RO PASSENGER, LEVEL I

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 49.1 Every applicant for a ro-ro passenger, level 1 certificate shall,
- (a) obtain a medical certificate prescribed by the Crewing Regulations.
  - (b) hold one of the following certificates with current validity:
    - (i) able seaman
    - (ii) bridge watchman
    - (iii) engine-room rating
    - (iv) engine room assistant
    - (v) ship's cook
    - (vi) proficiency in survival craft
    - (vii) restricted proficiency in survival craft
  - (c) provide the examiner with a certificate of the applicant's successful completion, at a recognized institution, of a course in ro-ro passenger safety, level 1.


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OF  
SEAFARERS  
SECTION FIVE OF FIVE  
REVISION 04**

<b>Responsible Authority</b>  The Director, Marine Personnel Standards and Pilotage is responsible for this document, including any changes, corrections, or updates.	<b>Approval</b>  <hr/> <p style="text-align: center;">Donald Roussel Director, Marine Personnel Standards and Pilotage Marine Safety</p> <b>Date signed:</b>
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51	GENERAL REQUIREMENTS OF APPLICANTS 51.1 (2)	1 April, 1999	01
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54	Chapter 54	August 2004	04
57	Chapter 57	August 2004	04

**Important :**

**This publication is subject to periodical reviews and it is updated accordingly**  
**Cette publication est sujette à des revues périodiques et elle est mise-à-jour en conséquence /**

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## INTRODUCTION

This publication was prepared with input from various federal, provincial and industry organizations including:

- Canadian Marine Advisory Council
- Canadian Marine Training Institutions
- Canadian Ship Owners Association
- Canadian Petroleum Association
- Canadian Association of Oil Well Drilling Contractors
- Canadian Offshore Vessel Operators Association
- Canadian Institute of Marine Engineers
- Company of Master Mariners of Canada
- Canada-Newfoundland Offshore Petroleum Board
- Canada-Nova Scotia Offshore Petroleum Board
- Government of Newfoundland -Department of Mines and Energy
- Government of Nova Scotia -Department of Mines and Energy
- Government of Canada -Department of Energy, Mines and Resources
- National Energy Board


This publication is intended as a guide for the certification of officers and crews of ships and marine offshore drilling units.

**The contents of this publication reflect the requirements of the Marine Certification and Crewing Regulations. In case of conflict, the regulations take precedence.**

This publication is subject to ongoing review and amendment as a result of consultation with the Canadian Marine Advisory Council.


For ease of reference and to reduce printing costs this publication has been divided into five sections pertaining to specific areas of specialization as follows:

- Section 1: General Information
- Section 2: Deck Certificates
- Section 3: Engineering Certificates
- Section 4: Rating Certificates
- Section 5: Mobile Offshore Unit (MODU) Certificates

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- TP 4957: Marine Emergency Duties (MED) training program.
- TP 4958: Simulated Electronic Navigation (SEN) courses.
- TP 5562: Co-operative Cadet Training Program, Navigation.
- TP 8060: Training courses for Fishing Service Certificate, Master of Fishing Vessels 60 to 100 Tons.
- TP 8129: Tanker Safety courses.
- TP 8911: Three-year Marine Engineer course.
- TP 10655: Transport Canada-approved marine training courses.
- TP 10933: Engine-Room Rating training courses.
- TP 10934: Course for Certificate of Service, Master of Vessels of Not More Than 1600 Tons.
- TP 10935: Simulated Engine Room and Control Room course.
- TP 10936: Bridge Watchman training courses.
- TP 10937: Mobile Offshore Drilling Unit courses.
- TP 11130: Marine Cooking training course.
- TP 13008: Marine First Aid and Marine Medical Care training program.
- TP 13024: Ro-Ro Passenger Ship Personnel training standards.
- TP 13117: Bridge Resource Management.
- TP 13720: Practical Skills for Marine Engineers Training Course.
- TP 13721: Training Record Book Requirements for Watchkeeping Engineer Candidates.

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## CHAPTER 50 - OFFSHORE INSTALLATION MANAGER (OIM), MODU/SURFACE

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 50.1 Every applicant for a certificate as Offshore Installation Manager, MODU/Surface, shall:
- (a) acquire 42 months (based on 12 hour days = 1.5 days qualifying service, actual days on board) service as follows:
    - (i) a minimum of 9 months qualifying service as a barge supervisor, maintenance supervisor, toolpusher, tourpusher, chief mate or equivalent on a surface MODU, and
    - (ii) the remaining 33 months qualifying service on any MODU that is not an inland MODU in any position specified in section 3.38 of TP 2293.
    - (iii) the service referred to in paragraph (a) shall include:
      - (A) assisting in at least 20 cargo transfer operations at sea between a MODU and a supply ship;
      - (B) assisting in at least four complete relocation moves of a MODU/surface unit; and
      - (C) assisting in at least 20 helicopter landings and departures from a MODU;
  - (b) obtain a medical certificate prescribed in the Crewing Regulations;
  - (c) hold a valid and current certificate for each of the following courses:
    - (i) Marine Emergency Duties Course set out in TP 4957, or approved equivalent:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2); and
      - (C) MED C and D or Command and Control Training as per TP 10937;
    - (ii) Marine Advanced First Aid Course (16 hours), or approved equivalent;
    - (iii) MODU Specific courses set out in TP 10937, or approved equivalent;
      - (A) Basic Offshore Survival (BST),
      - (B) Stability and Ballast Control, Surface,
      - (C) Hydrogen Sulphide (H2S) awareness,
      - (D) Supervisor Well Control, and
      - (E) approved company or onboard training as specified in Part II of this chapter to meet the remaining requirements of IMO Assembly Resolution A21/Res. 891;
  - (d) pass a written examination in Navigation Safety (061);
  - (e) Complete an approved course in Meteorology or pass a written examination in Meteorology (073); and
  - (f) pass an oral examination in General Seamanship (165C).

These requirements meet the standard of competence set out in IMO Assembly Resolution A21/Res.891, modified for Offshore Installation Manager, Surface as set out in Part II of this Chapter.

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## PART II-SPECIFICATION OF MINIMUM STANDARD OF COMPETENCE FOR OFFSHORE INSTALLATION MANAGER, MODU SURFACE

This table is based on IMO Assembly Resolution A21/Res.891 table 6.2:

Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
1. Plan and ensure safe ballasting and deballasting operations and accounting of changes in deck loads	<p>Knowledge of, and ability to apply, relevant international and national standards concerning stability</p> <p>Use of loading stability information which may be contained in or derived from stability and trim diagrams, operation manual, and/or computer-based loading and stability programs</p>	<p><i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1</p>	<p>Ballasting and deballasting are planned and executed in accordance with established procedures</p> <p>Changes in deck loads are accounted for in accordance with established procedures</p>
2. Operational control of trim, stability and stress	<p>Understanding of fundamental principles of MOU construction, including principal structural members and required periodic inspections</p> <p>Basic knowledge of effects of welding, and effects of corrosion on the structure</p> <p>Understanding of fundamental principles and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability (afloat mode)</p> <p>Stability criteria for MOUs (static and dynamic), environmental limits and criteria for survival conditions</p> <p>Understanding of inclining experiment, deadweight survey, and their use</p> <p>Use of daily loading calculations</p> <p>Knowledge of the effect:</p> <ol style="list-style-type: none"> <li>.1 on trim and stability of MOU in event of damage to and consequent flooding of a compartment, and countermeasures to be taken (afloat mode)</li> <li>.2 of loading supplies and ballasting in order to keep the unit's stresses within acceptable limits</li> <li>.3 of mooring systems and mooring line failure</li> <li>.4 of pre-loading and leg stresses on self-elevating units</li> <li>.5 of loss of buoyancy</li> </ol>	<p><i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1</p> <p>Successful completion of oral examination 165C</p>	<p>MOU structure, stability and stress conditions are maintained within safe limits at all times</p>

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<b>Competence</b>	<b>Knowledge understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
3. Maintain safety and security of MOU personnel and the operational condition of life-saving, fire-fighting and other safety systems	<p>Knowledge of life-saving appliance regulations (International Convention for the Safety of Life at Sea) as applicable to MOUs</p> <p>Organization of fire and abandon ship drills</p> <p>Maintenance of operational condition of life-saving, fire-fighting and other safety systems</p> <p>Actions to be taken to protect and safeguard all persons on board in emergencies, including evacuation</p> <p>Actions to limit damage following a fire, explosion, collision, or grounding</p> <p>Precautions to be taken before onset of heavy weather</p>	<p>Basic Offshore Survival course</p> <p>Supervisor Well Control Course</p> <p>Marine Emergency Duties Course, or equivalent:</p> <p>(1) Survival Craft Cox'n or MED B1;</p> <p>(2) Offshore Fire Team or MED (B2);</p> <p>(3) Command and Control of major emergencies or MED C and D;</p> <p><i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1</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> <p>Life-saving appliances and fire-fighting equipment are maintained in accordance with prescribed standards</p>
4. Develop emergency and damage control plans and handle emergency situations	<p>Preparation of contingency plans for response to emergencies</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>Evacuation from MOU</p> <p>Precautions to be taken before onset of heavy weather</p>	<p>Basic Offshore Survival course</p> <p>Supervisor Well Control Course</p> <p>Marine Emergency Duties Course, or equivalent:</p> <p>(1) Survival Craft Cox'n or MED B1;</p> <p>(2) Offshore Fire Team or MED (B2);</p> <p>(3) Command and Control of major emergencies or MED C and D;</p> <p><i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1</p> <p>Successful completion of oral examination 165C</p>	<p>Emergency procedures are in accordance with the established plans for emergency situations</p>
5. Respond to emergencies	<p>Knowledge of:</p> <p>.1 emergency procedures</p> <p>.2 the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons and countermeasures to be taken</p> <p>Effectively communicate stability-related information</p>	<p><i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1</p> <p>Command and Control of major emergencies or MED C and D;</p>	<p>Established procedures are followed during drills and emergencies</p> <p>Communications are clear and effective</p>




Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
6. Maintain MOU safe for transit, station keeping, mooring and dynamic positioning conditions	Knowledge of: <ol style="list-style-type: none"> <li>.1 the 1972 Collision Regulations, as amended</li> <li>.2 navigation and electronic navigational aids appropriate to the type of MOU</li> <li>.3 towing procedures, including recovery of tow</li> <li>.4 sea-bed composition and characteristics</li> <li>.5 behaviour of mooring systems and force distributions, including the effect of environmental conditions</li> <li>.6 consequences of mooring system failure</li> <li>.7 anchor placement and recovery, and working with anchor handling vessels</li> <li>.8 principles of dynamic positioning system, including capabilities and limitations of thrusters, power systems and maximum allowable position offsets (For Dynamic Position equipped vessels only)</li> </ol>	.1-.2 Successful completion of examination 061 (Colregs)/or approved courses .3-.4-.5-6-.7 Experience in rig moves and anchor handling as specified in regulation and completion of rig moving procedures or approved courses. On job training (OJT) Spread mooring systems or approved course .8 Successful completion of oral examination 165C (also for .3-4-.5-.6-.7)	Transit, station keeping, mooring and dynamic positioning operations are within safe limits at all times Communications are effective and comply with established procedures
7. Forecast weather and oceanographic conditions	Knowledge of: <ol style="list-style-type: none"> <li>.1 characteristics of weather systems</li> <li>.2 ability to apply available meteorological information to ensure safety of MOU and, upon request, supply other vessels or aircraft with information</li> <li>.3 sources of weather information</li> <li>.4 the effects of weather on the MOU environmental limits</li> </ol>	.1 to .3 Successful completion of wind, waves and weather or approved course or written examination 073 (meteorology) .4 rig moving procedures or approved course Successful completion of oral examination 165C. (.4)	The likely weather conditions for a determined period are based on all available information Actions taken to maintain safety of navigation and operations minimize risk to safety of MOU
8. Plan and ensure safe transfer of personnel	Knowledge of : <ol style="list-style-type: none"> <li>.1 precautions to be taken during transfer of personnel</li> <li>.2 use of the personnel basket</li> <li>.3 helicopter transfers</li> <li>.4 vessel transfers</li> <li>.5 effect of environmental conditions on method of personnel transfer</li> </ol>	Basic Offshore Survival (BST) Course Experience in helicopter landings and departures as specified in 50.1 (a) iii (C) Successful Completion of Oral Examination (165C) Command and Control of major emergencies	Personnel transfers are conducted safely

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Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
9. Plan and ensure safe loading, stowage, securing and handling of supplies, including dangerous goods	Knowledge of: .1 the effect on trim and stability of cargoes and cargo operations .2 safe handling, stowage and care of equipment, supplies and dangerous goods .3 crane and lifting equipment, and their inspections .4 procedures for loading and discharge of helicopters and supply vessels .5 precautions during loading, and unloading, and use of dangerous, hazardous, or harmful goods	.1 <i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1 .4 and .5 Experience in helicopter landings and departures as specified in 50.1 (a) iii (C) and experience in at least 20 cargo transfer as specified in 50.1 (a) iii (A) .2, .3 and .5 Successful completion of oral examination 165C/written examination Cargo 123	The likely weather conditions for a determined period are based on all available information Stowage and securing of cargoes and supplies ensures that stability and stress conditions remain within safe limits, and are in accordance with established guidelines and legislative requirements Information on dangers, hazards and special requirements is recorded in a suitable format for easy reference in the event of an incident
10. Prevention of pollution	Methods and aid to prevent pollution of the environment Knowledge of: .1 pollution prevention systems and controls .2 pollution control procedures, including the unit's MARPOL I/26 and article 3 of OPRC Convention Shipboard Oil Pollution Emergency Plan, MARPOL Annex V Waste Management Plan, and any plan dealing with dangerous/hazardous goods	Assessment of OJT checklist Successful completion of oral examination 165C	Operations are conducted without hazarding the environment through spills of oil or dangerous/hazardous goods, or garbage
11. Monitor and control safe working practices	Knowledge of safe working practices, such as: .1 occupational safety, health and hygiene .2 hazardous areas .3 permits to work .4 work over water .5 work in confined spaces Knowledge of personnel training, organization and communication Understanding and inspection of safety equipment Identify, evaluate, control new hazards through engineering controls or safe working practices	Assessment of OJT checklist Successful completion of oral examination 165C	Operations minimize hazards to personnel

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<b>Competence</b>	<b>Knowledge understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
12. Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea and the protection of the marine environment	<p>Knowledge of international maritime law embodied in international agreements and conventions</p> <p>Regard should be paid to the following subjects:</p> <ol style="list-style-type: none"> <li>.1 certificates and other documents required to be carried on board MOUs by international conventions and/or agreements</li> <li>.2 responsibilities under the relevant requirements of the: <ul style="list-style-type: none"> <li>- International Convention on Load Lines;</li> <li>- International Convention for the Safety of Life at Sea;</li> <li>- International Convention for the Prevention of Pollution from Ships;</li> </ul> </li> <li>.3 maritime declarations of health and the requirements of the International Health Regulations</li> <li>.4 responsibilities under international instruments affecting the safety of the MOU, visitors, crew and cargo</li> <li>.5 methods and aids to prevent pollution of the marine environment by MOUs</li> <li>.6 national legislation for implementing international agreements and conventions</li> </ol>	Successful completion of oral examination 165C	<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>
13. Monitor and control industrial operations impacting maritime safety	<p>Knowledge and appreciation of the interrelationship between marine operations and specific industrial activities including, where appropriate, the following:</p> <ol style="list-style-type: none"> <li>.1 drilling and maintenance, where appropriate, of wells</li> <li>.2 construction and offshore maintenance and repair</li> <li>.3 production</li> <li>.4 accommodation support</li> <li>.5 lifting operations</li> <li>.6. pipe-laying</li> <li>.7 diving</li> <li>.8 fire-fighting support</li> </ol>	<p>Assessment of OJT checklist</p> <p>Successful completion of oral examination 165C</p>	Industrial operations are carried out safely

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## CHAPTER 51 - BARGE SUPERVISOR, MODU/SURFACE

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 51.1 (1) Every applicant for a certificate as Barge Supervisor, MODU/Surface, shall:
- (a) subject to subsection (2), complete 12 months as follows:
    - (i) a minimum of six months sea service as a watchkeeping mate on a MODU/surface, while holding a certificate as Watchkeeping Mate, MODU/Surface, or a First Mate, Intermediate Voyage, Certificate and a MODU Certificate; and
    - (ii) the remaining time made up of any combination of service as a driller, watchkeeping mate, engineer, maintenance supervisor, tourpusher, toolpusher or ballast control operator; and
    - (iii) the service referred to in paragraph (a) shall include:
      - (A) at least 10 cargo-transfer operations at sea between a surface unit and a supply vessel of which not less than two or more than five shall have been observed from the supply vessel;
      - (B) at least two complete anchor-handling operations of a surface unit of which not less than one shall have been observed from the anchor-handling vessel; and
      - (C) at least 10 helicopter landings and departures;
  - (b) obtain a medical certificate prescribed in the Crewing Regulations;
  - (c) obtain a certificate of completion for each of the following courses from a school set out in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957, for:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2);
      - (C) Officer Certification (C); and
      - (D) Senior Officer (D);
    - (ii) Marine First Aid Advanced Course, set out in TP 13008;
    - (iii) Simulated Electronic Navigation Level I, set out in TP 4958; and

- (iv) Mobile Offshore Drilling Unit Courses, set out in TP 10937, for:
  - (A) Basic Drilling;
  - (B) Second-Line Supervisor Functions, Offshore Well Control; and
  - (C) Basic Offshore Survival;
- (d) pass an examination in each of the following:
  - (i) Meteorology;
  - (ii) Rig Construction; and
  - (iii) Stability and Ballast Control;
- (e) pass an examination in Simulated Electronic Navigation; and
- (f) pass an oral examination in General Seamanship.

51.1 (2) Not in use.


## PART II - EXAMINATIONS

51.2 The following table indicates the examinations for the Barge Supervisor, MODU, Certificate, the qualifying sea service required before each may be attempted, and other requirements.

Examination	Qualifying Service While Holding WKM MODU	Other Requirements
073 Meteorology	NIL	
114 M MODU Stability and Ballast Control	NIL	
125 M Rig Construction	NIL	
165 B General Seamanship	12 months	All other exams must have been passed.

## PART III - VALIDITY OF CERTIFICATE

51.3 The Barge Supervisor, MODU/Surface, Certificate has validity as barge supervisor of any MODU/Surface while the unit is secured or positioned on location for the purpose of conducting a drilling operation or is in transit under the charge of a towing vessel, provided such certificate, granted without geographical restriction, is also valid as the person in charge of a navigational watch when the unit is in transit.


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## PART IV - SYLLABUSES OF EXAMINATIONS

### 51.4 Meteorology

#### Examination number 073

ITEM	COLUMN
1.	Chemical Composition of the Atmosphere Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust and hygroscopic particles, dust, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).
2.	Vertical Structure of the Atmosphere Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parhelion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.
3.	Transfer of Heat Radiation, conduction, convection, turbulence.
4.	Temperature Related to the atmosphere and the earth; calorie, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.
5.	Atmospheric Moisture and Changes of State Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.
6.	Atmospheric Stability Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke; causes of subsidence; effects of substances, compression heating, evaporation.
7.	Fog Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.
8.	Clouds Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.
9.	Precipitation Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convectional, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.
10.	Lightning Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.
11.	Pressure and Pressure Systems Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isallator, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depression, polar front low, thermal depression, vertical instability depression (e.g., tropical revolving storm); straight isobars, effect of straight isobars on wind, on weather.

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12.	<p><b>Winds</b>  Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, associated pressure and weather characteristics, monsoons in the Indian Ocean and China Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevals, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.</p>
13.	<p><b>Air Masses</b>  Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical equatorial.</p>
14.	<p><b>Fronts</b>  Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).</p>
15.	<p><b>Families of Depressions or Extra-Tropical Cyclones</b>  Formation between two air masses, life cycle and movement, cross section, associated weather, frontogenesis, frontolysis, secondary depressions.</p>
16.	<p><b>Waves and Swells</b>  Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.</p>
17.	<p><b>Oceanic Currents and Effect on Climate</b>  Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; knowledge of the various currents of the world.</p>
18.	<p><b>Tropical Revolving Storms</b>  Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: North Atlantic, western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.</p>

19.	<p><b>Ice Formation and Decay</b> Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs, presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.</p>
20.	<p><b>Ice Detection and Reporting</b> Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Canadian Waters and Manice</i>, ice climatology and ice operations, <i>Ice Navigation in Canadian Waters</i>; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, seawater temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind-measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.</p>
21.	<p><b>Weather Messages and Codes</b> International analysis in code, definition, interpreting messages; plot pressure systems, fronts, isobars; forecast for 12-24 hours—pressure, wind, sea state, visibility, clouds, weather changes; knowledge of services available, Radio Aids to Marine Navigation Atlantic and Great Lakes Pacific; ability to locate marine weather forecast areas, understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weatherfax, weather, satellite, sea state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weatherfax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts.</p>
22.	<p><b>Optimum Weather Routing</b> Advantages, reduce storm damage, save time, meet special requirements; methods, on board ship, through shore based firm, through government departments; climatological routing, in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long range progs available.</p>
23.	<p><b>Requirements</b> Application of ship's performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant-pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship performance curves and locus positions; factors that require a continuous updating and revision of weather-routing procedures.</p>

Note: The examination is a written test comprising multiple-choice and descriptive questions.  
Duration is three and a half hours.

### 51.5 MODU Stability and Ballast Control

**Examination number 114 M**

ITEM	COLUMN
1.	<p><b>Definitions</b> Definitions of general terms (e.g., displacement, draft, trim, heel, freeboard, buoyancy, reserve buoyancy, block coefficient, deadweight, stable, unstable and neutral equilibrium).</p>
2.	<p><b>Terms</b> Understanding centre of gravity, centre of flotation, centre of buoyancy, reserve buoyancy, position of metacentre, righting lever and its effect on transverse and longitudinal stability; dynamic stability, synchronous rolling and angle of loll.</p>




3.	<b>Theory</b> Theory of moments as applied to stability, including the effects of heavy lifts and movement of liquids in tanks and free surface affect.
4.	<b>Effect of Weights</b> Effect of adding, removing, shifting weight and calculation of vertical, transverse and longitudinal shift of centre of gravity, danger of slack tanks, loading and unloading problems.
5.	<b>Inclining Experiment</b> Understanding the results of the inclining experiment report and using the results.
6.	<b>Tables</b> Use of hydrostatic curves, deadweight scale, hydrostatic tables and tank capacity tables; use of curves of statical stability; use of unit manuals.
7.	<b>Stability Criteria</b> Stability criteria for mobile offshore drilling units (e.g., allowable KG, effect of changing GM, righting area ratios and angle of downflooding).
8.	<b>External Effects</b> Effect of dynamic station-keeping systems on stability, force of the wind and high seas.
9.	<b>Calculations</b> Stability calculations utilizing concepts 1 to 8 above, theory and calculations of deck loads and effect on stability; areas, volumes of common figures, squares, rectangles, triangles, cubes, cones, wedges, cylinders and spheres.
10.	<b>Systems</b> Examination of liquid transfer systems and their limitations and procedures; ballast systems, fuel systems, drilling liquids; zones of reduced stability, asymmetrical ballasting/deballasting; dangers.
11.	<b>Response to Damage</b> Damage and damage-control procedure (use of pumping system and cross connections); effect of flooding compartments intentionally, including permeability; watertight integrity; dangers.
12.	<b>Environmental Effect</b> Environmental conditions and their effect on drilling operations; vessel and environmental limitations and criteria for changing to survival condition.
13.	<b>Structural Stress</b> Importance of load distribution with regard to structural stress; stress caused by location of load; stress in members; importance of bending moments and stress diagrams.

The examination consists of nine questions of which the applicant shall answer six. The examination may include calculations, sketches, and written description and multiple-choice questions. Questions may consist of several parts.  
Duration is three and a half hours.

### 51.6 Rig Construction

#### Examination umber 125 M

ITEM	COLUMN
1.	<b>Mobile Offshore Drilling Unit Construction</b> Basic construction of principal MODU types; construction of columns, drilling derrick, pontoons (footings), tubulars, deck houses, main and pipe decks, helicopter deck, ballast tanks, drilling well (moon pool), watertight doors, hatches; pressure vessels; location and extent of watertight bulkheads and flats; stiffening arrangements of watertight and tank-boundary bulkheads, including those made of corrugated plating.
2.	<b>Construction Portfolio</b> Contents, including: general arrangement, inboard and outboard profile, arrangement showing watertight compartments, decks and load density plans (including helicopter deck), transverse section showing scantlings, longitudinal section showing scantlings, framing, shell plating, bulkheads (watertight), structural and tanks showing location of air pipes and overflows, watertight doors and hatches, and capacity plans.

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3.	<b>Structural Strength</b> Load to which a MODU is subjected; minimizing of concentrated structural strengthening to compensate for load in areas of anticipated failure.
4.	<b>Welding Safety</b> Welding safety procedures; hot work permit; security of area; protective clothing; shielding; storage and handling of welding materials and gas bottles; fire watch precautions; precautions in enclosed spaces; protection and security of electrical cabling and equipment; use of gas detectors.
5.	<b>Corrosion</b> Maintenance of corrosion control arrangements and their effect if provision is not made for effective implementation of such maintenance arrangements.
6.	<b>Testing and Inspection</b> Methods of testing of tanks, bulkheads, other watertight or oiltight work, pressure vessels of various types; inspection and repair (minor) procedure to maintain a MODU in compliance with regulatory requirements; requirements and preparation for statutory surveys and inspections; classification societies and advantages of classification; docking and inspection procedures, periodic and annual inspection programs; non-destructive testing/inspecting; underwater cleaning techniques; underwater inspection methods and programs; quality assurance and preventative maintenance system.
7.	<b>Documentation</b> Inspection, certificate and classification requirements; compiling damage and defect report; IMO code for the construction and equipment of MODU and Canadian standard (TP 6472); contents and use of construction portfolio; contents and use of marine operations manual; application of loadline regulations to the principal type of MODUs, surface and column stabilized.
8.	<b>Watertight Integrity and Damage Control</b> Ballast piping, pumping and control systems, bilge piping, pumping deck and rig floor draining systems; maintenance of fire integrity on a MODU; definition of various hazardous zones; access and ventilation conditions affecting the extent of hazardous areas.

The examination consists of nine questions of which the applicant shall answer six. The examination may include calculations, sketches, and written description and multiple-choice questions. Questions may consist of several parts.  
Duration is three and a half hours.

### 51.7 General Seamanship

#### EXAMINATION NUMBER 165 B


ITEM	COLUMN
1.	<b>Machinery</b> Use and care of electric and hydraulic winches, ordinary and self-tensioning; windlasses and capstans associated with MODUs; electric, hydraulic and air deck cranes; elevators for personnel, stores and equipment.
2.	<b>Voyage Preparation</b> Manoeuvring a MODU under power; light and shapes of Collision Regulation required for move; planning for a towed voyage; preparing and inspecting towing equipment; securing towing vessels; the use, handling and securing of towing units; getting underway under tow; communicating with tug masters; authority of OIM when MODU is under tow.
3.	<b>Anchoring</b> Manoeuvres and cable handling, including equipment involved in the resetting or retrieving of anchors, use of anchor buoys; planning an anchor pattern; deployment of anchors with and without anchor-handling vessels; communication with anchor-handling vessels; clearing a foul anchor; hanging off an anchor; securing anchor gear in preparation for sea passage; use of anchors in emergency to take off motion; anchor and cable stowage, fittings and cable markings; maintenance of types of fairlead, their construction, naming and use.

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4.	<p><b>Mooring Lines</b> Use, care and stowage of mooring lines, comprising: types of line used for mooring and their characteristics; the names of the various mooring lines; making fast supply vessels; emergency cast-off procedures; the use of mooring wire-rope reels; types of fairlead, cleats and bollard.</p>
5.	<p><b>Stowage and Handling</b> Working of stores and equipment, comprising: responsibilities in transfer of cargo, stores and personnel to and from supply vessel; inspections of holds, decks and spaces to receive goods; preparation and operation of cranes; arrangements and working of heavy lifts by ship equipment, and lifts that cannot be handled by a single runner; the overhaul and regular inspections of lifting gear; use and maintenance of fork-lift trucks.</p>
6.	<p><b>Organization</b> MODU routine and organization, comprising: barge supervisor's functions and organizational duties; crew tours of shifts; direction of work; knowledge of drawing up emergency muster lists with appropriate duties for crew members; the organizational duties for fuelling, storing or ballasting in all conditions; barge supervisor's duties concerning the official logbook, entries in the deck log and owner's or charter's records; barge supervisor's duties when repair, alteration or maintenance work is being carried out; barge supervisor's duties when preparing MODU for sea; barge supervisor's duties and responsibilities on joining a MODU; the necessary paperwork or documentation to encompass the foregoing items, where applicable; control room and deck discipline, organization and routine under marine circumstances; maintenance of a proper lookout; duties and responsibilities of the person in charge of the shift, ballast control and other bridge personnel (jointly and separately); the purposes, necessity and general content of standing orders, instructions, night orders, MODU logbook and similar material; anchor watch duties and responsibilities; means of assessing a tendency to drag anchors; arrangement and responsibility of departments aboard ship.</p>
7.	<p><b>Pollution Prevention Management</b> Duties related to loading, transfer and storage of pollution; responsibilities under oil pollution prevention regulations and MARPOL; response to a pollution incident; identification of pollutants; obligation to prevent pollution; reporting of incidents; waste management.</p>
8.	<p><b>Emergency Response</b> Emergency duties and responsibilities for equipment, comprising: organization, frequency and routing of fire patrols under routine and exceptional conditions; recognition and assessment of fire hazards; importance of cleanliness and good housekeeping; organization of realistic fire drills, training of crew for emergencies; taking charge of marine emergencies; inspections, testing and maintenance of portable and fixed firefighting equipment; organizations of realistic boat and lifesaving appliance drills, training of crew in use of lifesaving appliances and man-overboard drills; stowage, inspections, testing and maintenance of lifeboats, capsules, rafts and their equipment, lifejackets, immersion suits, lifebuoys, self-igniting lights and distress signals; taking charge of the launching of boats, rafts and capsules; assessing damage and flooding in cases of collision or stranding; search and rescue procedures, including AMVER, MERSAR and TC publications.</p>
9.	<p><b>Personnel Documentation</b> Rights and privileges of certificates of competency limited to MODUs; certificated personnel required; general manning required to meet safety requirements.</p>
10.	<p><b>Collision Avoidance</b> Collision Regulations and their intent, ship routing, MODU safety zone; <i>Notices to Mariners</i> concerning MODU locations.</p>
11.	<p><b>MODU Underway</b> MODU handling in a seaway; use of thrusters and their effect; wind effects on a MODU; how to heave to anchoring in a tide, current, or wind; manoeuvring characteristics of other types of vessels; handling characteristics of tugs and problems of towing vessels; turning and manoeuvring in a channel; close-quarters situations at anchor and underway.</p>

The examination is taken from the syllabus for the examinations for Watchkeeping Mate, MODU, and First Mate, MODU.

The applicant is expected to have a deeper understanding of the intent and interpretation of the Collision Regulations as demonstrated by examination 062, which is supplemented here by oral questions and demonstrations.

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## CHAPTER 52 – BALLAST CONTROL OPERATOR

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

52.1 Every applicant for a certificate as Ballast Control Operator, MODU/Surface, shall:

- (a) complete six months service as a Ballast Control Operator Trainee;
- (b) obtain a medical certificate as prescribed in the Crewing Regulations;
- (c) hold a valid and current certificate for each of the following courses:
  - (i) MODU Specific courses set out in TP 10937, or approved equivalent;
    - (A) Basic Offshore Survival (BST),
    - (B) Approved training course in Stability and Ballast Control, Surface,
    - (C) Hydrogen Sulphide (H<sub>2</sub>S) awareness, and
    - (D) approved company or onboard training as specified in Part II of this chapter to meet the remaining requirements of IMO Assembly Resolution A21/Res. 891.


These requirements meet the standard of competence set out in IMO Assembly Resolution A21/Res.891, modified for Ballast Control Operator, Surface as set out in Part II of this Chapter.

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## PART II-SPECIFICATION OF MINIMUM STANDARD OF COMPETENCE FOR BALLAST CONTROL OPERATOR

This table is based on IMO Assembly Resolution A21/Res.891 table 6.4:

Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
1. Plan and ensure safe ballasting and deballasting operations and accounting of changes in deck loads	Knowledge of, and ability to apply, relevant international and national standards concerning stability Use of loading stability information as may be contained in or derived from stability and trim diagrams, operations manuals, and/or computer-based loading and stability programs	<i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1	Ballasting and deballasting are planned and executed in accordance with established procedures Changes in deck loads are accounted for in accordance with established procedures
2. Operational control of trim, stability and stress	Understanding of fundamental principles of ship construction and the theories and factors affecting trim and stability and the measures necessary to preserve trim and stability Stability criteria for MOUs, environmental limits and criteria for survival conditions Understanding the inclining experiment report and its use Use of daily loading calculations Dynamical stability Effect of mooring systems and mooring line failure	<i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1	Stability and stress conditions are maintained within established limits at all times
3. Respond to emergencies	Knowledge of emergency procedures Knowledge of the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons and countermeasures to be taken Effectively communicate stability-related information	<i>Stability and Ballast Control MODU Surface</i> course as set out in TP10937 Chapter 8.1	Established procedures are followed during drills and emergencies  Communications are clear and effective
4. Prevention of pollution	Methods and aids to prevent pollution of the environment Knowledge of relevant international and national requirements, regard should be paid especially to .1 certificates and other documents required by international conventions or national law, how they may be obtained, and their period of validity .2 responsibilities under relevant international agreements	Assessment of OJT	Follows pollution prevention procedures established by international convention, national requirements and company policy

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## CHAPTER 53 - MAINTENANCE SUPERVISOR, MODU/SURFACE ENDORSEMENT

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 53.1 Every applicant for an endorsement as Maintenance Supervisor, MODU/Surface, shall:
- (a) hold a certificate of competency as a 1<sup>st</sup> Class Engineer (Motor);
  - (b) complete 3 months qualifying service on a MODU Surface while holding a minimum certificate of competency as a 2<sup>nd</sup> Class Engineer (Motor);
  - (c) obtain valid and current medical certificate as prescribed in the Crewing Regulations;
  - (d) hold a valid and current certificate for each of the following courses:
    - (i) Marine Emergency Duties Courses as set out in TP 4957 or approved equivalent,
    - (ii) Marine Advanced First Aid Course (16 hours) or approved equivalent, and
    - (iii) Propulsion Plant Simulator Course Level II, set out in TP 10935;
  - (e) obtain a certificate of completion for each of the following Mobile Offshore Drilling Unit Courses, set out in TP 10937, or approved equivalent:
    - (i) Hydrogen Sulphide (H<sub>2</sub>S) awareness;
    - (ii) Basic Offshore Survival; and
    - (iii) approved company or onboard training as specified in Part II of this chapter to meet the remaining requirements of IMO Assembly Resolution A21/Res. 891; and
  - (f) pass an oral examination.

These requirements meet the standard of competence set out in IMO Assembly Resolution A21/Res. 891, modified for Maintenance Supervisor, Surface as set out in Part II of this Chapter.

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## PART II - SPECIFICATION OF MINIMUM STANDARD OF COMPETENCE FOR MAINTENANCE SUPERVISOR, MODU SURFACE


This table is based on IMO Assembly Resolution A21/Res. 891 table 6.5:

Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
1. Use appropriate tools for fabrication and repair operations typically performed on MOUs	Characteristics and limitations of materials used in construction and repair 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	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
2. Use hand tools and measuring equipment for dismantling, maintenance, repair and re-assembly of on-board plant and equipment	Design characteristics and selection of materials in construction of equipment Interpretation of machinery drawings and hand tools Operational characteristics of equipment and systems	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
3. Use hand tools, electrical and electronic measuring and test equipment for fault-finding, maintenance and repair operations	Safety requirements for working on electrical systems Construction and operational characteristics of on-board AC and DC electrical systems and equipment Construction and operation of electrical test and measuring equipment	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
4. Operate alternators, generators and control systems	Generating plant Appropriate basic electrical knowledge and skills Preparing, starting, coupling and charging over alternators or generators Location of common faults and action to prevent damage Control systems Location of common faults and action to prevent damage	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
5. Maintain engineering systems, including control systems	Appropriate basic mechanical knowledge and skills 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	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate

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<b>Competence</b>	<b>Knowledge understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
6. Operate, monitor and evaluate engine and machinery performance and capacity	Operation and maintenance of: engines auxiliary machinery including pumping and piping systems, associated control systems and, if appropriate, jacking systems	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
7. Detect and identify the cause of machinery malfunctions and correct faults	Detection of machinery malfunction and location of faults to prevent or minimize damage	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
8. Organize safe maintenance and repair procedures	Marine engineering practice Organizing and carrying out safe maintenance and repair procedure	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
9. Operate and maintain survival craft and launching systems and systems for fire prevention, detection and extinction	Maintenance of operational condition of survival craft and launching systems and systems for fire prevention, detection and extinction Actions taken to protect the unit and its personnel and limit damage following fire, explosion, collision or grounding	MODU Specific Oral Examination completion of MED training or approved equivalent	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
10. Prevention of pollution	Methods and aid to prevent pollution of the environment Knowledge of relevant international and national requirements, regard should be paid especially to: 1. certificates and other documents required by international conventions or national law, how they may be obtained, and their period of validity 2. responsibilities under relevant international agreements	MODU Specific Oral Examination	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate
11. Ensure safe working practices	Safe working practices	MODU Specific Oral Examination 3 month service on board MODU	holding a 1 <sup>st</sup> Class Engineer (motor) Certificate



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## CHAPTER 54 - OFFSHORE INSTALLATION MANAGER (OIM), MODU/SELF-ELEVATING

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 54.1 Every applicant for a certificate as Offshore Installation Manager, MODU/Self-Elevating, shall:
- (a) acquire 42 months (based on 12 hour days = 1.5 days qualifying service, actual days on board) service as follows:
    - (i) a minimum of 9 months qualifying service as a barge supervisor, maintenance supervisor, toolpusher or tourpusher on a self-elevating MODU, and
    - (ii) the remaining 33 months qualifying service on any MODU that is not an inland MODU in any position specified in section 3.38 of TP 2293.
    - (iii) the service referred to in paragraph (a) shall include:
      - (A) assisting in at least 20 cargo transfer operations at sea between a MODU and a supply ship;
      - (B) assisting in at least four complete relocation moves of a MODU/self-elevating unit; and
      - (C) assisting in at least 20 helicopter landings and departures from a MODU;
  - (b) obtain a medical certificate prescribed in the Crewing Regulations;
  - (c) hold a valid and current certificate or each of the following courses:
    - (i) Marine Emergency Duties Course set out in TP 4957, or approved equivalent:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2); and
      - (C) MED C and D or Command and Control Training as per TP 10937;
    - (ii) Marine Advanced First Aid Course (16 hours), or approved equivalent;
    - (iii) MODU Specific courses set out in TP 10937, or approved equivalent:
      - (A) Basic Offshore Survival (BST),
      - (B) Stability and Ballast Control, OIM Self-elevating,
      - (C) Hydrogen Sulphide (H<sub>2</sub>S) awareness,
      - (D) Supervisor Well Control, and
      - (E) approved company or onboard training as specified in Part II of this chapter to meet the remaining requirements of IMO Assembly Resolution A21/Res. 891;
  - (d) pass a written examination in Navigation Safety (061);
  - (e) Complete an approved course in Meteorology or pass a written examination in Meteorology (073); and
  - (f) pass an oral examination in General Seamanship (165C).

These requirements meet the standard of competence set out in IMO Assembly Resolution A21/Res. 891, modified for Offshore Installation Manager, Self-elevating as set out in Part II of this Chapter.

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**PART II-SPECIFICATION OF MINIMUM STANDARD OF COMPETENCE FOR OFFSHORE INSTALLATION MANAGER, MODU SELF ELEVATING**

This table is based on IMO Assembly Resolution A21/Res. 891 table 6.2:

<b>Competence</b>	<b>Knowledge understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
1. Plan and ensure safe ballasting and deballasting operations and accounting of changes in deck loads	<p>Knowledge of, and ability to apply, relevant international and national standards concerning stability</p> <p>Use of loading stability information which may be contained in or derived from stability and trim diagrams, operation manual, and/or computer-based loading and stability programs</p>	<i>Stability and Ballast Control MODU Self-elevating</i> course as set out in TP10937 Chapter 8.2	<p>Ballasting and deballasting are planned and executed in accordance with established procedures</p> <p>Changes in deck loads are accounted for in accordance with established procedures</p>
2. Operational control of trim, stability and stress	<p>Understanding of fundamental principles of MOU construction, including principal structural members and required periodic inspections</p> <p>Basic knowledge of effects of welding, and effects of corrosion on the structure</p> <p>Understanding of fundamental principles and the theories and factors affecting trim and stability and measures necessary to preserve trim and stability (afloat mode)</p> <p>Stability criteria for MOUs (static and dynamic), environmental limits and criteria for survival conditions</p> <p>Understanding of inclining experiment, deadweight survey, and their use</p> <p>Use of daily loading calculations</p> <p>Knowledge of the effect:</p> <p>.1 on trim and stability of MOU in event of damage to and consequent flooding of a compartment, and countermeasures to be taken (afloat mode)</p> <p>.2 of loading supplies and ballasting in order to keep the unit's stresses within acceptable limits</p> <p>.3 of mooring systems and mooring line failure</p> <p>.4 of pre-loading and leg stresses on self-elevating units</p> <p>.5 of loss of buoyancy</p>	<p><i>Stability and Ballast Control MODU Self-elevating</i> course as set out in TP10937 Chapter 8.2</p> <p>Successful completion of oral examination 165C</p>	MOU structure, stability and stress conditions are maintained within safe limits at all times



Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
3. Maintain safety and security of MOU personnel and the operational condition of life-saving, fire-fighting and other safety systems	<p>Knowledge of life-saving appliance regulations (International Convention for the Safety of Life at Sea) as applicable to MOUs</p> <p>Organization of fire and abandon ship drills</p> <p>Maintenance of operational condition of life-saving, fire-fighting and other safety systems</p> <p>Actions to be taken to protect and safeguard all persons on board in emergencies, including evacuation</p> <p>Actions to limit damage following a fire, explosion, collision, or grounding</p> <p>Precautions to be taken before onset of heavy weather</p>	<p>Basic Offshore Survival course</p> <p>Supervisor Well Control Course</p> <p>Marine Emergency Duties Course, or equivalent:</p> <p>(1) Survival Craft Cox'n or MED B1;</p> <p>(2) Offshore Fire Team or MED (B2);</p> <p>(3) Command and Control of major emergencies or MED C and D;</p> <p><i>Stability and Ballast Control MODU Self-elevating</i> course as set out in TP10937 Chapter 8.2</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> <p>Life-saving appliances and fire-fighting equipment are maintained in accordance with prescribed standards</p>
4. Develop emergency and damage control plans and handle emergency situations	<p>Preparation of contingency plans for response to emergencies</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>Evacuation from MOU</p> <p>Precautions to be taken before onset of heavy weather</p>	<p>Basic Offshore Survival course</p> <p>Supervisor Well Control Course</p> <p>Marine Emergency Duties Course, or equivalent:</p> <p>(1) Survival Craft Cox'n or MED B1;</p> <p>(2) Offshore Fire Team or MED (B2);</p> <p>(3) Command and Control of major emergencies or MED C and D;</p> <p><i>Stability and Ballast Control MODU Self-elevating</i> course as set out in TP10937 Chapter 8.2</p> <p>Successful completion of oral examination 165C</p>	<p>Emergency procedures are in accordance with the established plans for emergency situations</p>
5. Respond to emergencies	<p>Knowledge of:</p> <p>.1 emergency procedures</p> <p>.2 the effect on trim and stability of flooding due to damage, fire-fighting, loss of buoyancy or other reasons and countermeasures to be taken</p> <p>Effectively communicate stability-related information</p>	<p><i>Stability and Ballast Control MODU Self-elevating</i> course as set out in TP10937 Chapter 8.2</p> <p>Command and Control of major emergencies or MED C and D;</p>	<p>Established procedures are followed during drills and emergencies</p> <p>Communications are clear and effective</p>




Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
6. Maintain MOU safe for transit, station keeping, mooring and dynamic positioning conditions	Knowledge of: <ul style="list-style-type: none"> <li>.1 the 1972 Collision Regulations, as amended</li> <li>.2 navigation and electronic navigational aids appropriate to the type of MOU</li> <li>.3 towing procedures, including recovery of tow</li> <li>.4 sea-bed composition and characteristics</li> <li>.5 behaviour of mooring systems and force distributions, including the effect of environmental conditions</li> <li>.6 consequences of mooring system failure</li> <li>.7 anchor placement and recovery, and working with anchor handling vessels</li> <li>.8 principles of dynamic positioning system, including capabilities and limitations of thrusters, power systems and maximum allowable position offsets (For Dynamic Position equipped vessels only)</li> </ul>	<ul style="list-style-type: none"> <li>.1 Successful completion of examination 061 (Colregs)</li> <li>.2 not applicable</li> <li>.3-.4 Experience in rig moves and anchor handling as specified in regulation and completion of rig moving procedures or approved course</li> <li>.5 not applicable</li> <li>.6-.7 Spread mooring systems or approved course</li> <li>.8 not applicable</li> </ul> Successful completion of oral examination 165C. (.4)	Transit, station keeping, mooring and dynamic positioning operations are within safe limits at all times Communications are effective and comply with established procedures
7. Forecast weather and oceanographic conditions	Knowledge of: <ul style="list-style-type: none"> <li>.1 characteristics of weather systems</li> <li>.2 ability to apply available meteorological information to ensure safety of MOU and, upon request, supply other vessels or aircraft with information</li> <li>.3 sources of weather information</li> <li>.4 the effects of weather on the MOU environmental limits</li> </ul>	<ul style="list-style-type: none"> <li>.1 to .3 Successful completion of wind, waves and weather or approved course or written examination 073 (meteorology)</li> <li>.4 rig moving procedures or approved course.</li> </ul> Successful completion of oral examination 165C. (.4)	The likely weather conditions for a determined period are based on all available information Actions taken to maintain safety of navigation and operations minimize risk to safety of MOU
8. Plan and ensure safe transfer of personnel	Knowledge of : <ul style="list-style-type: none"> <li>.1 precautions to be taken during transfer of personnel</li> <li>.2 use of the personnel basket</li> <li>.3 helicopter transfers</li> <li>.4 vessel transfers</li> <li>.5 effect of environmental conditions on method of personnel transfer</li> </ul>	Basic Offshore Survival (BST) Course Experience in helicopter landings and departures as specified in 54.1 (a) iii (C) Successful Completion of Oral Examination (165C) Command and Control of major emergencies	Personnel transfers are conducted safely



Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
<p>9. Plan and ensure safe loading, stowage, securing and handling of supplies, including dangerous goods</p>	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>.1 the effect on trim and stability of cargoes and cargo operations</li> <li>.2 safe handling, stowage and care of equipment, supplies and dangerous goods</li> <li>.3 crane and lifting equipment, and their inspections</li> <li>.4 procedures for loading and discharge of helicopters and supply vessels</li> <li>.5 precautions during loading, and unloading, and use of dangerous, hazardous, or harmful goods</li> </ul>	<ul style="list-style-type: none"> <li>.1 <i>Stability and Ballast Control MODU Self-elevating</i> course as set out in TP10937 Chapter 8.2</li> <li>.4 and .5 Experience in helicopter landings and departures as specified in 54.1 (a) iii (C) and experience in at least 20 cargo transfer as specified in 54.1 (a) iii (A)</li> <li>.2, .3 and .5 Successful completion of oral examination 165C.</li> </ul>	<p>The likely weather conditions for a determined period are based on all available information</p> <p>Stowage and securing of cargoes and supplies ensures that stability and stress conditions remain within safe limits, and are in accordance with established guidelines and legislative requirements</p> <p>Information on dangers, hazards and special requirements is recorded in a suitable format for easy reference in the event of an incident</p>
<p>10. Prevention of pollution</p>	<p>Methods and aid to prevent pollution of the environment</p> <p>Knowledge of:</p> <ul style="list-style-type: none"> <li>.1 pollution prevention systems and controls</li> <li>.2 pollution control procedures, including the unit's MARPOL I/26 and article 3 of OPRC Convention Shipboard Oil Pollution Emergency Plan, MARPOL Annex V Waste Management Plan, and any plan dealing with dangerous/hazardous goods</li> </ul>	<p>Assessment of OJT checklist</p> <p>Successful completion of oral examination 165C</p>	<p>Operations are conducted without hazarding the environment through spills of oil or dangerous/hazardous goods, or garbage</p>
<p>11. Monitor and control safe working practices</p>	<p>Knowledge of safe working practices, such as:</p> <ul style="list-style-type: none"> <li>.1 occupational safety, health and hygiene</li> <li>.2 hazardous areas</li> <li>.3 permits to work</li> <li>.4 work over water</li> <li>.5 work in confined spaces</li> </ul> <p>Knowledge of personnel training, organization and communication</p> <p>Understanding and inspection of safety equipment</p> <p>Identify, evaluate, control new hazards through engineering controls or safe working practices</p>	<p>Assessment of OJT checklist</p> <p>Successful completion of oral examination 165C</p>	<p>Operations minimize hazards to personnel</p>



Competence	Knowledge understanding and proficiency	Methods for demonstrating competence	Criteria for evaluating competence
<p>12. Monitor and control compliance with legislative requirements and measures to ensure safety of life at sea and the protection of the marine environment</p>	<p>Knowledge of international maritime law embodied in international agreements and conventions            Regard should be paid to the following subjects:            .1 certificates and other documents required to be carried on board MOUs by international conventions and/or agreements            .2 responsibilities under the relevant requirements of the:            - International Convention on Load Lines;            - International Convention for the Safety of Life at Sea;            - International Convention for the Prevention of Pollution from Ships;            .3 maritime declarations of health and the requirements of the International Health Regulations            .4 responsibilities under international instruments affecting the safety of the MOU, visitors, crew and cargo            .5 methods and aids to prevent pollution of the marine environment by MOUs            .6 national legislation for implementing international agreements and conventions</p>	<p>Successful completion of oral examination 165C</p>	<p>Procedures for monitoring operations and maintenance comply with legislative requirements            Potential non-compliance is promptly and fully identified            Planned renewal and extension of certificates ensures continued validity of surveyed items and equipment</p>
<p>13. Monitor and control industrial operations impacting maritime safety</p>	<p>Knowledge and appreciation of the interrelationship between marine operations and specific industrial activities including, where appropriate, the following:            .1 drilling and maintenance, where appropriate, of wells            .2 construction and offshore maintenance and repair            .3 production            .4 accommodation support            .5 lifting operations            .6 pipe-laying            .7 diving            .8 fire-fighting support</p>	<p>Assessment of OJT checklist            Successful completion of oral examination 165C</p>	<p>Industrial operations are carried out safely</p>

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## CHAPTER 55 - BARGE SUPERVISOR, MODU/SELF ELEVATING

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 55.1 (1) Every applicant for a certificate as Barge Supervisor, MODU/Self-Elevating, shall:
- (a) subject to subsection (2), complete:
    - (i) a minimum of 12 months sea service as a driller, watchkeeping mate or engineer on a MODU/surface or MODU/self-elevating; and
    - (ii) the service referred to in paragraph (i) shall include:
      - (A) assisting in at least 10 cargo transfer operations at sea between a MODU and a supply ship of which not less than two or more than five shall have been observed from the supply ship;
      - (B) assisting in at least two complete relocation moves of a MODU/self-elevating unit; and
      - (C) assisting in at least 10 helicopter landings and departures from a MODU;
  - (b) obtain a medical certificate prescribed in the Crewing Regulations;
  - (c) obtain a certificate of completion for each of the following courses from a school set out in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2);
      - (C) Officer Certification (C); and
      - (D) Senior Officer (D);
    - (ii) Marine First Aid Advanced Course, set out in TP 13008;
    - (iii) Mobile Offshore Drilling Unit Courses, set out in TP 10937:
      - (A) Basic Drilling;
      - (B) Second Line Supervisor functions, Offshore Well Control;
      - (C) Basic Offshore Survival; and
      - (D) Stability for Self-Elevating Units;
  - (d) pass an examination in each of the following:
    - (i) Meteorology;
    - (ii) Rig Construction; and
    - (iii) Stability and Ballast Control; and
  - (e) pass an oral examination in General Seamanship.
- 55.1 (2) Not in use.

## PART II - EXAMINATIONS

55.2 The following table indicates the examinations for the Barge Supervisor, MODU, Certificate, the qualifying sea service required before each may be attempted, and other requirements.

Examination	Qualifying Service	Other Requirements
073 Meteorology	NIL	
114 M MODU Stability and Ballast Control	NIL	
125 M Rig Construction	NIL	
165 B General Seamanship	12 months	All other exams must have been passed.

## PART III - VALIDITY OF CERTIFICATE


55.3 The Barge Supervisor, MODU/Self-Elevating, Certificate has validity as barge supervisor of any MODU/Self-elevating while the unit is secured or positioned on location for the purpose of conducting a drilling operation or is in transit under the charge of a towing vessel, provided such certificate granted without geographical restriction is also valid as the person in charge of a navigational watch when the unit is in transit.

## PART IV - SYLLABUSES OF EXAMINATIONS


### 55.4 Meteorology Examination Number 073

ITEM	COLUMN
1.	Chemical Composition of the Atmosphere Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust and hygroscopic particles, dust, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).
2.	Vertical Structure of the Atmosphere Troposphere, stratosphere, mesosphere, thermosphere and ionosphere; stratospheric clouds, nacreous and noctilucent, appearance, height limits, composition; optical phenomena, reflection, refraction, aureole, bishop's ring, corona, halo, mock sun or parhelion, rainbow, mirages, Saint Elmo's fire, northern lights, magnetic storms, phosphorescence.
3.	Transfer of Heat Radiation, conduction, convection, turbulence.
4.	Temperature Related to the atmosphere and the earth; calorie, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.
5.	Atmospheric Moisture and Changes of State Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.



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6.	<p>Atmospheric Stability</p> <p>Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke; causes of subsidence; effects of substances, compression heating, evaporation.</p>
7.	<p>Fog</p> <p>Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.</p>
8.	<p>Clouds</p> <p>Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.</p>
9.	<p>Precipitation</p> <p>Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convectional, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.</p>
10.	<p>Lightning</p> <p>Theory of formation; associated clouds, conditions within the clouds; times, seasons and localities of occurrence.</p>
11.	<p>Pressure and Pressure Systems</p> <p>Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isallator, diurnal pressure variation, effect of diurnal pressure variation on detection of tropical revolving storms, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depression, polar front low, thermal depression, vertical instability depression (e.g., tropical revolving storm); straight isobars, effect of straight isobars on wind, on weather.</p>
12.	<p>Winds</p> <p>Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls; monsoons, theory of monsoon formation, land and sea breezes compared to monsoons, pressure and weather characteristics associated with monsoons, monsoons in the Indian Ocean and the China Sea; global systems circulation, seasonal modification and permanent pressure systems; intertropical convergence zone, trade winds, horse latitudes, westerlies, roaring forties, polar front, semi-permanent highs (Atlantic and Pacific), polar highs, Icelandic and Aleutian lows, effects of land; local winds, locality, season and prevailing direction of following winds, levanter, vendevals, mistral, bora, sirocco, gregale, etessain, khamsin, simoon, shamal, kaus, elephants, brick fielder, williwaw, harmattan, norther, tehuantepecer; upper-air circulation and jet stream, thermal wind, isohypses, Rossby waves, flow patterns at 500 mbar, steering rule.</p>
13.	<p>Air Masses</p> <p>Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, narrative polar, maritime tropical, equatorial.</p>
14.	<p>Fronts</p> <p>Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).</p>
15.	<p>Families of Depressions or Extra-Tropical Cyclones</p> <p>Formation between two air masses, life cycle and movement cross section, associated weather, frontogenesis, frontolysis, secondary depressions.</p>
16.	<p>Waves and Swells</p> <p>Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores; seiche.</p>

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17.	Oceanic Currents and Effect on the Climate Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold; various currents of the world.
18.	Tropical Revolving Storms Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting; names and season for tropical storms in the following areas: North Atlantic, western North Pacific, eastern North Pacific, South Pacific, Bay of Bengal, Arabian Sea, western Indian Ocean, eastern Indian Ocean.
19.	Ice Formation and Decay Freezing of fresh and salt water; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs, presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.
20.	Ice Detection and Reporting Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, interpretation of ice charts; <i>Canadian Waters and Manice</i> , ice climatology and ice operations, Ice Navigation in Canadian Waters; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, seawater temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.
21.	Weather Messages and Codes International analysis in code, definition, interpreting messages; plot pressure systems, fronts, isobars; forecast for 12-24 hours pressure, wind, sea state, visibility, clouds, weather changes; knowledge of services available, <i>Radio Aids to Marine Navigation Atlantic and Great Lakes Pacific</i> ; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weatherfax, weather, satellite, sea-state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weatherfax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts.
22.	Optimum Weather Routing Advantages, reduce storm damage, save time, meet special requirements; methods, on board ship, through shore-based firm, through government departments; climatological routing in areas with stable weather patterns; optimum routing, geography does not dictate track, travel time is more than three days or 1500 miles; data and long range progs available.
23.	Requirements Application of ship's-performance curves and sea data; use of surface analysis and prog charts; use of 500 mbar constant pressure charts for estimating storm track; use of ice charts, wave charts; practical drawing of optimum tracks embracing the use of polar stereographic or gnomonic charts, ship's-performance curves and locus positions; factors that require a continuous updating and revision of weather-routing procedures.

Note: The examination consists of a written test comprising multiple-choice and descriptive questions.  
Duration is three and a half hours.

## 55.5 MODU Stability and Ballast Control

### Examination number 114 M

ITEM	COLUMN
1.	Definitions Definitions of general terms (e.g., displacement, draft, trim, heel, freeboard, buoyancy, reserve buoyancy, block coefficient, deadweight, stable, unstable and neutral equilibrium).
2.	Terms Centre of gravity, centre of flotation, centre of buoyancy, reserve buoyancy, position of metacentre, righting lever and its effect on transverse and longitudinal stability; dynamic stability, synchronous rolling and angle of loll.
3.	Theory Theory of moments as applied to stability, including the effects of heavy lifts and movement of liquids in tanks and free-surface effect.
4.	Effect of Weights Effect of adding, removing, shifting weight and calculation of vertical, transverse and longitudinal shift of centre of gravity, danger of slack tanks, loading and unloading problems.
5.	Inclining Experiment Understanding the results of the inclining experiment report and using the results.
6.	Tables Use of hydrostatic curves, deadweight scale, hydrostatic tables and tank capacity tables; use of curves of statical stability; use of unit manuals.
7.	Stability Criteria Stability criteria for mobile offshore drilling units (e.g., allowable KG, effect of changing GM, righting area ratios and angle of downflooding).
8.	External Effects Effect of dynamically-stationed keeping systems on stability, force of the wind and high seas.
9.	Calculations Stability calculations utilizing concepts 1 to 8 above, and theory and calculations of deck loads and effect on stability; areas, volumes of common figures, squares, rectangles, triangles, cubes, cones, wedges, cylinders and spheres.
10.	Systems Examination of liquid transfer systems and their limitations and procedures; ballast systems, fuel systems, drilling liquids; zones of reduced stability, asymmetrical ballasting/deballasting.
11.	Response to Damage Damage and damage control procedure (use of pumping system and cross connections); effect of flooding compartments intentionally, including permeability; watertight integrity.
12.	Environmental Effect Environmental conditions and their effect on drilling operations; vessel and environmental limitations and criteria for changing to survival condition.
13.	Structural Stress Importance of load distribution with regard to structural stress; stress caused by location of load; stress in members; importance of bending moments and stress diagrams.
14.	Emergency Procedures Risk analysis of environmental conditions; emergency repairs to structure, damage from collision; shoring and temporary closures; use of cables and winches for securing; preparedness.

The examination will consist of nine questions of which the applicant shall answer six. The examination may include calculations, sketches and written description and multiple-choice questions. A question may consist of several parts.

Duration is three and a half hours.

## 55.6 Rig Construction


### Examination number 125 M

ITEM	COLUMN
1.	Mobile Offshore Drilling Unit Construction Basic construction of principal MODU types, including construction of: columns, drilling derrick, pontoons (footings), tubulars, deck houses, main and pipe decks, helicopter deck, ballast tanks, drilling well (moon pool), watertight doors, hatches; pressure vessels; location and extent of watertight bulkheads and flats; stiffening arrangements of watertight and tank-boundary bulkheads, including those made of corrugated plating.
2.	Construction Portfolio Contents, including: general arrangement, inboard and outboard profile, arrangement showing watertight compartments, decks and load density plans (including helicopter deck), transverse section showing scantlings, longitudinal section showing scantlings, framing, shell plating, bulkheads (watertight), structural and tanks showing location of air pipes and overflows, watertight doors and hatches, and capacity plans.
3.	Structural Strength Stresses to which a MODU is subjected; minimizing of concentrated stress; structural strengthening to compensate for stress in areas of anticipated failure.
4.	Welding Welding criteria for new construction and repair; acceptable welding procedures and inspecting methods; welding methods and materials, preparation of surfaces, atmospheric and gas-free conditions suitable for welding, sequence used in production welding to minimize shrinkage, types of welds, advantages and shortcomings of various welding types; conditions suitable for welding; welding methods.
5.	Corrosion Corrosion-control arrangements and their effect on scantlings during construction if provision is not made for effective implementation of such arrangements.
6.	Testing and Inspection Methods of testing of tanks, bulkheads, other watertight or oiltight work, pressure vessels of various types; inspection and repair (major, minor) procedure to maintain a MODU in compliance with regulatory requirements; requirements and preparation for statutory surveys and inspections; classification societies and advantages of classification; docking and inspection procedures, periodic and annual inspection programs; non-destructive testing/inspecting; underwater cleaning techniques; underwater inspection methods and programs; quality assurance and preventative maintenance system.
7.	Documentation Compiling damage and defect reports; IMO Code for the construction and equipment of a MODU and Canadian standard (TP 6472); contents and use of construction portfolio; contents and use of marine operations manual; application of loadline regulations to the principal type of MODUs, surface and column-stabilized.
8.	Watertight Integrity and Damage Control Ballast piping, pumping and control systems, bilge piping, pumping deck and rig floor-draining systems; maintenance of fire integrity on a MODU; definition of various hazardous zones; access and ventilation conditions affecting the extent of hazardous areas.

The examination will consist of nine questions of which the applicant shall answer six. The examination may include calculations, sketches, and written description and multiple-choice questions. A question may consist of several parts. Duration is three and a half hours.


**55.7 General Seamanship**  
**Examination number 165 B**

ITEM	COLUMN
1.	<p>Machinery            Use and care of electric and hydraulic winches, ordinary and self-tensioning; windlasses and capstans; main and emergency steering gears associated with MODUs; electric and hydraulic deck cranes; elevators for personnel, stores and equipment.</p>
2.	<p>Voyage Preparation            Manoeuvring a MODU under power; preparations for getting underway; planning for a towed voyage; preparing and inspecting towing equipment; securing towing vessels; the use, handling and securing of towing units; getting underway, under tow; communicating with tug masters; authority of OIM when MODU is under tow.</p>
3.	<p>Anchoring            Manoeuvres and cable handling involved in the use of ground tackle and ancillary equipment, including the use of anchor buoys; planning an anchor pattern; deployment of anchors with and without anchor-handling vessels; communication with anchor-handling vessels; clearing a foul anchor; hanging off an anchor; securing anchor gear in preparation for sea passage; use of anchors in emergency, to take way off; anchor and cable stowage, fittings and cable markings.</p>
4.	<p>Mooring Lines            Use, care and stowage of mooring lines, comprising: types of line used for mooring and their characteristics; the names of the various mooring lines; making fast supply vessels; emergency cast-off procedures; the use of mooring wire-rope reels; types of fairlead, their construction, naming and use.</p>
5.	<p>Stowage and Handling            Working of stores and equipment, comprising: mate's responsibilities in transfer of cargo, stores and personnel to and from supply vessel; inspections of holds, decks and spaces to receive goods; preparation and operation of cranes; arrangements and working of heavy lifts by ship equipment, and lifts that cannot be handled by a single runner; the overhaul and regular inspection of lifting gear.</p>
6.	<p>Organization            MODU routine and organization, comprising: the barge supervisor's executive and organizational duties; crew watches, direction of work; drawing up emergency muster lists with appropriate duties for crew members; the organizational duties for fuelling, storing or ballasting in all conditions; the barge supervisor's duties concerning the official logbook, entries in the deck log and owner's or charter's records; the barge supervisor's duties when repair, alteration or maintenance work is being carried out; the barge supervisor's duties when preparing a MODU for sea; the barge supervisor's duties and responsibilities on joining a MODU; the necessary paperwork or documentation to encompass the foregoing items, where applicable; control room and deck discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; duties and responsibilities of the barge supervisor, officer of the watch, ballast control and other bridge personnel (jointly and separately); the purposes, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties and responsibilities; means of assessing a tendency to drag anchors; arrangement and responsibility of departments aboard ship.</p>
7.	<p>Pollution-Prevention Management            Duties related to loading, transfer and storage of pollution responsibilities under oil pollution-prevention regulations and MARPOL; response to a pollution incident; identification of pollutants; obligation to prevent pollution.</p>
8.	<p>Emergency Response            Emergency duties and responsibilities for equipment, comprising: organization, frequency and routing of fire patrols under routine and exceptional conditions; recognition and assessment of fire hazards; importance of cleanliness and good housekeeping; organization of realistic fire drills, training of crew for emergencies; taking charge of marine emergencies; inspections, testing and maintenance of portable and fixed firefighting equipment; organization of realistic boat and lifesaving appliance drills, training of crew in use of lifesaving appliances and man-overboard drills; stowage, inspections, testing and maintenance of lifeboats, capsules, rafts and their equipment, lifejackets, immersion suits, lifebuoys, self-igniting lights and distress signals; taking charge of the launching of boats, rafts and capsules; assessing damage and flooding in cases of collision or stranding; search and rescue procedures, including a knowledge of AMVER, MERSAR, and TC publications.</p>

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9.	Personnel Documentation Rights and privileges of certificates of competency limited to MODUs; certificated personnel required; general manning required to meet safety requirements.
10.	Collision Avoidance Collision Regulations and their intent, ship routing, MODU safety zone; <i>Notices to Mariners</i> concerning MODU locations.
11.	MODU Underway MODU handling in a seaway; transverse thrust and its effect; wind effects on a MODU; how to heave to; anchoring in a tide, current, or wind; manoeuvring characteristics of other types of vessels; stern power and its effect; the handling characteristics of tugs and problems of towing vessels; turning and manoeuvring in a channel; docking problems; close-quarters situations at anchor and underway.

The examination is taken from the syllabus for the examinations for Watchkeeping Mate, MODU. The applicant is expected to have a deeper understanding of the intent and interpretation of the Collision Regulations as demonstrated by examination 062, which is supplemented here by oral questions and demonstrations.

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## CHAPTER 56 - WATCHKEEPING MATE, MODU/SELF-ELEVATING

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 56.1 Every applicant for a certificate as Watchkeeping Mate, MODU/Self-Elevating, shall:
- (a) complete 18 months service as follows:
    - (i) a minimum of six months service as a deck rating, driller, engine-room rating or engineer on watch on a MODU/self-elevating unit; and
    - (ii) the remainder of the service made up of any combination of deck rating, driller, engine-room rating or engineer on a MODU;
  - (b) obtain a medical certificate prescribed by the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate with Maritime Commercial Qualifications (ROC-MC) issued by Industry Canada;
  - (d) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957:
      - (A) Basic Safety (A1);
      - (B) Survival Craft (B1);
      - (C) Marine Fire Fighting (B2); and
      - (D) Officer Certification (C);
    - (ii) Marine First Aid Advanced Course, set out in TP 13008;
    - (iii) Simulated Electronic Navigation Level I, set out in TP 4958; and
    - (iv) MODU courses set out in TP 10937:
      - (A) Hydrogen Sulphide Alive (H<sub>2</sub>S);
      - (B) Stability for Self-elevating Units; and
      - (C) Basic Offshore Survival;
  - (e) pass an examination in each of the following subjects:
    - (i) Communications;
    - (ii) Chartwork and Pilotage;
    - (iii) Navigation Safety; and
    - (iv) General Rig Knowledge;
  - (f) pass a practical examination in Simulated Electronic Navigation Level I; and
  - (g) pass an oral examination in General Seamanship.

## PART II - EXAMINATIONS

56.2 The following table indicates the examinations for the Watchkeeping Mate, MODU/Self-elevating, Certificate, the qualifying sea service required before each may be attempted, and other requirements.

Examination	Qualifying Service	Other Requirements
012 Communications	NIL	NIL
SIM 1 Navigating Instruments	12 months	Completions of the SEN I Course
041 Chartwork and Pilotage	12 months	NIL
061 Navigation Safety	18 months	NIL
151 M General Rig Knowledge	12 months	NIL
165 A General Seamanship	18 months	All other exams must have been passed.

## PART III - VALIDITY OF CERTIFICATE

56.3 The Watchkeeping Mate, MODU/Self-elevating, Certificate has validity as third or second mate of a self-elevating MODU on site or under tow in any location.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 56.4 Communications Examination number 012

ITEM	COLUMN
1.	Visual Recognition of letters and numerals sent by flashing light or sound in Morse code, International Code Flags, meaning of single-letter International Code; coding and decoding of messages sent by flag, Morse and voice procedures using the International Code of Signals.
2.	Radio Use of radio aids to marine navigation for ascertaining facilities and services.

Note: The examination consists of:


- (a) reading Morse flashing light at a speed of four words per minute;
- (b) satisfying the examiner of ability to send Morse by flashing light; and
- (c) a multiple-choice test on the remainder of the syllabus.

Duration as necessary.



**56.5 Chartwork and Pilotage  
Examination Number 041**

ITEM	COLUMN
1.	<p>Pilotage Preparations for pilotage, using available charts and publications, possession and ready for immediate use all necessary charts, including large-scale charts of the pilotage area duly corrected to date, latest sailing directions, <i>Notices to Mariners</i>, light lists, Traffic Zone Regulations (as applicable), tide tables, Charts and Publications Regulations, Code of Navigation Procedures and Practices, and <i>Radio Aids to Marine Navigation</i>.</p>
2.	<p>Steering Common steering procedures, their purpose and how to put them into effect; the importance of establishing and adhering to internationally-accepted procedures in issuing helm and steering orders and having them acknowledged and complied with; the instruction of helmsmen in this matter.</p>
3.	<p>Symbols The chart symbols and abbreviations as published in <i>Canadian Hydrographic Service(CHS) Chart No. 1</i>.</p>
4.	<p>Sailing Directions The contents of preface to <i>Sailing Directions</i>, the important general navigational information contained in the preamble and opening chapter of these volumes.</p>
5.	<p>Lists of Lights Light characteristics, colours and sound signals used as aids to navigation; use of Lists of Lights, Buoys and Fog Signals; the terms used to define the power of lights (e.g., geographical range, luminous range, charted range, computed range, nominal range, computed visibility); use of a luminous-range diagram; the effect of abnormal refraction fog signals of different types, anomalies of sound propagation in fog, notices regarding lights, lighthouses and buoys etc. published in <i>Notices to Mariners</i>.</p>
6.	<p>Tidal Currents Find the set and rate of tidal current that may be expected at a given point from information given in tide and current table or on the chart; ability to use tables and information on the chart of the locality with awareness of the possibly significant effect of weather on the reliability of the information so obtained.</p>
7.	<p>Navigation in Confined Waters Navigation in confined waters, including: altering course; transits; leading marks and bearings; recording the vessel's progress; making allowance for height of tide; the preparatory details to be attended to when entering confined waters (e.g., a review of the relevant sections of the sailing directions, ready availability of large-scale charts of the area with proposed track drawn indicating distances, courses and near dangers noted); navigational aids with their characteristics to be identified, clearing lines, marks and bearings to be used during the passage to be drawn in, precalculation of tidal heights where critical depths of water may be encountered; the maintenance of a record of the vessel's progress on both chart and logbook, including times of passing successive points, course's compass error, speed, weather; fixing the vessel's position by relative and true bearings, transits; dead-reckoning position, estimated position and observed position</p>
8.	<p>Navigation Aids Navigational aids in pilotage situations; the necessity of continuing the customary checks and counts of the vessel's safe progress by the officer of the watch (OOW) and ship's personnel with record of the details of duties performed, notwithstanding that the vessel was under the conduct of a pilot; the duty of the OOW to ensure that the pilot's advice is understood and effectively carried out, the extent to which reliance is placed on buoys.</p>
9.	<p>Canadian System Canadian System of Buoyage in detail; differences between lateral and cardinal systems; use of <i>Sailing Directions</i> for determining other buoyage systems in use; current and new Canadian buoyage system with an understanding of the basic principles employed in the lateral and the cardinal buoyage systems, the importance of consulting the applicable volume of <i>Sailing Directions</i> for details of buoyage system in force locally prior to entering unfamiliar waters of other countries; <i>Aids to Navigation</i>.</p>

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10.	<p><b>Bridge Practices</b>          Bridge practices and procedures in pilotage situations, charts, various projections in common use; the requirement to continue the practice of good navigation procedures by the OOW and ship's personnel and the realization that the presence of a pilot on the bridge does not absolve the ship's personnel from their continuing responsibility for the safe navigation of the ship; the principle employed in construction charts on the Mercator, polyconic, and gnomonic projections, the limitations associated with each of these projections and the purposes of each in practical navigation.</p>
11.	<p><b>Charts</b>          Significant distortion, numbering and the presentation of information; the cause of chart distortion, need for nautical charts on board ship; the replacement of superseded editions; the mode of presentation of information on charts; metrication; chart catalogues and numbering.</p>
12.	<p><b>Chart Usage</b>          Use charts produced by the major projections in common use by the Canadian Hydrographic Service, including gnomonic charts; the use of charts in the practice of coastal navigation and on ocean passages; the plotting of bearings, position lines, clearing lines etc.; the transfer of positions from a chart of one projection to another of a different projection; the use of a gnomonic projection chart, Mercator and polyconic charts.</p>
13.	<p><b>Fixing Position</b>          Fixing the ship's position by means at the disposal of the OOW, including electronic navigational aids; considerations to be taken into account, including errors and limitations of equipment; the correction and plotting of bearings taken visually, by radar or direction finder (DF) and the limitations of accuracy inherent in each of these methods; the ship's position established by bearings or ranges taken simultaneously or with an interval and run intervening.</p>
14.	<p><b>Estimating Position</b>          Estimating the vessel's position, including allowing for effects of wind and/or tide; the reliability of the value in direction and force of wind, current and tidal effect used in arriving at the ship's DR position and the resulting area of doubt.</p>
15.	<p><b>Laying Off Courses</b>          Laying off courses, including allowance for effects of wind and tide; the problem of combining vectors of wind, current, tidal effect and course to steer to arrive at course made good, scrutiny of chart for off-lying dangers.</p>
16.	<p><b>Conversion of Course</b>          Conversion of true courses laid off to magnetic courses, including determination of variation at any place; conversion of true courses to gyro, magnetic and compass courses and vice versa; determining the up-to-date value of variation and interpolating for variation at a given locality from isogonic lines or compass roses; use of transit lines, azimuth and amplitude to determine compass error.</p>
17.	<p><b>Distance Measurement</b>          Distance measurement and the determination of speed made good and speed through the water; the measurement of distance on a Mercator or polyconic chart; the factors contributing to speed made good and speed through the water, how the difference between the two is expressed.</p>
18.	<p><b>Range of Visibility</b>          Factors controlling the range of visibility; terms associated with visibility of lights on navigational aids.</p>
19.	<p><b>Reliability of Charts</b>          Reliability of charts; indications by which reliability may be judged (e.g., date of original survey and possibility of subsequent surveys, adequacy of recorded soundings corrections having been made to date); large-scale charts show a small area in greater detail than small-scale charts; care and upkeep of charts.</p>
20.	<p><b>Publications</b>          Use of publications at the disposal of the coastal navigator, including <i>Notices to Mariners</i> for the correction of charts and publications; the various publications available to the navigator and the nature of their contents; the importance of chart corrections being kept up-to-date.</p>
21.	<p><b>Tidal Terms</b>          The meaning of tidal terms in common use in CHS and US tide tables; general understanding of tidal phenomena necessary for the comprehension of tidal terms; tidal atlases.</p>

22.	<b>Calculation of Tides</b> Calculation of tides and heights of high and low water at reference and secondary ports and the calculation of depth of water at those times; use of the calculated depth of water at high and low water to determine the height of water at a given charted position.
23.	<b>Set and Rate of Tides</b> Estimation of set and rate of tidal currents by reference to tidal current tables and by actual observation; the tentative nature of tabulated tidal current values and the need for caution in using them; the care required in making tidal current observations and the associated details that must be recorded.
24.	<b>Records</b> The need for keeping an accurate record of the vessel's progress and the keeping of such a record; the duty of the OOW to maintain an accurate, detailed and continuous record of the vessel's progress from which a position may be readily determined at any time; the value of such a record being available as a measure of safe navigation and in the event of an emergency requiring immediate knowledge of the ship's position.

Note: The examination consists of:  
(a) a practical chartwork paper, and  
(b) a multiple-choice examination.  
Duration is three and a half hours.

**56.6 Navigation Safety**  
**Examination number 061**

ITEM	COLUMN
1.	<b>Navigation Safety</b> Application of the content of Collision Regulations with Canadian Modifications, 1983; recommended Code of Nautical Procedures and Practices.

Note: The examination is a multiple-choice test, supplemented by oral questions as necessary.  
Duration is one and a half hours.

**56.7 Navigation Instruments**  
**Examination number SIM 1**


ITEM	COLUMN
1.	The syllabus for the examination is presented in TP 4958, Simulated Electronic Navigation Courses.

Note The examination consists of:  
(a) a check list approved by the instructor after a practical and oral test at an approved school;  
(b) a multiple-choice examination conducted by an approved school and subject to scrutiny and monitoring by Transport Canada; and  
(c) an examination conducted by Transport Canada, with simulated exercises.  
Duration is three and a half hours.

## 56.8 General Rig Knowledge

### Examination number 151 M


ITEM	COLUMN
1.	Types of Drilling Units Semi-submersible, column-stabilized, anchored, dynamically-positioned; surface type, self-propelled, ship type, non self-propelled, barge type.
2.	Design Criteria Water depth; maximum wind, wave, current, ice, temperature and tidal conditions; maximum load criteria (structure, deck, derrick, and hull); marine growth; damage criteria.
3.	MODU Structural Strength (Accomplished by excluding individual consideration of fatigue and corrosion) Column stabilized units, strengthening of deck (column, hull, tubular) structures against wave impact, strengthening watertight compartments against hydrostatic pressure, strengthening in way of anchoring, mooring systems, methods of stiffening tubular members, column and tubular bracing critical joints, local strengthening for ice; surface units, strengthening in way of drilling structure (moon pool), maintaining continuity of longitudinal strength, compensating for large hatches/moon pool, strengthening in way of anchoring and mooring systems, strengthening in way of thrusters, strengthening in way of derrick and deck loads, strengthening in way of ice surface hull; general material strength, steel types, welding connections.
4.	Dimensions Column stabilized (e.g., identify dimensions on longitudinal profile or transverse section), moulded baseline load, waterline length overall (pontoons), breadth moulded, total height to crown, elevations, freeboard, column spacing centre to centre (F to A, P to S), maximum operating draft, storm draft, transit draft, pontoon width moulded, pontoon depth moulded, principal dimensions of columns, air gap; drilling capacity, drilling depth, water depth, air gap, environmental criteria, riser angle limitations, slip-joint stroke.
5.	Modes of Operations Normal drilling condition (afloat); severe storm condition (afloat); transit condition.
6.	General Terminology Longitudinal framing, transverse framing, centre line, midship section, camber, sheer, shell, bulkhead, deck, hatch, superstructure and deck house, bilge, cofferdam, watertight doors, thruster pods.
7.	Structural Terminology Angles, frames, beams, stringers, flanges, brackets, floors, coaming, lug projection for grabbing, pillar, girders, stiffeners, tripping brackets, ring frames, diagonals, struts, tubulars, plating.
8.	MODU and Equipment Identify, on an appropriate drawing, decks, pump room, control room, ballast tanks, fuel tanks, machinery space, crew spaces, watertight bulkheads (flats), rudder, thrusters, freshwater tanks, helicopter deck (fuelling), crane, drilling derrick, crown block, travelling block, hook, swivel, rotary table, racking platform, mooring equipment (windless), pontoons, davits, blow-out preventers, choke, riser tensioner, guideline tensioner, mud tanks, cement tanks, stability columns, footings, moon pool, columns, bracings, thruster compartments, crane pedestals, drill water tanks, motion compensators, kelly, diverter, shaker room, mud-pump room, sack storage area, mud-pit room, pipe deck, pipe stowage, substructure, emergency-generator room, production test equipment, flare room, marine riser (bays), casing, bop-test pits (stowage), anchor racks (stowage), chain locker, fairleads, elevator (column), column tanks, cement room (pump).
9.	Frames Types, spacing, numbering (longitudinal, transverse) connection to shell plating; bulb bar or flat bar; longitudinal, transverse, intermediate, combination, web frame, ring frame (tubular members columns).
10.	Shell Plating Purpose, to shut out water, take up sheer stresses resulting from water pressure, bending stresses (sea, ice, other craft, deck loads); conventional numbering of plates for drill ships
11.	Beams Transverse, longitudinal, connection to frames, decks, coamings, shell.
12.	Decks Numbering of decks, load density of each and where shown.

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13.	<b>Bulkheads</b> Tank bulkheads, watertight bulkheads, oiltight bulkheads, decks and flats, corrugated bulkheads (tanks, housing), arrangements and connection of plates, stiffeners, beams, girders, webs and tripping brackets, fire rating.
14.	<b>Mooring Equipment and Towing Arrangements</b> Type; anchor storage, chain locker closures, where positioned; fair leads; tension measurement, how often tested, who tests.
15.	<b>Hatchways and Moon Pools</b> Connecting and strengthening members, protection arrangements.
16.	<b>Cranes, Drilling Derrick and Personnel Lift</b> Terms used and signals, hoisting, lowering, outreach, slewing, travelling (in case of gantry crane), SWL at various rodii; names of parts, preparation and procedures for use, how often tested, by whom, non-destructive tests, dynamic-load derating; complete understanding of cranes, drilling derrick operation, inspection, examination and testing procedure, including completion cargo hauling machinery and gear register; test certificates of wires, chains, shackles and hooks, routine maintenance.
17.	<b>Helicopter Facilities</b> Construction; safety arrangements, non-skid surface, drainage facilities for fuel or firefighting equipment (foam etc.); visual aids (markings, night lights and wind direction indicator), aircraft tie-down arrangement, crash box, fuel stowage, fixed firefighting equipment maintenance.
18.	<b>Ropes, Wires and Chains</b> Safe working load and breaking strength calculations, natural fibre ropes, man-made fibre ropes, wire ropes, chains, open link, studded link.
19.	<b>Loadlines</b> Where marked, who assigned them, draft and loadline markings, rig depth below keel.
20.	<b>Industrial and Environment Safety</b> Safe working practices regulations and recommendations, tackle regulations, pollution prevention regulations, oil pollution prevention regulations, arctic water pollution regulations, shipping safety control zones, garbage pollution prevention, provincial regulations, occupational health and safety, master oil disposal tank (burn/transfer to shore).
21.	<b>Occupational Health and Safety</b> <i>Canada Labour Code</i> as applied to offshore drilling units.
22.	<b>Cargo</b> Handling, stowage, compatibility, damage, contamination, and ventilation requirements of following cargo for MODUs: pipes, chains, mud (oil base), flammable liquids, explosives, radioactive materials, oxyacetylene cylinder.
23.	<b>Codes</b> Ability to use following codes: IMO Dangerous Goods, Deck Cargo Safety, Code of Safe Working Practices.
24.	<b>Records</b> Ability to complete Oil Record Book in compliance with the Pollution Prevention Regulations, cargo log, deck log, and record keeping in general.
25.	<b>Plans and Drawings</b> Use of following safety related plans: location and operation of lifesaving appliances and a procedure for evacuation of personnel from unit; fire control plan; plan showing hazardous locations and doors; gas detection systems; and fire- and boat-drill requirements.

**56.9 General Seamanship**  
**Examination number 165 A**

<b>ITEM</b>	<b>COLUMN</b>
1.	Terminology Rigging of MODUs, comprising: names, purpose, and construction of standing and running rigging, drilling, derricks, burner booms and geronimo rigs.
2.	Knots Ropes and Rigging Basic knotting, gripping and splicing with reference to current practice, seizing, packings, frapping, and stoppers; the reeving of blocks and purchases, rigging of stages and chairs; the rigging of fuelling booms and hoses.
3.	On Board Organization Control room and deck discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; duties and responsibilities of the OIM, officer of the watch, ballast control and other bridge personnel (jointly and separately); the purposes, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties and responsibilities; means of assessing a tendency to drag anchors; arrangement and responsibility of departments aboard ship.
4.	Safety and Emergency Action required of the officer of the watch in emergencies at sea, when underway and on location, comprising: man overboard; running aground; collision; sighting of derelicts; sighting or receiving distress signals; breakdown of navigational aids or equipment; power failure; capsizing of tugs when under tow or manoeuvring; tending of anchors; routine and exceptional fire patrols and inspections; action on discovery of fire aboard; precaution when taking on or transferring fuel, water or stores; safe working practices in the protection of crew members; parted supply boat moorings, burst oil lines, tank overflow; actions required when a passing vessel is approaching on a close-quarters course; accidents to any person on board, including collapse of a crew member in a tank or other confined space.
5.	Anchors Anchors and associated equipment, comprising: construction and names of the parts of stocked and stockless anchors; chain cable and shackles; chain-cable markings and reporting; cable stowage; combination wire and chain cables; wire cables; stowage of wire cables; securing devices; manual and automatic tensioning devices; emergency releasing arrangement; fittings between cable locker and hawse pipe; common terms used in anchor work; terms associated with lead of cable; anchoring in shallow or deep water; anchoring in an emergency; heaving up and securing cable; terms pertaining to MODU at anchor.
6.	Mooring Mooring and mooring lines or securing supply boats to unit, comprising: the names of the various mooring lines, their purpose, and terms used in handling and working them.
7.	Joining Responsibility on joining a MODU.
8.	Collision Regulations
9.	Pollution Duties related to loading, transfer and storage of pollutants, responsibilities under pollution-prevention regulations and MARPOL.

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## CHAPTER 57 - MAINTENANCE SUPERVISOR, MODU/SELF-ELEVATING CERTIFICATE OR ENDORSEMENT

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 57.1 Every applicant for an endorsement as Maintenance Supervisor, MODU/Self-Elevating, shall:
- (a) (i) complete 12 months qualifying service on a MODU Self-elevating after obtaining a certificate of competency as Third-Class Engineer (motor); or
  - (ii) complete 24 months qualifying service on a MODU Self-elevating after obtaining equivalent technical qualifications and pass an examination in the following subjects: third class engineering knowledge general, engineering knowledge motor and electrotechnology; \* or
  - (iii) complete 60 months qualifying service on a MODU Self-elevating and pass an examination in the following subjects: third class engineering knowledge general, engineering knowledge motor and electrotechnology;
  - (b) obtain valid and current medical certificate as prescribed in applicable Regulations;
  - (c) hold a valid and current certificate for each of the following courses:
    - (i) Marine Emergency Duties Courses, set out in TP 4957 or approved equivalent;
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2); and
      - (C) MED C and D or Command and Control Training as per TP 10937;
    - (ii) Marine Advanced First Aid Course (16 hours) or approved equivalent; and
    - (iii) Propulsion Plant Simulator Course Level I as set out in TP 10935 or approved equivalent;
  - (d) obtain a certificate of completion for each of the following approved Mobile Offshore Drilling Unit Courses or approved equivalent:
    - (i) Hydrogen Sulphide (H<sub>2</sub>S) awareness; and
    - (ii) Basic Offshore Survival (BST); and
  - (e) pass an oral examination.
- \* A certificate issued by a technical college recognized by a province of Canada based upon an accredited two-year course in the electrical, instrumentation and/or mechanical trades or a Canadian inter-provincial journey person's certificate in the electrical, instrumentation or mechanical trades; an exemption in electrotechnology may be granted on the production of evidence of having equivalent qualifications.

These requirements meet the standard of competence set out in IMO Assembly Resolution A21/Res. 891, modified for Maintenance Supervisor, MODU Self-elevating as set out in Part II of this Chapter.

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## PART II-SPECIFICATION OF MINIMUM STANDARD OF COMPETENCE FOR MAINTENANCE SUPERVISOR, MODU SELF-ELEVATING

This table is based on IMO Assembly Resolution A21/Res. 891 table 6.5:

<b>Competence</b>	<b>Knowledge understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
1. Use appropriate tools for fabrication and repair operations typically performed on MOUs	Characteristics and limitations of materials used in construction and repair 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	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
2. Use hand tools and measuring equipment for dismantling, maintenance, repair and re-assembly of on-board plant and equipment	Design characteristics and selection of materials in construction of equipment Interpretation of machinery drawings and hand tools Operational characteristics of equipment and systems	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
3. Use hand tools, electrical and electronic measuring and test equipment for fault-finding, maintenance and repair operations	Safety requirements for working on electrical systems Construction and operational characteristics of on-board AC and DC electrical systems and equipment Construction and operation of electrical test and measuring equipment	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
4. Operate alternators, generators and control systems	Generating plant Appropriate basic electrical knowledge and skills Preparing, starting, coupling and changing over alternators or generators Location of common faults and action to prevent damage Control systems Location of common faults and action to prevent damage	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
5. Maintain engineering systems, including control systems	Appropriate basic mechanical knowledge and skills 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	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations



<b>Competence</b>	<b>Knowledge understanding and proficiency</b>	<b>Methods for demonstrating competence</b>	<b>Criteria for evaluating competence</b>
6. Operate, monitor and evaluate engine and machinery performance and capacity	Operation and maintenance of: engines auxiliary machinery including pumping and piping systems, associated control systems and, if appropriate, jacking systems	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
7. Detect and identify the cause of machinery malfunctions and correct faults	Detection of machinery malfunction and location of faults to prevent or minimize damage	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
8. Organize safe maintenance and repair procedures	Marine engineering practice Organizing and carrying out safe maintenance and repair procedure	Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
9. Operate and maintain survival craft and launching systems and systems for fire prevention, detection and extinction	Maintenance of operational condition of survival craft and launching systems and systems for fire prevention, detection and extinction Actions taken to protect the unit and its personnel and limit damage following fire, explosion, collision or grounding	Successful completion of MODU Specific Oral Examination completion of MED B1,B2,C and D training or approved equivalent	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
10. Prevention of pollution	Methods and aid to prevent pollution of the environment Knowledge of relevant international and national requirements, regard should be paid especially to: 1. certificates and other documents required by international conventions or national law, how they may be obtained, and their period of validity 2. responsibilities under relevant international agreements	Assessment of On Job Training (OJT) Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations
11. Ensure safe working practices	Safe working practices	Assessment of OJT Successful completion of MODU Specific Oral Examination	Hold a 3 <sup>rd</sup> Class (motor) or equivalent technical certificate or pass appropriate examinations

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## CHAPTER 58 - OFFSHORE INSTALLATION MANAGER (OIM), MODU/INLAND

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 58.1 (1) Every applicant for a certificate as Offshore Installation Manager, MODU/Inland, shall:
- (a) subject to subsection (2), complete 12 months service as follows:
    - (i) a minimum of six months service on a MODU as a barge supervisor while holding a certificate as Barge Supervisor, MODU/Inland;
    - (ii) the remaining time made up of any combination of service as a watchkeeping mate or engineer, maintenance supervisor, tourpusher or toolpusher; and
    - (iii) the service referred to in paragraph (a) shall include:
      - (A) assisting in at least 20 cargo-transfer operations at sea between a MODU and a supply ship of which not less than two shall have been observed from the supply ship; and
      - (B) assisting in at least four complete relocation moves of a MODU/Inland;
  - (b) obtain a medical certificate prescribed in the Crewing Regulations;
  - (c) obtain a certificate of completion for each of the following courses from a school listed in TP 10655:
    - (i) Marine Emergency Duties Course, set out in TP 4957:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2);
      - (C) Officer Certification (C); and
      - (D) Senior Officer (D);
    - (ii) Marine First Aid Advanced Course, set out in TP 13008; and
    - (iii) Mobile Offshore Drilling Unit Course, set out in TP 10937:
      - (A) Advanced Drilling;
      - (B) Second Line Supervisor functions, Offshore Well Control; and
      - (C) Basic Offshore Survival;
  - (d) pass a written examination in each of the following:
    - (i) MODU Management;
    - (ii) Rig Construction; and
    - (iii) subject to subsection 58.2, Engineering Knowledge; and
  - (e) pass an oral examination in General Seamanship.

## PART II - EXAMINATIONS

58.2 The following table indicates the examinations for the Offshore Installation Manager Certificate, the qualifying service required before each may be attempted, and other requirements.

Examinations	Qualifying Service While Holding a Barge Supervisor MODU Certificate	Other Requirements
95 M MODU Management	NIL	
125 M Rig Construction	NIL	
135 M Marine Engineering* Knowledge	NIL	
165 C General Seamanship	12 months	All other exams must have been passed.

\*Holders of a Marine Engineers Certificate may be exempted from the requirement to pass 135 M.

## PART III - VALIDITY OF CERTIFICATE

58.3 The OIM, MODU/Inland, Certificate has validity as offshore installation manager of any MODU/surface or self-elevating unit while the unit is secured or positioned on location on inland waters for the purpose of conducting drilling operations or is in transit under the charge of a towing vessel, provided that such certificates granted without geographical restriction are also valid as the person in charge of a navigational watch when the unit is in transit.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 58.4 MODU Management

#### Examination number 095 M


ITEM	COLUMN
1.	Business and Law The provisions of the <i>Canada Shipping Act</i> relating to ship safety, ship registration, ship manning, seafarers' rights, pollution and protection; certification of seafarers; accident investigation; use of councillors' offices; engagement and discharge of personnel, inside and outside Canada; maintenance of discipline; port wardens and steamship inspectors; limitation of liability; provisions, health and accommodation; <i>Pilotage Act</i> ; pilotage; coasting trade, coasting licences and regulations; customs and immigration procedures; <i>Carriage of Goods by Water Act</i> ; control of ships and Canada's international obligations, <i>Canadian Labour Code</i> , hazardous goods regulations.
2.	Contracts Marine insurance; charter parties, deviation and its effect on various contracts; function of ship's agents; OIM's responsibilities in the event of salvage and salvage agreements; business aspects of putting into port with damaged ship or cargo; noting and extending protest.
3.	Management General organization of MODU and ship's management; MODU and shipboard accounting; procurement of stores; entering and clearing ships in foreign ports; sick seafarers in foreign ports; personnel training; union representation; putting into port with damaged ship or cargo.
4.	Conventions Function and jurisdiction of International Maritime Organization, International Labour Organization, Safety Of Life at Sea, Standards of Training, Certification and Watchkeeping for Seafarers, 1978; Antwerp Rules; United Nations Convention on Trade and Development; Tonnage Measurement, 1976; tonnage rules for coasting; Suez and Panama rules; articles, regulations and resolutions; MARPOL.
5.	Regulations Shipping Casualties Reporting; Vessel Traffic Reporting Systems; Foreign-Going, Home-Trade, Inland Waters and Minor Waters Voyage; Potable Water; Medical Examination of Seafarers; Quarantine; Ship's Crew's Food and Catering; Inspection Certificate for Non-Convention Ships; Safety Certificate; Oil Prevention; <i>Canada Labour Code</i> Part II pertaining to marine; MODU's obligation and responsibilities in the event of emergencies, collision, distress, search and rescue; legal consequences of infractions of regulation.

Note: The examination consists of written descriptive questions.  
Duration is three and a half hours.

### 58.5 Marine Engineering Knowledge

#### Examination number 135 M

ITEM	COLUMN
1.	Steam Boiler Principles of combustion, fuel burning methods and arrangements, manual and automatic controls, steam generation up to the delivery of steam in the superheated state, the closed-feed system, boiler construction including mountings and associated auxiliaries, an appreciation of maintenance, the use of heaters and economizers, auxiliary and domestic boilers.
2.	Internal Combustion Engines Principles of operation of two- and four-cycle and opposed-piston engines; ignition of fuels in diesel engines, effects of turbocharging; cooling and lubricating systems associated with main engines; effect on engine of sub-zero air temperatures; control arrangements, reversing, auxiliaries associated with main diesel units, and diesel electric propulsion.
3.	Pumps Types of reciprocating, rotating and screw pumps; circulation systems for vessels operating in ice.

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4.	Piping and Pumping Arrangements Bilge, ballast, cargo, fuel and fire systems; high- and low-level intakes; overboard discharges; hull fittings; special arrangements for navigating in ice.
5.	Drive Systems Thrust and trailing blocks, reduction gearing, electromagnetic coupling or hydraulic coupling for two or more engines on one shaft, flexible couplings; reduction gears, table drives; hydraulic motors and valving.
6.	Transmission of Heat Principles of transmission of heat; refrigeration and insulation.
7.	Remote-Control Systems Principles of operation of remote-control systems; types of control transmission, pneumatic, electric, hydraulic, data logging, alarm and fail-safe systems, bridge-control systems, basic computer concepts as found on ships.
8.	Hydraulic Systems Hydraulic systems on board ship; block diagrams of system; characteristics of fluids; storage of fluids, contamination of fluids; safety in operation; prevention of water contamination and saltwater corrosion.
9.	Shaft Vibration and Critical Speed Causes and effects of shaft vibration, propeller cavitation, relationship between vibration and critical engine speed, effect of draft and trim, effective remedies, reasons why engine should not be operated within a critical speed range.
10.	Venturi System Principle, use and limitations for ventilation, ejectors and syphons.
11.	Air Receivers Periodic internal cleaning, cleaning materials to avoid and why, mountings fitted, inspection and testing, certificate.
12.	Engine Power Calculation of power (diesel); reasons for loss of power in individual cylinders of a diesel engine; effect of power imbalance and how corrected (diesel); effect on power by quality of fuel; energy management.
13.	Propellers Advantages and disadvantages of fixed, controllable-pitch, and shrouded propellers.
14.	Electrical Units Electric potential, potential difference, units and dimension.
15.	Electric Circuit Resistance, its definition, units and dependence on temperature and dimensions of conductor; Ohm's law, effective resistance of groups of resistances connected in series and in parallel; potential-difference batteries, principles of primary cell and secondary cell, lead-storage battery, specific gravity of the electrolyte of cell, charging a battery, general care and maintenance; alkaline cell; nickel-iron cell; cells connected in series and parallel.
16.	Kirchhoff's Law Statement of Kirchhoff's law with calculations involving their application in series and parallel DC circuits.
17.	Power Definition and dimension of power in an electric circuit, statement of joule's law with calculations.
18.	Alternating Current Definition of alternating current and meaning of cycle, sinusoidal wave form, frequency and period, peak value, RMS and average value per half cycle of an alternating current, arithmetic relation of each to value of a direct current of equal power; the purpose for which knowledge of RMS values are required and the purpose involving peak values; ratio as the form factor, and the value of this ratio for a sine wave.
19.	AC Circuits Electrical terms used with AC circuits, including inductive impedance, capacitive impedance, reactance, admittance, susceptance; capacitors in series and parallel; capacitance, its units and dimensions, calculations of equivalent capacitance of capacitors connected in series and in parallel; leading and lagging power factor, apparent power, reactive power, series and parallel resonance, phase angle, current leading and lagging voltage; calculation of series and parallel circuit parameters, combinations of resistance, capacitance and inductance; determination of resonant frequency; calculation of the power factor of a complex circuit.

20.	<p><b>Alternators</b></p> <p>Production of an EMF in a conductor as a consequence of the relative motion of the conductor in a magnetic field altering the flux linkages; direction of the induced EMF as determined by Right Hand Rule; relationship between speed, number of poles and frequency; operation of a simple alternator with production of a sine wave EMF; construction of large alternator of rotating field type; diagram illustrating the important features; magnetic circuit and the method of supplying current to magnet coils; importance of reducing magnetic reluctance at the air gap and how achieved; effect of shaped pole facings on the shape of the EMF curve generated; deleterious effects of eddy currents in the armature and method of reducing these currents; inductor-type alternator; diagram showing position of the armature winding and the field magnet winding and shape of the rotor, polyphase alternator, three-phase generator, advantages of polyphase generator, connection of the three phases in a star or delta with consequent differing line voltages and currents.</p>
21.	<p><b>AC Motors</b></p> <p>Characteristics of AC motors without commutators as fundamentally single-speed machines; induction motor; constructional details of a large-size machine with stator carrying polyphase winding connected to the supply; speed characteristics with explanation of the existence of slip; rotor speed being less than synchronous speed; synchronous motor; advantage of this motor where constant speed with no slip is desirable, method of starting and the consequences of switching on the three-phase supply before the motor rotates at the supply frequency, method of exciting the magnetic field; use of this motor to compensate for excessive inductance, reactance and thus improve the power factor.</p>
22.	<p><b>Transformers</b></p> <p>General construction and elementary principles; functions performed by a power transformer with diagram identifying the parts, including the magnetic flux circuit and the primary and secondary windings; transformation ratio and the effect of a primary EMF on the secondary when the latter is on open circuit; no load current of a transformer, its components and the phase relation of each to the applied voltage; the effect of the secondary being put on load, including the changes that take place in magnetic flux in currents in the primary, secondary; effect on the power factor of the nature of load, resistive or reactive; arrangements for dissipating the heat generated in core and winding of large transformers.</p>
23.	<p><b>Unit Generation and Distribution System</b></p> <p>Diagram of the electrical installation on a modern unit identifying the various components, including the generating machines, distribution, safety devices, circuit breakers, grounding of machines, general layout; switch gear, motor starters, circuit breakers, tracing systems and arrangement of other appliances.</p>
24.	<p><b>Measuring Instruments</b></p> <p>General knowledge of the use and principles employed by common measuring instruments found on board a unit; moving coil-type ammeter and voltmeter, essential features with sketch showing the moving coil and the field of comparative high flux of a permanent magnet ensuring a uniform torque, the manner of providing a control torque, connections of the instrument as an ammeter and as a voltmeter; moving iron-type ammeter and voltmeter, main features with sketch of the attracted iron or repulsion-type arrangement by which the soft iron experiences an attraction or repulsion and so moves the pointer over the scale; method of providing a control torque, availability of this instrument for AC measurements, lack of uniformity of the scale; wattmeter, general method of measuring power in an AC circuit with details of connections; megger, type of measurement made by this instrument, principle employed, components of the measuring system, the direction of the coils as mounted and when in equilibrium position at test, the generation of the testing current, method of balancing the bridge.</p>

Note: The examination consists of descriptive questions that permit the applicant some options.  
Duration is three and a half hours.

## 58.6 Rig Construction

### Examination number 125 M

ITEM	COLUMN
1.	<p>Mobile Offshore Drilling Unit Construction</p> <p>Basic construction of principal MODU types, including construction of: columns, drilling derrick, pontoons (footings), tubulars, deck houses, main and pipe decks, helicopter deck, ballast tanks, drilling well (moon pool), watertight doors, hatches; pressure vessels; location and extent of watertight bulkheads and flats; stiffening arrangements of watertight and tank-boundary bulkheads, including those made of corrugated plating.</p>
2.	<p>Construction Portfolio</p> <p>Contents, including: general arrangement, inboard and outboard profile, arrangement showing watertight compartments, decks and load density plans including helicopter deck, transverse section showing scantlings, longitudinal section showing scantlings, framing, shell plating, bulkheads (watertight), structural and tanks showing location of air pipes and overflows, watertight doors and hatches, and capacity plans.</p>
3.	<p>Structural Strength</p> <p>Stresses to which a MODU is subjected; minimizing of concentrated stress; structural strengthening to compensate for stress in areas of anticipated failure.</p>
4.	<p>Welding</p> <p>Welding criteria for new construction and repair; acceptable welding procedures and inspecting methods; welding methods and materials, preparation of surfaces, atmospheric and gas-free conditions suitable for welding, sequence used in production welding to minimize shrinkage, types of welds, advantages and shortcomings of various welding types; conditions suitable for welding.</p>
5.	<p>Corrosion</p> <p>Corrosion-control arrangements and their effect on scantlings during construction if provision is not made for effective implementation of such arrangements.</p>
6.	<p>Testing and Inspection</p> <p>Methods of testing of tanks, bulkheads, other watertight or oiltight work, pressure vessels of various types; inspection and repair (major, minor) procedure to maintain a MODU in compliance with regulatory requirements; requirements and preparation for statutory surveys and inspections; classification societies and advantages of classification; docking and inspection procedures, periodic and annual inspection programs; non-destructive testing/inspecting; underwater cleaning techniques; underwater inspection methods and programs; quality assurance and preventative maintenance system.</p>
7.	<p>Documentation</p> <p>Compiling damage and defect reports; IMO Code for the construction and equipment of a MODU and Canadian standard (TP 6472); contents and use of construction portfolio; contents and use of marine operations manual; application of loadline regulations to the principal type of MODUs, surface and column-stabilized.</p>
8.	<p>Watertight Integrity and Damage Control</p> <p>Ballast piping, pumping and control systems, bilge piping, pumping deck and rig floor-draining systems; maintenance of fire integrity on a MODU; definition of various hazardous zones; access and ventilation conditions affecting the extent of hazardous areas.</p>

The examination will consist of nine questions of which the applicant shall answer six. The examination may include calculations, sketches, and written description and multiple-choice questions. A question may consist of several parts. Duration is three and a half hours.

**58.7 General Seamanship**  
**Examination number 165 C**


ITEM	COLUMN
1.	<p><b>Machinery</b>            Use and care of electric and hydraulic winches, ordinary and self-tensioning; windlasses and capstans; main and emergency steering gears associated with MODUs; electric and hydraulic deck cranes; elevators for personnel, stores and equipment.</p>
2.	<p><b>Voyage Preparation</b>            Manoeuvring a MODU under power; preparations for getting underway; planning for a towed voyage; preparing and inspection of towing equipment; securing towing vessels; the use, handling and securing of towing units; getting underway under tow; communicating with tug masters; authority of OIM when MODU is under tow.</p>
3.	<p><b>Anchoring</b>            Manoeuvres and cable handling involved in the use of ground tackle and ancillary equipment, including the use of anchor buoys; planning an anchor pattern; deployment of anchors with and without anchor-handling vessels; communication with anchor-handling vessels; clearing a foul anchor; hanging off an anchor; securing anchor gear in preparation for sea passage; use of anchors in emergency, to take way off; anchor and cable stowage, fittings and cable markings.</p>
4.	<p><b>Mooring Lines</b>            Use, care and stowage of mooring lines, comprising: types of line used for mooring and their characteristics; the names of the various mooring lines; making fast supply vessels; emergency cast-off procedures; the use of mooring wire-rope reels; types of fairlead, their construction, naming and use.</p>
5.	<p><b>Stowage and Handling</b>            Working of stores and equipment, comprising: mate's responsibilities in transfer of cargo, stores and personnel to and from supply vessel; inspections of holds, decks and spaces to receive goods; preparation and operation of cranes; arrangements and working of heavy lifts by ship equipment and lifts that cannot be handled by a single runner; the overhaul and regular inspections of lifting gear.</p>
6.	<p><b>Organization</b>            MODU routine and organization, comprising: the OIM's executive and organizational duties; crew watches direction of work; drawing up emergency muster lists with appropriate duties for crew members; the organizational duties for fuelling, storing or ballasting in all conditions; the OIM's duties concerning the official logbook, entries in the deck log and owner's or charter's records; the OIM's duties when repair, alteration or maintenance work is being carried out; the OIM's duties when preparing MODU for sea; the OIM's duties and responsibilities on joining a MODU; the necessary paperwork or documentation to encompass the foregoing items, where applicable; control room and deck discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; duties and responsibilities of the OIM, officer of the watch, ballast control and other bridge personnel (jointly and separately); the purposes, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties and responsibilities; means of assessing a tendency to drag anchors; arrangement and responsibility of departments aboard ship.</p>
7.	<p><b>Pollution-Prevention Management</b>            Duties related to loading, transfer and storage of pollution responsibilities under oil pollution-prevention regulations and MARPOL; response to a pollution incident; identification of pollutants; obligation to prevent pollution.</p>
8.	<p><b>Emergency Response</b>            Emergency duties and responsibilities for equipment, comprising: the organization, frequency and routing of fire patrols under routine and exceptional conditions; recognition and assessment of fire hazards; importance of cleanliness and good housekeeping; organization of realistic fire drills, training of crew for emergencies; taking charge of marine emergencies; inspections, testing and maintenance of portable and fixed firefighting equipment; organizations of realistic boat and lifesaving appliance drills, training of crew in use of lifesaving appliances and man-overboard drills; stowage, inspections, testing and maintenance of lifeboats, capsules, rafts and their equipment, lifejackets, immersion suits, lifebuoys, self-igniting lights and distress signals; taking charge of the launching of boats, rafts and capsules; assessing damage and flooding in cases of collision or stranding; search and rescue procedures, including a knowledge of AMVER, MERSAR, and TC publications.</p>



9.	Personnel Documentation Rights and privileges of certificates of competency limited to MODUs; certificated personnel required; general manning required to meet safety requirements.
10.	Collision Avoidance Collision Regulations and their intent, ship routing, MODU safety zone; <i>Notices to Mariners</i> concerning MODU locations.
11.	MODU Underway MODU handling in a seaway; transverse thrust and its effect; wind effects on a MODU; how to heave to anchoring in a tide, current, or wind; manoeuvring characteristics of other types of vessels; stern power and its effect; the handling characteristics of tugs and problems of towing vessels; turning and manoeuvring in a channel; docking problems; close-quarters situations at anchor and underway.
12.	Rigging and Cordage Rigging of MODUs, comprising: the names, purpose, and construction of standing and running rigging, drilling, derricks, burner booms and geronimo rigs; basic knotting, gripping and splicing with reference to current practice, seizing, rackings, frapping, and stoppers; reeving of blocks and purchases, rigging of stages and bosun's chairs; rigging of booms and hoses.
13.	Duties of Marine Crew Action required of the officer of the watch in emergencies at sea when underway and on location, comprising: man overboard; running aground; collision; sighting of derelicts; sighting or receiving distress signals; breakdown of navigational aids or equipment; power failure; capsizing of tugs when under tow or manoeuvring; tending of anchors; routine and exceptional fire patrols and inspections; action on discovery of fire aboard; precaution when taking on or transferring fuel, water or stores; safe working practices in the protection of crew members; parted supply boat moorings, burst oil lines, tank overflow; actions required when a passing vessel is approaching on a close-quarters course; accidents to any person on board including collapse of a crew member in a tank or other confined space.
14.	Terminology and Identification Anchors and associated equipment, comprising: construction and names of the parts of stocked and stockless anchors; chain cable and shackles; chain-cable markings and reporting; cable stowage; combination wire and chain cables; wire cables; stowage of wire cables; securing devices; manual and automatic tensioning devices; emergency releasing arrangement; fittings between cable locker and hawse pipe; common terms used in anchor work; terms associated with lead of cable; anchoring in shallow or deep water; anchoring in an emergency; heaving up and securing cable; terms pertaining to a MODU at anchor.

The examination is taken from the syllabus for the examinations for Watchkeeping Mate, MODU, and First Mate, MODU.

The applicant is expected to have a deeper understanding of the intent and interpretation of the Collision Regulations as demonstrated by examination 062, which is supplemented here by oral questions and demonstrations.

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## CHAPTER 59 - BARGE SUPERVISOR, MODU/INLAND

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 59.1 Every applicant for a certificate as Inland Barge Supervisor, MODU/Inland, shall:
- (a) subject to subsection 59.2, complete:
    - (i) a minimum of 12 months service as driller, watchkeeping mate or maintenance supervisor on a MODU; and
    - (ii) the service referred to in paragraph (i) shall include:
      - (A) assisting in at least 10 cargo-transfer operations at sea between a MODU and a supply vessel of which not less than two or more than five shall have been observed from the supply vessel; and
      - (B) assisting in at least two complete relocation moves of a MODU;
  - (b) obtain a medical certificate prescribed in the Crewing Regulations;
  - (c) obtain a certificate of completion for each of the following courses from a school set out in TP 10655:
    - (i) Marine Emergency Duties Courses, set out in TP 4957:
      - (A) Survival Craft (B1);
      - (B) Marine Fire Fighting (B2);
      - (C) Officer Certification (C); and
      - (D) Senior Officer (D);
    - (ii) Marine First Aid Advanced Course, set out in TP 13008;
    - (iii) Simulated Electronic Navigation Level I, set out in TP 4958;
    - (iv) Mobile Offshore Drilling Unit Courses, set out in TP 10937:
      - (A) Basic Drilling;
      - (B) Second Line Supervisor functions, Offshore Well Control; and
      - (C) Basic Offshore Survival;
  - (d) pass an examination in each of the following:
    - (i) Meteorology;
    - (ii) Rig Construction; and
    - (iii) Stability and Ballast Control;
  - (e) pass an examination in Simulated Electronic Navigation; and
  - (f) pass an oral examination in General Seamanship.
- 59.2 Not in use.

## PART II - EXAMINATIONS

59.3 The following table indicates the examinations for the Barge Supervisor, MODU/Inland, Certificate, the qualifying sea service required before each may be attempted, and other requirements.

Examination	Qualifying Service	Other Requirements
072 Meteorology	NIL	
114 M MODU Stability and Ballast Control	NIL	
125 M Rig Construction	NIL	
165 B General Seamanship	12 months	All other exams must have been passed.

59.4 The applicant must have successfully completed approved Basic Drilling, Second-Line Supervisor, Offshore Well Control, Stability, SEN 1 and Basic Offshore Survival courses.


## PART III - VALIDITY OF CERTIFICATE

59.5 The validity of a Barge Supervisor, MODU/Inland, Certificate is restricted to service on MODU/surface or self-elevating units while engaged in drilling within the inland waters of Canada.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 59.6 Meteorology Examination number 072

ITEM	COLUMN
1.	Chemical Composition of the Atmosphere Water vapour, nitrogen, oxygen, argon, carbon dioxide, krypton, xenon, ozone; dust and hygroscopic particles, dust, smoke, salt particles; micro-organisms (such as bacteria used as nuclei for artificial snow).
2.	Vertical Structure of the Atmosphere Troposphere and stratosphere.
3.	Transfer of Heat Radiation, conduction, convection, turbulence.
4.	Temperature Related to the atmosphere and the earth; calorie, specific heat of water and earth; perpendicular and oblique radiation; selective absorption of radiation by the atmosphere; isotherm; temperature and distance of the sun.
5.	Atmospheric Moisture and Changes of State Heat of fusion, vaporization and sublimation; latent heat; relative and absolute humidity, saturation, supersaturation and supercooling, dew point; lapse rates, adiabatic cooling, dry and saturated lapse rates.
6.	Atmospheric Stability Stability, instability, conditional instability, potential instability; causes of inversions, radiative cooling, turbulence or convection, subsidence; effects of inversions, fog and low-lying cloud, smog, accumulation of smoke, causes of subsidence.

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7.	Fog Definition, formation; season, locality and frequency of occurrence; major types, advection, radiation, frontal, sea smoke; anomalous propagation of sound in fog, mist, haze, smog.
8.	Clouds Formation, convection, turbulence, frontal, convergence, orographic; types, stratus, cumulus, stratocumulus, nimbostratus, cumulonimbus, altostratus, altocumulus, cirrus, cirrostratus, cirrocumulus.
9.	Precipitation Theories explaining the formation of precipitation; relative sizes of condensation nuclei, cloud droplets, drizzle drops and rain drops; types, convectional, frontal, orographic; forms of precipitation, dew, frost, rain, snow, sleet, hail, snow pellets, snow grains, ice pellets, diamond dust, rime.
10.	Pressure and Pressure Systems Definition; Coriolis effect; convergence and divergence; highs and lows, standard atmosphere (1013.25 mbar); isobar, isobaric patterns and pressure gradients, pressure gradient, terminology, deepening or filling low, weakening or filling high, shallow (weak) pressure gradients, steep (strong) pressure gradients; patterns, troughs, ridges, cols; types of depression, polar front low, thermal depression, vertical instability depression (e.g., tropical revolving storm); straight isobars, effect of straight isobars on wind, on weather.
11.	Winds Definition, speed (knots and Beaufort scale); direction, veering and backing, calculation of pressure gradient, geostrophic wind, gradient wind, centrifugal force, Buys Ballot's law, cyclostrophic wind, effect of latitude and friction on wind speed, effect of latitude on geostrophic wind scale, absence of surface friction above 2000 feet, angle of indraught (15° at sea, 30° over the land); special wind effects, land and sea breezes, anabatic and katabatic winds, Fohn effect (chinook), gusts and squalls.
12.	Air Masses Definition; source regions; identification; characteristics; modification; seasonal movement (North America and offshore); types, continental arctic, continental polar, continental tropical, maritime arctic, maritime polar, maritime tropical, equatorial.
13.	Fronts Definition; types, stationary, cold, warm, occluded; movement; sequence of weather associated with fronts, pressure, wind, temperature, cloud, weather, visibility; squall lines, definition, association with cold fronts, weather experienced with squall lines, pressure, wind, temperature, cloud, weather, visibility; areas of occurrence; local names (e.g., pampero, southerly buster).
14.	Families of Depressions or Extra-tropical Cyclones Formation between two air masses, life cycle and movement cross-section, associated weather, frontogenesis, frontolysis, secondary depressions.
15.	Waves and Swells Difference between seas and swells, definitions of period, height, length, speed, steepness, fetch; wave groups, waves in shallow water, ground swell, breakers and surf; swells in forecasting tropical revolving storms; effects of coast, currents, tide; storm surge; effect of ice on waves, ice crystals, pack ice; tsunamis and tidal waves, description, epicentre, dangers, tsunami warning system, true tidal waves and tidal bores.
16.	Oceanic Currents and Effect on the Climate Definition of set and drift, wind-drift currents, gradient currents, complex currents (including stream currents), Coriolis effect and Ekman's spiral, upwelling, permanent currents, seasonal currents; general surface circulation and offshoots in North American waters, geographical limits, seasonal variations, direction, strength; effect of currents on climate, warm, cold.
17.	Tropical Revolving Storms Definition of path, track, vertex or cod, vortex or eye, trough line, angle of indraught, dangerous semi-circle, dangerous quadrant, navigable semi-circle; features distinguishing it from extra-tropical cyclone, small diameter, steeper pressure gradient, winds tangent to central isobars, eye absence of fronts; warnings, radio messages, projected track, unusual swell, appearance of the sky, unusual changes in wind strength and direction, corrected drop in barometric pressure; weather associated with tropical revolving storms; sources of energy; seasonal distribution; practical rules for avoidance; hurricane and typhoon anchorages; mandatory reporting.

18.	Ice Formation and Decay Freezing of fresh water and saltwater; formation of land ice; Greenland and Antarctic ice caps, glaciers; ice types and egg code; types of ice, new, frazil, grease, slush, shuga, nilas, pancake, young, grey, grey-white, first-year, second-year, multi-year, fast ice, pack ice, ice of land origin, forms of floating ice (floe sizes); ice fields and their movement, icebergs and drift, iceberg routes, limits, seasons, reasons for variation in numbers, difference between northern and southern hemisphere icebergs, presence of icebergs in North Pacific, North Atlantic lane routes, International Ice Patrol; icing of superstructures, causes, fog, freezing drizzle, freezing rain, freezing spray, serious accumulation above 04; avoidance, shelter, warmer water, alteration of course and speed; mandatory reporting, freezing temperatures, high winds.
19.	Ice Detection and Reporting, Ice blink, absence of sea swell, problems associated with radar, limitations due to poor visibility, liaison with shore reporting stations; receipt of ice advisory broadcasts, ice advisory service, shipping support service, Interpretation of ice charts; <i>Ice Navigation in Canadian Waters and Manice</i> , ice climatology and ice operations; instrumentation, thermometers, dry bulb, wet bulb, marine screen, psychrometer, seawater temperature bucket; barometer, units, corrections, diurnal variations; barograph; wind-measuring instruments; observations and weather reports, auxiliary ship, selected ship; climatology and forecasting, purpose, avoiding damage from storms, improving passage time, holding course in fine weather.
20.	Weather Messages and Codes Knowledge of services available, <i>Radio Aids to Marine Navigation Atlantic, Great Lakes and Pacific</i> ; ability to locate marine weather forecast areas; understanding weather forecasts for the Great Lakes, ability to use MAFOR code; assorted weatherfax, weather, satellite, sea state, and ice charts; synoptic charts, surface and upper air; recognition of isobaric distribution patterns; comparison with earlier charts; knowledge of information available on weatherfax in Canada and worldwide; understanding of synoptic surface analysis charts; understanding of surface progs; understanding of wave charts, analysis, forecast; understanding of ice charts; ability to forecast the following for 12-24 hours, pressure, wind, sea state, visibility, clouds, weather changes.

Note: The examination consists of a written test comprising multiple-choice and descriptive questions.  
Duration is three hours.

### 59.7 MODU Stability and Ballast Control EXAMINATION NUMBER 114 M

ITEM	COLUMN
1.	Definitions Definitions of general terms (e.g., displacement, draft, trim, heel, freeboard, buoyancy, reserve buoyancy, block coefficient, deadweight, stable, unstable and neutral equilibrium).
2.	Terms Centre of gravity, centre of flotation, centre of buoyancy, reserve buoyancy, position of metacentre, righting lever and its effect on transverse and longitudinal stability; dynamic stability, synchronous rolling and angle of loll.
3.	Theory Theory of moments as applied to stability, including the effects of heavy lifts and movement of liquids in tanks and free-surface effect.
4.	Effect of Weights Effect of adding, removing, shifting weight and calculation of vertical, transverse and longitudinal shift of centre of gravity, danger of slack tanks, loading and unloading problems.
5.	Inclining Experiment Understanding the results of the inclining experiment report and using the results.
6.	Tables Use of hydrostatic curves, deadweight scale, hydrostatic tables and tank-capacity tables; use of curves of statical stability; use of unit manuals.

7.	Stability Criteria Stability criteria for mobile offshore drilling units (e.g., allowable KG, effect of changing GM, righting area ratios and angle of downflooding).
8.	External Effects Effect of dynamically-stationed keeping systems on stability, force of the wind and high seas.
9.	Calculations Stability calculations utilizing concepts 1 to 8 above, and theory and calculations of deck loads and effect on stability; areas, volumes of common figures, squares, rectangles, triangles, cubes, cones, wedges, cylinders and spheres.
10.	Systems Examination of liquid-transfer systems and their limitations and procedures; ballast systems, fuel systems, drilling liquids; zones of reduced stability, asymmetrical ballasting/deballasting.
11.	Response to Damage Damage and damage control procedure (use of pumping system and cross connections); effect of flooding compartments intentionally, including permeability; watertight integrity.
12.	Environmental Effect Environmental conditions and their effect on drilling operations; vessel and environmental limitations and criteria for changing to survival condition.
13.	Structural Stress Importance of load distribution with regard to structural stress; stress caused by location of load; stress in members; importance of bending moments and stress diagrams.
14.	Emergency Procedures Risk analysis of environmental conditions; emergency repairs to structure, damage from collision; shoring and temporary closures; use of cables and winches for securing; preparedness.

The examination will consist of nine questions of which the applicant shall answer six. The examination may include calculations, sketches, and written description and multiple-choice questions. A question may consist of several parts.  
Duration is three and a half hours.

### 59.8 Rig Construction

#### Examination number 125 M

ITEM	COLUMN
1.	Mobile Offshore Drilling Unit Construction Basic construction of principal MODU types, including construction of: columns, drilling derrick, pontoons (footings), tubular, deck houses, main and pipe decks, helicopter deck, ballast tanks, drilling well (moon pool), watertight doors, hatches; pressure vessels; location and extent of watertight bulkheads and flats; stiffening arrangements of watertight and tank-boundary bulkheads, including those made of corrugated plating.
2.	Construction Portfolio Contents, including: general arrangement, inboard and outboard profile, arrangement showing watertight compartments, decks and load-density plans including helicopter deck, transverse section showing scantlings, longitudinal section showing scantlings, framing, shell plating, bulkheads (watertight), structural and tank tanks showing location of air pipes and overflows, watertight doors and hatches, and capacity plans.
3.	Structural Strength Stresses to which a MODU is subjected; minimizing of concentrated stress; structural strengthening to compensate for stress in areas of anticipated failure.
4.	Welding Welding criteria for new construction and repair; acceptable welding procedures and inspecting methods; welding methods and materials, preparation of surfaces, atmospheric and gas-free conditions suitable for welding, sequence used in production welding to minimize shrinkage, types of welds, advantages and shortcomings of various welding types; conditions suitable for welding.


5.	Corrosion Corrosion-control arrangements and their effect on scantlings during construction if provision is not made for effective implementation of such arrangements.
6.	Testing and Inspection Methods of testing of tanks, bulkheads, other watertight or oiltight work, pressure vessels of various types; inspection and repair (major, minor) procedure to maintain a MODU in compliance with regulatory requirements; requirements and preparation for statutory surveys and inspections; classification societies and advantages of classification; docking and inspection procedures, periodic and annual inspection programs; non-destructive testing/inspecting; underwater cleaning techniques; underwater inspection methods and programs; quality assurance and preventative maintenance system.
7.	Documentation Compiling damage and defect reports; IMO Code for the construction and equipment of a MODU and Canadian standard (TP 6472); contents and use of construction portfolio; contents and use of marine operations manual; application of loadline regulations to the principal type of MODUs, surface and column-stabilized.
8.	Watertight Integrity and Damage Control Ballast piping, pumping and control systems, bilge piping, pumping deck and rig floor-draining systems; maintenance of fire integrity on a MODU; definition of various hazardous zones; access and ventilation conditions affecting the extent of hazardous areas.

The examination will consist of nine questions of which the applicant shall answer six. The examination may include calculations, sketches, and written description and multiple-choice questions. A question may consist of several parts.  
Duration is three and a half hours.

### 59.9 General Seamanship

#### Examination number 165 B

ITEM	COLUMN
1.	Machinery Use and care of electric and hydraulic winches, ordinary and self-tensioning; windlasses and capstans; main and emergency steering gears associated with MODUs; electric and hydraulic deck cranes; elevators for personnel, stores and equipment.
2.	Voyage Preparation Manoeuvring a MODU under power; preparations for getting underway; planning for a towed voyage; preparing and inspecting towing equipment; securing towing vessels; the use, handling and securing of towing units; getting underway under tow; communicating with tug masters; authority of OIM when MODU is under tow.
3.	Anchoring Manoeuvres and cable handling involved in the use of ground tackle and ancillary equipment, including the use of anchor buoys; planning an anchor pattern; deployment of anchors with and without anchor-handling vessels; communication with anchor-handling vessels; clearing a foul anchor; hanging off an anchor; securing anchor gear in preparation for sea passage; use of anchors in emergency to take way off; anchor and cable stowage, fittings and cable markings.
4.	Mooring Lines Use, care and stowage of mooring lines, comprising: types of line used for mooring and their characteristics; the names of the various mooring lines; making fast supply vessels; emergency cast-off procedures; the use of mooring wire-rope reels; types of fairlead, their construction, naming and use.
5.	Stowage and Handling Working of stores and equipment, comprising: the mate's responsibilities in transfer of cargo, stores and personnel to and from supply vessel; inspections of holds, decks and spaces to receive goods; preparation and operation of cranes; arrangements and working of heavy lifts by ship equipment and lifts that cannot be handled by a single runner; the overhaul and regular inspections of lifting gear.


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6.	<p><b>Organization</b>  MODU routine and organization, comprising: the barge supervisor's executive and organizational duties; crew watches, direction of work; drawing up emergency muster lists with appropriate duties for crew members; the organizational duties for fuelling, storing or ballasting in all conditions; the barge supervisor's duties concerning the official logbook, entries in the deck log and owner's or charter's records; the barge supervisor's duties when repair, alteration or maintenance work is being carried out; the barge supervisor's duties when preparing a MODU for sea; the barge supervisor's duties and responsibilities on joining a MODU; the necessary paperwork or documentation to encompass the foregoing items, where applicable; control room and deck discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; duties and responsibilities of the barge supervisor, officer of the watch, ballast control and other bridge personnel (jointly and separately); the purposes, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties and responsibilities; means of assessing a tendency to drag anchors; arrangement and responsibility of departments aboard ship.</p>
7.	<p><b>Pollution-Prevention Management</b>  Duties related to loading, transfer and storage of pollution responsibilities under oil pollution-prevention regulations and MARPOL; response to a pollution incident; identification of pollutants; obligation to prevent pollution.</p>
8.	<p><b>Emergency Response</b>  Emergency duties and responsibilities for equipment, comprising: the organization, frequency and routing of fire patrols under routine and exceptional conditions; recognition and assessment of fire hazards; importance of cleanliness and good housekeeping; organization of realistic fire drills, training of crew for emergencies; taking charge of marine emergencies; inspections, testing and maintenance of portable and fixed firefighting equipment; organization of realistic boat and lifesaving appliance drills, training of crew in use of lifesaving appliances and man-overboard drills; stowage, inspections, testing and maintenance of lifeboats, capsules, rafts and their equipment, lifejackets, immersion suits, lifebuoys, self-igniting lights and distress signals; taking charge of the launching of boats, rafts and capsules; assessing damage and flooding in cases of collision or stranding; search and rescue procedures, including a knowledge of AMVER, MERSAR and TC publications.</p>
9.	<p><b>Personnel Documentation</b>  Rights and privileges of certificates of competency limited to MODUs; certificated personnel required; general manning required to meet safety requirements.</p>
10.	<p><b>Collision Avoidance</b>  Collision Regulations and their intent, ship routing, MODU safety zone; <i>Notices to Mariners</i> concerning MODU locations.</p>
11.	<p><b>MODU Underway</b>  MODU handling in a seaway; transverse thrust and its effect; wind effects on a MODU; how to heave to anchoring in a tide, current, or wind; manoeuvring characteristics of other types of vessels; stern power and its effect; the handling characteristics of tugs and problems of towing vessels; turning and manoeuvring in a channel; docking problems; close-quarters situations at anchor and underway.</p>

The examination is taken from the syllabus for the examinations for Watchkeeping Mate, MODU, and First Mate, MODU.

The applicant is expected to have a deeper understanding of the intent and interpretation of the Collision Regulations as demonstrated by examination 062, which is supplemented here by oral questions and demonstrations.



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## CHAPTER 60 - WATCHKEEPING MATE, MODU/INLAND

### PART I - GENERAL REQUIREMENTS OF APPLICANTS

- 60.1 Every applicant for a certificate as Watchkeeping Mate, MODU/Inland, shall:
- (a) complete 18 months service as follows:
    - (i) a minimum of six months sea service as deck rating, driller, engine-room rating or engineer on watch on a MODU/inland; and
    - (ii) the remaining time made up of any combination of service as a deck rating, driller, engine-room rating or engineer on a MODU;
  - (b) obtain a medical certificate prescribed in the Crewing Regulations;
  - (c) obtain a Restricted Operator Certificate (ROC) with Marine Qualifications issued by Industry Canada;
  - (d) obtain a Marine First Aid Advanced Certificate on completion of a course set out in TP 13008,;
  - (e) obtain a certificate of completion for each of the following MODU courses, set out in TP 10937:
    - (i) Hydrogen Sulphide Alive (H<sub>2</sub>S);
    - (ii) Stability for Surface or Self-Elevating Units, as applicable; and
    - (iii) Basic Offshore Survival;
  - (f) pass an examination in each of the following subjects:
    - (i) Communications;
    - (ii) Chartwork and Pilotage;
    - (iii) Navigation Safety; and
    - (iv) General Rig Knowledge; and
  - (g) pass an oral examination in General Seamanship.

## PART II - EXAMINATIONS

60.2 The following table indicates the examinations for the Watchkeeping Mate, MODU/Inland, Certificate, the qualifying sea service required before each may be attempted, and other requirements.

<b>Examination</b>	<b>Qualifying Service</b>	<b>Other Requirements</b>
012 Communication	NIL	NIL
041 Chartwork and Pilotage	12 months	NIL
061 Navigation Safety	18 months	NIL
151 M General Rig Knowledge	12 months	NIL
165 A General Seamanship	18 months	All other exams must have been passed.

## PART III - VALIDITY OF CERTIFICATE

60.3 A Watchkeeping Mate, MODU/Inland, Certificate has validity as third or second mate of a MODU/surface or self-elevating on site or under tow on the inland waters of Canada.

## PART IV - SYLLABUSES OF EXAMINATIONS

### 60.4 Communications


#### Examination number 012

<b>ITEM</b>	<b>COLUMN</b>
1.	Visual The recognition of letters and numerals sent by flashing light or sound in Morse code, International Code Flags, meaning of single-letter International Code; coding and decoding of messages sent by flag, Morse and voice procedures using the International Code of Signals.
2.	Radio The use of radio aids to marine navigation for ascertaining facilities and services.

Note: The examination consists of:


- (a) reading Morse flashing light at a speed of four words per minute;
- (b) satisfying the examiner of ability to send Morse by flashing light; and
- (c) a multiple-choice test on the remainder of the syllabus.

Duration as necessary.

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**60.5 Chartwork and Pilotage**  
**Examination number 041**

<b>ITEM</b>	<b>COLUMN</b>
1.	Pilotage Preparations for pilotage, using available charts and publications, possession and ready for immediate use all necessary charts, including large-scale charts of the pilotage area duly corrected to date, latest sailing directions, <i>Notices to Mariners</i> , light lists, Traffic Zone Regulations, as applicable, tide tables, Charts and Publications Regulations, Code of Navigation Procedures and Practices, and <i>Radio Aids to Marine Navigation</i> .
2.	Steering Common steering procedures, their purpose and how to put them into effect; the importance of establishing and adhering to internationally-accepted procedures in issuing helm and steering orders and having them acknowledged and complied with; the instruction of helmsmen in this matter.
3.	Symbols The chart symbols and abbreviations as published in <i>Canadian Hydrographic Service(CHS) Chart No. 1</i> .
4.	Sailing Directions The contents of preface to <i>Sailing Directions</i> , the important general navigational information contained in the preamble and opening chapter of these volumes.
5.	Lists of Lights Light characteristics, colours and sound signals used as aids to navigation; use of Lists of Lights, Buoys and Fog Signals; the terms used to define the power of lights (e.g., geographical range, luminous range, charted range, computed range, nominal range, computed visibility); use of a luminous-range diagram; the effect of abnormal refraction fog signals of different types, anomalies of sound propagation in fog, notices regarding lights lighthouses and buoys etc. published in <i>Notices to Mariners</i> .
6.	Tidal Currents Finding the set and rate of tidal current that may be expected at a given point from information given in tide and current table or on the chart; ability to use tables and information on the chart of the locality with awareness of the possibly significant effect of weather on the reliability of the information so obtained.
7.	Navigation in Confined Waters Navigation in confined waters: altering course; transits; leading marks and bearings; recording the vessel's progress; making allowance for height of tide; the preparatory details to be attended to when entering confined waters (e.g., a review of the relevant sections of the sailing directions, ready availability of large-scale charts of the area with proposed track drawn indicating distances, courses and near dangers noted); navigational aids with their characteristics to be identified, clearing lines, marks and bearings to be used during the passage to be drawn in, precalculation of tidal heights where critical depths of water may be encountered; the maintenance of a record of the vessel's progress in chart and logbook, including times of passing successive points, course's compass error, speed, weather; fixing the vessel's position by relative and true bearings, transits; dead-reckoning position, estimated position and observed position.
8.	Navigation Aids Navigational aids in pilotage situations; the necessity of continuing the customary checks and counts of the vessel's safe progress by the officer of the watch (OOW) and ship's personnel with record of the details of duties performed, notwithstanding that the vessel was under the conduct of a pilot; the duty of the OOW to ensure that the pilot's advice is understood and effectively carried out, the extent to which reliance is placed on buoys.
9.	Canadian System Canadian System of Buoyage in detail; differences between lateral and cardinal systems; use of <i>Sailing Directions</i> for determining other buoyage systems in use; current and new Canadian buoyage system with an understanding of the basic principles employed in the lateral and cardinal buoyage systems, the importance of consulting the applicable volume of <i>Sailing Directions</i> for details of buoyage system in force locally prior to entering unfamiliar waters of other countries; <i>Aids to Navigation</i> .

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10.	<p>Bridge Practices</p> <p>Bridge practices and procedures in pilotage situations charts, various projections in common use; the requirement to continue the practice of good navigation procedures by the OOW and ship's personnel and the realization that the presence of a pilot on the bridge does not absolve the ship's personnel from their continuing responsibility for the safe navigation of the ship; the principle employed in construction charts on the Mercator, polyconic, and gnomonic projections, the limitations associated with each of these projections and the purposes of each in practical navigation.</p>
11.	<p>Charts</p> <p>Significant distortion, numbering and the presentation of information; the cause of chart distortion, need for nautical charts on board ship; the replacement of superseded editions; the mode of presentation of information on charts; metrication; chart catalogues and numbering.</p>
12.	<p>Chart Usage</p> <p>Using charts produced by the major projections in common use by the Canadian Hydrographic Service, including gnomonic charts; the use of charts in the practice of coastal navigation and on ocean passages; the plotting of bearings, position lines, clearing lines etc.; the transfer of positions from a chart of one projection to another of a different projection; the use of a gnomonic projection chart, Mercator and polyconic charts.</p>
13.	<p>Fixing Position</p> <p>Fixing the ship's position by means at the disposal of the OOW, including electronic navigational aids; considerations to be taken into account, including errors and limitations of equipment; the correction and plotting of bearings taken visually, by radar or direction finder (DF) and the limitations of accuracy inherent in each of these methods; the ship's position established by bearings or ranges taken simultaneously or with an interval and run intervening.</p>
14.	<p>Estimating Position</p> <p>Estimating the vessel's position, including allowing for effects of wind and/or tide; the reliability of the value in direction and force of wind, current and tidal effect used in arriving at the ship's DR position and the resulting area of doubt.</p>
15.	<p>Laying Off Courses</p> <p>Laying off courses, including allowance for effects of wind and tide; the problem of combining vectors of wind, current, tidal effect and course to steer to arrive at course made good, scrutiny of chart for off-lying dangers.</p>
16.	<p>Conversion of Course</p> <p>Conversion of true courses laid off to magnetic courses, including determination of variation at any place; conversion of true courses to gyro, magnetic and compass courses and vice versa; determining the up-to-date value of variation and interpolating for variation at a given locality from isogonic lines or compass roses; use of transit lines, azimuth and amplitude to determine compass error.</p>
17.	<p>Distance Measurement</p> <p>Distance measurement and the determination of speed made good and speed through the water; the measurement of distance on a Mercator or polyconic chart; the factors contributing to speed made good and speed through the water, how the difference between the two is expressed.</p>
18.	<p>Range of Visibility</p> <p>Factors controlling the range of visibility; terms associated with visibility of lights on navigational aids.</p>
19.	<p>Reliability of Charts</p> <p>Reliability of charts; indications by which reliability may be judged (e.g., date of original survey and possibility of subsequent surveys, adequacy of recorded soundings corrections having been made to date); large-scale charts show a small area in greater detail than small-scale charts; care and upkeep of charts.</p>
20.	<p>Publications</p> <p>Use of publications at the disposal of the coastal navigator, including <i>Notices to Mariners</i> for the correction of charts and publications; the various publications available to the navigator and the nature of their contents; the importance of chart corrections being kept up-to-date.</p>
21.	<p>Tidal Terms</p> <p>The meaning of tidal terms in common use in CHS and US tide tables; general understanding of tidal phenomena necessary for the comprehension of tidal terms; tidal atlases.</p>

22.	<b>Calculation of Tides</b> Calculation of tides and heights of high and low water at reference and secondary ports and the calculation of depth of water at those times; use of the calculated depth of water at high and low water to determine the height of water at a given charted position.
23.	<b>Set and Rate of Tides</b> Estimation of set and rate of tidal currents by reference to tidal current tables and by actual observation; the tentative nature of tabulated tidal current values and the need for caution in using them; the care required in making tidal current observations and the associated details that must be recorded.
24.	<b>Records</b> The need for keeping an accurate record of the vessel's progress and the keeping of such a record; the duty of the OOW to maintain an accurate, detailed and continuous record of the vessel's progress from which a position may be readily determined at any time; the value of such a record being available as a measure of safe navigation and in the event of an emergency requiring immediate knowledge of the ship's position.

Note: The examination consists of:  
(a) a practical chartwork paper, and  
(b) a multiple-choice examination.  
Duration is three and a half hours.

## 60.6 Navigation Safety

### Examination number 061


ITEM	COLUMN
1.	<b>Navigation Safety</b> Application of the content of Collision Regulations with Canadian Modification, 1983; recommended Code of Nautical Procedures and Practices.

Note: The examination is a multiple-choice test supplemented by oral questions as necessary.  
Duration is one and a half hours.

## 60.7 General Rig Knowledge

### Examination number 151 M

ITEM	COLUMN
1.	<b>Types of Drilling Units</b> Semi-submersible, column-stabilized, anchored, dynamically-positioned; surface type, self-propelled, ship type, non self-propelled, barge type.
2.	<b>Design Criteria</b> Water depth; maximum wind, wave, current, ice, temperature and tidal conditions; maximum load criteria (structure, deck, derrick, and hull); marine growth; damage criteria.
3.	<b>MODU Structural Strength (Accomplished by excluding individual consideration of fatigue and corrosion)</b> Column stabilized units, strengthening of deck (column, hull, tubular) structures against wave impact, strengthening watertight compartments against hydrostatic pressure, strengthening in way of anchoring, mooring systems, methods of stiffening tubular members, column and tubular bracing critical joints, local strengthening for ice; surface units, strengthening in way of drilling structure (moon pool), maintaining continuity of longitudinal strength, compensating for large hatches/moon pool, strengthening in way of anchoring and mooring systems, strengthening in way of thrusters, strengthening in way of derrick and deck loads, strengthening in way of ice surface hull; general material strength, steel types, welding connections.

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4.	<p>Dimensions</p> <p>Column stabilized (e.g., identify dimensions on longitudinal profile or transverse section), moulded baseline load, waterline length overall (pontoons), breadth moulded, total height to crown, elevations, freeboard, column spacing centre to centre (F to A, P to S), maximum operating draft, storm draft, transit draft, pontoon width moulded, pontoon depth moulded, principal dimensions of columns, air gap; drilling capacity, drilling depth, water depth, air gap, environmental criteria, riser angle limitations, slip joint stroke.</p>
5.	<p>Modes of Operation</p> <p>Normal drilling condition (afloat); severe storm condition (afloat); transit condition.</p>
6.	<p>General Terminology</p> <p>Longitudinal framing, transverse framing, centre line, midship section, camber, sheer, shell, bulkhead, deck, hatch, superstructure and deck house, bilge, cofferdam, watertight doors, thruster pods.</p>
7.	<p>Structural Terminology</p> <p>Angles, frames, beams, stringers, flanges, brackets, floors, coaming, lug projection for grabbing, pillar, girders, stiffeners, tripping brackets, ring frames, diagonals, struts, tubulars, plating.</p>
8.	<p>MODU and Equipment</p> <p>Identify, on an appropriate drawing, decks, pump room, control room, ballast tanks, fuel tanks, machinery space, crew spaces, watertight bulkheads (flats), rudder, thrusters, freshwater tanks, helicopter deck (fuelling), crane, drilling derrick, crown block, travelling block, hook, swivel, rotary table, racking platform, mooring equipment (windless), pontoons, davits, blow-out preventers, choke, riser tensioner, guideline tensioner, mud tanks, cement tanks, stability columns, footings, moon pool, columns, bracings, thruster compartments, crane pedestals, drill water tanks, motion compensators, kelly, diverter, shaker room, mud-pump room, sack storage area, mud-pit room, pipe deck, pipe stowage, substructure, emergency generator room, production test equipment, flare room, marine riser (bays), casing, bop-test pits (stowage), anchor racks (stowage), chain locker, fairleads, elevator (column), column tanks, cement room (pump).</p>
9.	<p>Frames</p> <p>Type, spacing, numbering (longitudinal, transverse), connection to shell plating; bulb bar or flat bar; longitudinal, transverse, intermediate, combination, web frame, ring frame (tubular members columns).</p>
10.	<p>Shell Plating</p> <p>Purpose, to shut out water, take up sheer stresses resulting from water pressure, bending stresses (sea, ice, other craft, deck loads); conventional numbering of plates for drill ships.</p>
11.	<p>Beams</p> <p>Transverse, longitudinal, connection to frames, decks, coamings, shell.</p>
12.	<p>Decks</p> <p>Numbering of decks, load density of each and where shown.</p>
13.	<p>Bulkheads</p> <p>Tank bulkheads, watertight bulkheads, oiltight bulkheads, decks and flats, corrugated bulkheads (tanks, housing), arrangements and connection of plates, stiffeners, beams, girders, webs and tripping brackets, fire rating.</p>
14.	<p>Mooring Equipment and Towing Arrangements</p> <p>Type; anchor storage, chain locker closures; where positioned; fair leads; tension measurement, how often tested, who tests.</p>
15.	<p>Hatchways and Moon Pools</p> <p>Connecting and strengthening members, protection arrangements.</p>
16.	<p>Cranes, Drilling Derrick and Personnel Lift</p> <p>Terms used and signals, hoisting, lowering, outreach, slewing, travelling (in case of gantry crane), SWL at various rodii; names of parts, preparation procedures for use, how often tested, by whom, non-destructive tests, dynamic-load derating; complete understanding of cranes, drilling derrick operation, inspection, examination and testing procedure including completion cargo hauling machinery and gear register; test certificates of wires, chains, shackles and hooks, routine maintenance.</p>

17.	<p>Helicopter Facilities</p> <p>Construction; safety arrangements, non-skid surface, drainage facilities for fuel or firefighting equipment (foam etc.); visual aids (markings, night lights and wind-direction indicator), aircraft tie-down arrangement, crash box, fuel stowage, fixed firefighting equipment maintenance.</p>
18.	<p>Ropes, Wires and Chains</p> <p>Safe working load and breaking strength calculations, natural fibre ropes, man-made fibre ropes, wire ropes, chains, open link, studded link.</p>
19.	<p>Loadlines</p> <p>Where marked, who assigned them, draft and loadline markings, rig depth below keel.</p>
20.	<p>Industrial and Environmental Safety</p> <p>Safe working practices regulations and recommendations, tackle regulations, pollution-prevention regulations, oil pollution-prevention regulations, arctic water pollution regulations, shipping safety control zones, garbage pollution prevention, provincial regulations, occupational health and safety, master oil disposal tank (burn/transfer to shore).</p>
21.	<p>Occupational Health and Safety</p> <p><i>Canada Labour Code</i> as applied to offshore drilling units.</p>
22.	<p>Cargo</p> <p>Handling, stowage, compatibility, damage, contamination, and ventilation requirements of following cargo for MODUs: pipes, chains, mud (oil base), flammable liquids, explosives, radio active materials, oxyacetylene cylinder.</p>
23.	<p>Codes</p> <p>Ability to use following codes: IMO Dangerous Goods, Deck Cargo Safety, Code of Safe Working Practices.</p>
24.	<p>Records</p> <p>Ability to complete Oil Record Book in compliance with the Pollution-Prevention Regulations, cargo log, deck log, and general record keeping.</p>
25.	<p>Plans and Drawings</p> <p>Use of following safety-related plans: location and operation of lifesaving appliances and procedure for evacuation of personnel from unit; fire control plan; plan showing hazardous locations and doors; gas detection systems; and fire- and boat-drill requirements.</p>

Open book, sections 20, 21, 22 and 23.

**60.8 General Seamanship**  
**Examination number 165 A**

<b>ITEM</b>	<b>COLUMN</b>
1.	Terminology Knowledge of the rigging of MODUs, comprising the names, purpose, and construction of standing and running rigging, drilling, derricks, burner booms and geronimo rigs.
2.	Knots Ropes and Rigging Basic knotting, gripping and splicing with reference to current practice, seizing, packings, frapping, and stoppers; the reeving of blocks and purchases, rigging of stages and chairs; the rigging of fuelling booms and hoses.
3.	On Board Organization Control room and deck discipline, organization and routine under all circumstances; steering orders and responses; maintenance of a proper lookout; duties and responsibilities of the OIM, officer of the watch, ballast control and other bridge personnel (jointly and separately); the purposes, necessity and general content of standing orders, night orders, bridge or movement book, ship's logbook and similar material; anchor watch duties and responsibilities; means of assessing a tendency to drag anchors; arrangement and responsibility of departments aboard ship.
4.	Safety and Emergency Action required of the officer of the watch in emergencies at sea, when underway and on location comprising: man overboard; running aground; collision; sighting of derelicts; sighting or receiving distress signals; breakdown of navigational aids or equipment; power failure; capsizing of tugs when under tow or manoeuvring; tending of anchors; routine and exceptional fire patrols and inspections; action on discovery of fire aboard; precaution when taking on or transferring fuel, water or stores; safe working practices in the protection of crew members; parted supply boat moorings, burst oil lines, tank overflow; actions required when a passing vessel is approaching on a close-quarters course; accidents to any person on board, including collapse of a crew member in a tank or other confined space.
5.	Anchors Anchors and associated equipment, comprising: construction and names of the parts of stocked and stockless anchors; chain cable and shackles; chain-cable markings and reporting; cable stowage; combination wire and chain cables; wire cables; stowage of wire cables; securing devices; manual and automatic tensioning devices; emergency releasing arrangement; fittings between cable locker and hawse pipe; common terms used in anchor work; terms associated with lead of cable; anchoring in shallow or deep water; anchoring in an emergency; heaving up and securing cable; terms pertaining to a MODU at anchor.
6.	Mooring Mooring and mooring lines or securing supply boats to unit, comprising: names of the various mooring lines, their purpose and terms used in handling and working them.
7.	Joining Responsibility on joining MODU.
8.	Collision Regulations
9.	Pollution Duties related to loading, transfer and storage of pollutants, responsibilities under pollution-prevention regulations and MARPOL.