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(07-2007)

Training Record Book

Requirements for Applicants to the Fourth-Class Engineer Certificate

2nd EDITION

July 2007



To be completed by MPS Division

TC-XXXXXXX



Canada

<p>Responsible Authority</p> <p>The Director, Marine Personnel Standards and Pilotage is responsible for this document, including any change, correction, or update.</p>	<p>Approval</p> <hr/> <p>Naim Nazha Director, Marine Personnel Standards and Pilotage Marine Safety</p>
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TC-XXXXXX (to be completed by MPS)

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Table of Contents

Revision Table	iii
Table of Contents	iv
Scope and Application	1
1.1 Purpose.....	1
1.2 Scope.....	1
1.3 Effective date	1
1.4 Authority	1
1.5 Background.....	1
Requirements	2
2.1 Fourth-Class Engineer certificate	2
2.2 Completion of training record book.....	2
2.3 Approved marine engineering cadet training programs	2
Approval of Engineering Training Record Book.....	3
3.1 General.....	3
3.2 Approval process	3
3.3 Training record book required elements.....	3
3.4 Approved training record books	5
Annex A	6
ANNEX A – Model Training Record Book	7
4.1 Introduction.....	7
4.2 Scope.....	7
4.3 Objective.....	8
4.4 Approved on-board training program.....	8
Guidance for the Chief Engineer Officer or Supervising Engineer Officer.....	9
4.5 General.....	9
4.6 Conducting effective training	10
Guidance for Trainees Completing this Record Book	11
4.7 General.....	11
Signature Pages	12
5.1 Chief Engineer or Master’s review/sign off of training manual.....	12
5.2 Engineers’ task sign off	13
Information.....	15
6.1 Trainee personal information.....	15
6.2 Vessel information	15
Safety Familiarisation.....	20
7.1 Basic safety familiarisation.....	20
Engine Room Operations	22
8.1 General.....	22
8.2 Technical details – Diesel propulsion.....	23

8.3	Technical details – Steam propulsion	24
8.4	Technical details – General.....	25
8.5	Generators	26
8.6	Fuel/oil/water systems	27
8.7	Starting, control and general air systems	29
8.8	Cargo handling and stowage.....	30
8.9	Safety and environmental protection	32
Engineering Watchkeeping.....		35
9.1	Propulsion machinery	35
9.2	Auxiliary Machinery.....	36
9.3	General.....	38
Maintenance duties.....		39
10.1	General.....	39
10.2	Diesel propulsion machinery	40
10.3	Steam propulsion machinery.....	41
10.4	Auxiliary machinery	42
Ship operational responsibilities.....		43
11.1	General.....	43
ANNEX B – Marine Laws and Regulations		46
12.1	Introduction.....	46
12.2	Objective.....	46
12.3	Canadian Laws and Regulations.....	47
12.4	MARPOL.....	50
12.5	SOLAS.....	53
ANNEX C – Ship Stability and Construction		57
13.1	Introduction.....	57
13.2	Objective.....	57
13.3	Ship Stability.....	58
13.4	Ship Construction	63

Scope and Application

1.1 Purpose

- (1) To inform the ship owners, ship operators, masters, officers and crew members of the requirement to successfully complete a Marine Safety approved training record book as a part of the mandatory minimum 6 months of sea service before being examined for the fourth-class certificate of competence bearing the STCW endorsement.
- (2) To provide details of the on-board training during the required seagoing service.
- (3) To provide an approved model Training Record Book, that may be used by applicants to the fourth-class certificate of competency.
- (4) To provide an alternative to the training courses on:
 - (a) Marine Laws and Regulations, and
 - (b) Ship Construction and Stability.

1.2 Scope

- (1) This requirement applies to applicants to the certificate of competency as fourth-class engineer bearing the STCW endorsement, in compliance with Chapter III of the Seafarers' Training, Certification and Watchkeeping Code A (STCW Code) of the Convention on Standards of Training, Certification and Watchkeeping for Seafarers (STCW Convention), as amended to which Canada is a party.

1.3 Effective date

- (1) This document enters into force on July 1st, 2007.

1.4 Authority

- (1) The *Marine Personnel Regulations, section 147, (SOR/2007-115)* made pursuant to the Canada Shipping Act, 2001 (2001, c.26).

1.5 Background

- (1) Canada, being party to the STCW Convention, is required to follow the STCW Code for all STCW-endorsed certificates issued by Canada.
- (2) Contained in the STCW Code is the requirement to document the on-board training. This is part of the mandatory minimum requirements for certification of officers in charge of an engineering watch.

Requirements

2.1 Fourth-Class Engineer certificate

- (1) After the effective date, all applicants to the STCW-endorsed fourth-class engineer certificate will be required to show, in addition to the testimonials and the training certificates required by the *Marine Personnel Regulations*, a successfully completed Marine Safety approved training record book.

2.2 Completion of training record book

- (1) Applicants who wish to be examined for an STCW-endorsed fourth-class certificate must complete a Marine Safety approved training record book as a part of the mandatory six months of sea service. Applicants who did not complete this record book will be issued a fourth-class certificate restricted to Near Coastal Waters 11 voyages or to a specific ship engaged on voyages in Canadian waters.
- (2) There will, over time, be a number of training record books that will achieve approved status, therefore, a check with the local Marine Safety office and employer, will confirm which training manual will be most suitable. Section 3.4 of this publication lists the approved manuals at the date of printing.
- (3) For those applicants that do not have access to company training manuals or where present company manuals are not approved, applicants must complete the model training record book in Annex A. This model training record book is based on the International Maritime Organisation's 1987 *Model training record book for candidates for certification as officers in charge of an engineering watch or designated duty engineers*. It has been modified to more closely fit Canadian maritime industry requirements.
- (4) While completing the service requirements of the certificate, the training manual is to be signed off by either the Chief Engineer, Master or company training officer.
- (5) Marine Safety examiners will sight the completed approved training manual as proof of the duties and competencies acquired during the mandatory service period aboard ship.

2.3 Approved marine engineering cadet training programs

- (1) Graduates from Marine Safety approved engineering cadet training programs will have completed a sea training manual as a part of their program, and as such are not required to complete an additional training manual.

Approval of Engineering Training Record Book

3.1 General

- (1) Only those manuals that have received Marine Safety approval and are listed by Marine Safety Headquarters as having met the requirements of both the STCW Code and the *Marine Personnel Regulations* may be submitted by the applicants.
- (2) Organisations that may wish to create and/or have approved, a training record book that, when presented to Marine Safety, demonstrates the applicant's required competence during this minimum 6 month service, should contact the Manager, Engineering Certification, Marine Personnel Standards and Pilotage, Marine Safety, Ottawa.

3.2 Approval process

- (1) Organisations wishing to create and/or have approved, a training record book that can be used by their employees or the marine industry in general should contact the Manager, Engineering Certification, Marine Personnel Standards and Pilotage, Marine Safety, Transport Canada, Tower B, Place De Ville, 112 Kent St, 4th Floor, Ottawa, Ontario K1A 0N5. Tel: 1-613-998-0640
- (2) Advice can be sought from the Manager, Engineering Certification concerning the approval process.
- (3) The process normally requires the submission of two original copies of the manual, together with any documentation required.
- (4) The manual and any documentation will be reviewed by the Engineering section.
- (5) Formal approval or recommended changes will be communicated to the organisation concerned, with any conditions or recommendations that the Manager, Engineering Certification may wish to make.
- (6) Approved Training Record Books will be added to the approved list, the local Transport Canada Examination Centres advised and this TP amended accordingly.

3.3 Training record book required elements

- (1) Each training record book is to contain the following elements that are integral to the safe operation of the engineering watch, and shall be arranged to clearly indicate competencies in the following areas:
 - (a) shipboard familiarisation;
 - (b) preparing main machinery and auxiliary equipment for sea;

- (c) shutting down main machinery;
- (d) manoeuvring main machinery;
- (e) preparing, starting, coupling and changing over generators;
- (f) transferring fuel;
- (g) preparing and operating evaporators and distillation plants;
- (h) operating oily water separators and conducting appropriate tests to ensure the correct operation of those separators, prevention of environmental pollution responsibilities;
- (i) preparing and operating air compressors;
- (j) preparing and starting steering gear and conducting appropriate tests to ensure the correct operation of the steering gear;
- (k) testing boiler water-level gauges under normal working conditions;
- (l) operating boilers, including the combustion system;
- (m) transferring ballast and fresh water;
- (n) lubricating machinery;
- (o) pumping bilges;
- (p) taking machinery readings and compiling the data in the machinery space log books;
- (q) acting as assistant watchkeeper at sea;
- (r) maintaining a safe engineering watch, including “taking over”, “accepting”, “routine duties” and “handing over a watch”;
- (s) the safety requirements for working on electrical systems;
- (t) the maintenance and repair to plant and equipment;
- (u) a general knowledge of the principal structural members of the ship and the proper names for the various parts;
- (v) a general knowledge of vessel watertight integrity and the actions to be taken in the event of the partial loss of intact buoyancy.

- (2) In addition to the above required elements, the record book shall be so constructed to allow sign off by either the Chief Engineer, Master or company training officer.
- (3) In order to aid organisations that may wish to create or modify a training record book, there is included with this TP a *Model Training Record Book for Applicants to the Fourth-Class Engineer Certificate* - see annex "A".

3.4 Approved training record books

- (1) The following training manuals have been approved by the Manager, Engineering Certification, as meeting the requirements of the STCW Code and the *Marine Personnel Regulations* relating to the fourth-class engineer Training Record Book.
 - (a) *Model Training Record Book for Applicants to the Fourth-Class Engineer Certificate*, TP 13721, Annex A.
 - (b) Canadian Coast Guard Ships' Crew OJT Manual (DFO/5559), First Edition, September 1998. (Applicants must have successfully completed chapters 3, 4 and 6)
 - (c) British Columbia Ferry Corporation Watchkeeping Engineer Training Record Book, First Edition, 2001.
 - (d) Training manual from the International Shipping Federation.

Annex A

**Model Training Record Book
for Applicants to the Fourth-
Class Engineer Certificate**

ANNEX A – Model Training Record Book

4.1 Introduction

- (1) This model training record book is developed as guidance to assist parties in developing their own training record book which may be used as part of an approved on-board training program. It may be used by applicants where a company training record book is not provided or has not received approved status. The content of this book follows the structure of the STCW Convention given in section A-III/1 of the STCW Code. Nothing should prevent a party from adopting its own format or specifying the assignments presented in section A-III/1 of the Code in greater detail. Each company has responsibilities as outlined in regulation I/14 of the STCW Convention and section A-I/14 of the STCW Code.
- (2) This model training record book is based on the IMO, STCW.7/Circ.3 published 6th December 1996. It has been altered to address the additional requirements of the *Canada Shipping Act, 2001* and its associated regulations, together with input from the Canadian maritime industry.
- (3) This model training record book details the practical training that needs to be obtained onboard vessels. It will serve both as a guide to the practical training which should be undertaken during the mandatory period of sea service and as a record of the satisfactory completion of that training.
- (4) Each trainee is required to have his own training record book and is responsible for its safe keeping. Ship engineer officers and supervisors in charge of training will also need to consult it to facilitate planning and organisation of the training.
- (5) No on-board training or assessment should take place unless such activities can be carried out without interfering with the normal operation of the ship, jeopardising safety of life at sea, or posing a risk of marine pollution.

4.2 Scope

- (1) The aim of the practical training is for trainees to:
 - (a) gain experience in relevant aspects of shipboard activities as they occur on board the ship on which the trainee is sailing;
 - (b) test and compare the knowledge with the daily practice on board;
 - (c) consolidate and expand theoretical knowledge;
 - (d) build a practical basis to achieve the standards of competence in accordance with table A-III/1 of the STCW Code;

- (e) build a practical basis to achieve the standards of competence in accordance with regulation VIII/2 of the STCW Convention and the corresponding sections of Parts A and B of the STCW Code;
- (f) prepare for a higher position on board.

4.3 Objective

- (1) The trainees will acquire basic engineering skills and a practical awareness of the need to follow safe working practices. They will also be able to keep an engineering watch safely, in accordance with the relevant regulations and recommendations.
- (2) The aim of the training record book is three fold, namely:
 - (a) directing the practical training, so the trainee is guided as to the objectives of the practical training period;
 - (b) giving guidance to the engineer officers regarding the development of the practical training to enable them to judge the progress and, if necessary, to make adjustments; and
 - (c) providing sign off space so that the required training can be proved and documented.

4.4 Approved on-board training program

- (1) Applicants for certification are required to complete 6 months of on-board training and experience. This training forms part of an overall system of training and experience approved by Marine Safety under whose authority the certificate is issued. On-board training is required to ensure that the applicant receives systematic practical training and experience which is closely supervised and monitored by qualified engineer officers and adequately documented in an approved training record book. Regulations require that engineer officers supervising and monitoring and assessing the onboard training are appropriately qualified.
- (2) Each general training activity specified in the approved training record book is required to have been completed by the applicant and supervised, monitored, assessed and documented as being satisfactorily completed.

Guidance for the Chief Engineer Officer or Supervising Engineer Officer

4.5 General

- (1) Seagoing service is a requirement for certification as a fourth-class engineer officer. The minimum length of the seagoing service is six months in the engine department under the supervision of a qualified and certificated engineer officer.
- (2) The seagoing service is an important part of the training to become a marine engineer. For the trainee to gain maximum benefit from the experience, it is essential to have the full co-operation of all officers who will be involved in the training process.
- (3) Throughout training, emphasis on safe practices is essential; trainees with little experience aboard ship will require special attention. During the period of supervised engine-room watchkeeping, the training should be aimed at putting into practice the requirements of the Watchkeeping Standards.
- (4) This record book provides a comprehensive record of the trainee's progress. Planned training at sea will ensure that the best use is made of the trainee's time and that he gains the necessary practical experience required to become a competent watchkeeping engineer. The record book should be examined by the chief engineer or master at regular intervals.
- (5) The familiarisation training should be completed as soon as practicable after the trainee joins a new ship.
- (6) When a task is completed, it should be recorded and initialled by the engineer or officer concerned.
- (7) Part of the training is to record facts about the ship and its equipment. For these and certain other tasks, it will be necessary for the trainee to have access to various documents, such as ship's plans and drawings, hydrostatic data, manufacturer's instruction manuals and other information.
- (8) These guidance notes and the record book are concerned solely with the achievement and documentation of a minimum standard of competence required of a fourth-class engineer. No attempt is made in this training record book to suggest how a trainee's suitability in other respects should be determined or reported. That is considered to be a matter for the employer.
- (9) The Training Record Book should be examined before being used:
 - (a) to ensure it belongs to the trainee being instructed or assessed; and
 - (b) to verify whether it has been used by an unauthorised person or whether there are suspect entries. If such indications are confirmed, the local Marine Safety office is to be advised.

- (10) Chief Engineers and/or Masters are asked to sign the appropriate section (5.1) at regular intervals or when the trainee is discharged from the vessel. Where the vessel has an official stamp, it is recommended that this be applied over the entry.

4.6 Conducting effective training

- (1) Several steps are required to make the conducting and recording of training as effective as possible, without placing an undue burden on officers, supervisors or crew members.
- (a) Decide who will be supervising the trainee on your ship. These should be engineering officers or experienced crew members that may be used for certain tasks. Try to spread the workload as much as possible.
 - (b) Explain/demonstrate the basic steps in practical training. These are:
 - (i) explain the job to the trainee, emphasising all safety aspects;
 - (ii) show the trainee the safe way to do the job;
 - (iii) watch the trainee do it; and
 - (iv) have the trainee demonstrate his knowledge or ability to the supervisor.
- (2) The supervisor/officer, when signing off an item, must be certain the trainee understands how to do the job safely.
- (3) Plan suitable times for conducting training and schedule work teams accordingly. In some cases, having the trainee work with experienced employees on a given job will allow the training on tasks associated with that job to be completed with little extra effort, as long as safety is not compromised.
- (4) Periodically review the trainee's progress. This is your opportunity to discuss the completed tasks with the trainee and an opportunity to reinforce any weak areas.
- (5) It is important to recognise positive behaviour of the trainers and trainees through the company appraisal system. This will foster a positive training environment.

Guidance for Trainees Completing this Record Book

4.7 General

- (1) Before starting to complete this manual, trainees should read it completely, in order to understand what is required and what level of effort and sign off is required. Failure to complete the manual and obtain the required signatures will hamper your ability to convince the engineering examiner that you have successfully completed the training required.
- (2) When joining a vessel or when starting this manual, trainees should inform the Chief Engineer and the appropriate engine room staff of their intention to complete the manual. Obtaining appropriate signatures will be easier if everyone is aware of this manual's content and requirements.
- (3) Before attempting a task, supervisors and watch personnel are to be aware of the specific task to be undertaken and they, in collaboration with the Chief Engineer, should set the level of supervision required.
- (4) In order to successfully complete this manual, there is a requirement to get the tasks and assignments checked off. Normally, these tasks can be signed off by the engineer of the watch or Chief Engineer.
- (5) While there is no final manual sign off, examiners will be verifying that tasks are completed and that there is an entry on the sign off page (section 5.1). Therefore, regular submission for sign off is recommended. At a minimum, trainees should ensure the manual sign off is completed before signing off a vessel. It becomes very difficult to obtain signatures once you have departed the vessel.
- (6) There are some sections and tasks that speak of steam propulsion machinery. Similarly, there are sections and tasks that refer to motor powered vessels, trainees should complete the relevant sections and tasks.
- (7) Once completed, this manual should be presented to the Marine Safety examiner when applying for the fourth-class engineer certificate of competency.

5.2 Engineers' task sign off

Engineers signing off tasks in this manual are required to print their name and position, and include a sample of their initials beside it. There is room in each box for initials and date, as shown:

Name: R. J. Smith Position: 4 th Engineer Vessel: MV "Neverhome"	RS 10/1/2001
---	-----------------

Name: Position: Vessel:	
-------------------------------	--

Name: Position: Vessel:	
-------------------------------	--

Name: Position: Vessel:	
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Name: Position: Vessel:	
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Name: Position: Vessel:	
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Name:

Position:

Vessel:

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Name:

Position:

Vessel:

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Name:

Position:

Vessel:

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Name:

Position:

Vessel:

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Name:

Position:

Vessel:

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Name:

Position:

Vessel:

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Name:

Position:

Vessel:

--

Information

6.1 Trainee personal information

Full Name:
Permanent Address:
CDN Number:
Training Record Book completed aboard:
1
2
3
4

6.2 Vessel information

Trainees are to complete the ship's data section for each vessel aboard which tasks are signed off.

(1) Ship's data, vessel 1

Ship's name
Call sign
Vessel type
Port of registry
Gross registered tons
Net registered tons
Loaded displacement
Cargo
Length overall (m)
Beam (m)
Summer draft loaded (m)
Service speed (knots)
Shaft power (kW)
Propeller(s)
Service r.p.m
Bunker capacity
Daily fuel consumption
Fuel type and viscosity
N° of lifeboats and rafts
Fire-fighting pumps

(2) Ship's data, vessel 2

Ship's name
Call sign
Vessel type
Port of registry
Gross registered tons
Net registered tons
Loaded displacement
Cargo
Length overall (m)
Beam (m)
Summer draft loaded (m)
Service speed (knots)
Shaft power (kW)
Propeller(s)
Service r.p.m
Bunker capacity
Daily fuel consumption
Fuel type and viscosity
N° of lifeboats and rafts
Fire-fighting pumps

(3) Ship's data, vessel 3

Ship's name
Call sign
Vessel type
Port of registry
Gross registered tons
Net registered tons
Loaded displacement
Cargo
Length overall (m)
Beam (m)
Summer draft loaded (m)
Service speed (knots)
Shaft power (kW)
Propeller(s)
Service r.p.m
Bunker capacity
Daily fuel consumption
Fuel type and viscosity
N° of lifeboats and rafts
Fire-fighting pumps

(4) Ship's data, vessel 4

Ship's name
Call sign
Vessel type
Port of registry
Gross registered tons
Net registered tons
Loaded displacement
Cargo
Length overall (m)
Beam (m)
Summer draft loaded (m)
Service speed (knots)
Shaft power (kW)
Propeller(s)
Service r.p.m
Bunker capacity
Daily fuel consumption
Fuel type and viscosity
N° of lifeboats and rafts
Fire-fighting pumps

Engine Room Operations

8.1 General

Duty or Tasks Performed Satisfactorily

**Check off signature
and date**

State the rank structure in the engine room. Who reports to whom?

Locate all the normal and emergency exits from the engine room spaces. Show the location of all fire extinguishers, eye wash stations and first aid kits.

Explain what safety gear should be worn before entering the engine room.

Engine room gas smothering system: What is the extinguishing agent used? How does the system work? Should the system be activated while personnel are in the engine room? Who should pull the smothering system release?

Describe the purpose of the Engine Room (C/E) Log Book and Oil Record Book. What are the abbreviations used in each?

Demonstrated ability to recognise the various engine room alarms and emergency signals.

Demonstrated ability to use the various communication systems, including emergency sound powered devices.

8.2 Technical details – Diesel propulsion

Trainees aboard steam powered vessels need not complete section 8.2.

(1) Main engine

Make and type
Cylinder bore
Piston stroke
Output power
Number of cylinders
Reversible or non-reversible
2 or 4-stroke
Scavenging/supercharging system
Trunk piston or crosshead construction
Number of inlet and outlet valves
Idle, rated and full revolutions
Fuel type
Compression pressure
Firing pressure
Lube oil pressure
Specific fuel consumption
Method of starting

(2) Coupling/reduction gearing

Make and type of coupling or reduction gearing
Type of coupling (plate/hydraulic, reversible, etc.)
Type of reduction gearing
Reduction ratio
Type of gear teeth

8.3 Technical details – Steam propulsion

Trainees aboard motor vessels need not complete section 8.3.

(1) Main turbine

Make and type
Type of turbine
Type and number of stages HP turbine
Type and number of stages LP turbine
Number of RPM (HP and LP)
Power output
Inlet steam pressure
Inlet steam temperature
Extractions (bleed) steam pressure
Reheat steam pressure and temperature
Exhaust steam pressure
Exhaust steam temperature
Type of governor and trip mechanisms

(2) Reduction gear assembly

Make and type
Reduction ratio
Type of gear teeth

(3) Main boilers

Make and type
Steam generating capacity
Steam pressure & temperature
Combustion control system/burner management system
Feed water control system
Superheated steam temperature control
Type of desuperheater
Type of economiser
Soot blower arrangement
Safety valve arrangement
List of boiler mountings and internals

8.4 Technical details – General

(1) Thrust block

Make and type
Separate or built-in

(2) Shafting

Configuration
Maximum revolution/minute
Type of stern tube and gland
Type and number of bearings

(3) Propeller

Make and type
Fixed/controllable pitch/contra rotation
Number of blades
Right/left handed
Pitch and diameter

(4) Thrusters (bow and/or stern)

Number
Location
Make and type
Type of drive
Maximum electrical power consumption
Maximum output power

(5) Steering gear

Make and type
N° of pumps, ram arrangement
Follow up arrangements
Emergency arrangements

8.5 Generators

(1) Ship service generators

Number of generators
Make and type
Power output
Revolutions/minute
2 or 4-stroke
Type of scavenging/turbo charging
Type of fuel
Method of starting
Compression pressure
Firing pressure
Specific fuel consumption
Governor
Voltage
Frequency
Normal and maximum load

(2) Shaft generators

Number of shaft generators
Make and type
Voltage
Frequency
Normal and maximum load
Drive method
Maximum and minimum shaft r.p.m. permissible
Frequency and voltage control

(3) Emergency generator

Make and type
Prime mover details
Voltage
Frequency
Maximum continuous output
Method of starting (auto/manual start details)
Emergency generator supplies power to which systems?

8.6 Fuel/oil/water systems

(1) Fuel transfer pumps

Number on board
Type
Capacity
Fuels carried

(2) Tanks

Capacity fuel storage tank(s)
Capacity settling tank(s)
Capacity day tank(s)
Capacity sludge tank(s)

(3) Fuel cleaning system

Number of purifiers
Make and year of manufacture
Type of purifiers
Capacity

(4) Fuel heater

Heater type
Viscosity controller type
Fuel blending system details

(5) Lubricating oil system

Number of pumps
Main lube-oil pumps make
Type and capacity

(6) Lube oil purifiers

Number on board
Type and capacity

(7) Fresh water system

Make of fresh water evaporator(s)
Number on board
Type
Capacity
Heating medium
Potable water capacity of vessel
Non-potable water capacity of vessel

8.7 Starting, control and general air systems

(1) Starting air compressors

Number on board
Working principle
Make and type
Capacity
Working pressure
Stage cooling temperatures

(2) General air compressors

Number on board
Working principle
Make and type
Capacity
Working pressure

(3) Control air compressors

Number on board
Working principle
Make and type
Capacity
Working pressure
Type of cooling

(4) Pressure vessels (air receivers)

Number on board
Working pressures
Safety devices fitted

(5) Auxiliary boilers

Number on board, type and system
Manufacturer(s)
Working pressure
Safety devices, alarms and controls
Capacity
Burner management
Combustion control

(6) Exhaust gas steam boilers

Number fitted
Working principle
Manufacturer, type
Working pressure
Capacity
Control systems

8.8 Cargo handling and stowage

(1) Cargo pumps (where applicable)

Number on board
Make and type
Working principle
Capacity
Maximum working pressure
Method of drive
Method and location of control and monitors

(2) Ballast pumps

Number on board
Make and type
Working principle
Capacity
Maximum working pressure
Method of drive
Method and location of control and monitors

(3) Stripping pumps (where applicable)

Number on board
Make and type
Working principle
Capacity
Maximum working pressure
Method of drive
Method and location of control and monitors

(4) Insert gas plant (where applicable)

Working principle
Capacity
Method and location of controls and monitors

(5) Tank wash installation

Working principle
Capacity
Cleaning solvent

(6) Deck cranes/unloading equipment

Number on board
Make and type
Working principle
Safe working load/capacity

8.9 Safety and environmental protection

(1) Fire extinguishing system

Fire pumps
 Number on board
 Working principle
 Method of drive
 Capacity
 Pressure
 Location on board
 Operating positions
Emergency fire pump
 Working principle
 Capacity
 Method of drive
 Location on board
 Operating positions
Fixed fire-fighting installation(s)
 Working principle
 Protected space(s)
 Operating positions

Fire extinguishing system continued:

Sprinkler installation

Working principle

Protected space(s)

Fire detection system

Working principle

Protected space(s)

Hydrants

Number on board

International shore connection

Number on board

Location

(2) Bilge pumping arrangement

Bilge ejector

Number on board

Location

Capacity

Bilge pumps

Number on board

Location

Working principle

Capacity

Operating positions

(3) Environmental protection

Sewage treatment

Plant working principle

Capacity

Oily water separator

Working principle

Capacity

Control system

Number of ppm in the effluent

Incinerator

Working principle

Capacity

Substances to be burnt

Required fuel

Maximum working temperature

Ballast water monitor

Working principle

Control system

Engineering Watchkeeping

9.1 Propulsion machinery

Duty or Tasks Performed Satisfactorily

**Check off
signature and date**

Demonstrated ability to prepare and test steering gear for sea. What tests are carried out on the steering gear before leaving port?

--

Demonstrated ability to prepare, start and place on line a ship service generator.

--

Demonstrated ability to parallel two ship service generators.

--

Demonstrated ability to prepare all auxiliary machinery and systems for propulsion system start up.

--

Demonstrated ability to prepare main propulsion machinery and systems for sea.

--

Demonstrated ability to manoeuvre propulsion system.

--

Demonstrated ability to shut down the main propulsion system and machinery.

--

Demonstrated ability to monitor propulsion systems, auxiliary equipment and their operation.

--

Demonstrated ability to make rounds of the machinery spaces.

--

Demonstrated ability to follow written and oral instructions from chief and second engineer.

--

Demonstrated ability to recognise problems that should be reported to the chief engineer and to the second engineer.

--

Main propulsion system control understood. How to carry out throttle orders from the bridge and effect speed change of the propeller. What alternate means are available should the main control system fail?

Demonstrated ability to recognise operating problems related to the vessel operating in shallow water, ice choked waters, or heavy seas.

Demonstrated ability to operate propulsion system in special operational modes, due to equipment failures, adverse ship conditions or reduced power requirements.

Demonstrated ability to manipulate/bypass or isolate propulsion or auxiliary equipment in order to carry out repairs.

Demonstrated ability to locate common faults in the propulsion and auxiliary equipment and take action necessary to prevent damage.

Demonstrated ability to locate and use relevant manuals, drawings diagrams and instructions.

Demonstrated ability to record all events related to the main and auxiliary machinery which have occurred during the engineering watch.

Demonstrated ability to take over, and perform an engineering watch in port.

9.2 Auxiliary Machinery

Duty or Tasks Performed Satisfactorily

Demonstrated ability to transfer fuel oil, including a detailed understanding of all associated tanks, pumps and pipework.

Demonstrated ability to prepare and operate an evaporator or distillation plant, including a detailed understanding of all associated tanks, pumps and pipework.

Demonstrated ability to operate the bilge system and oily water separator, including a detailed understanding of all associated tanks, pumps and pipework. What is the “parts per million” (ppm) rating of the oily water separator?

**Check off
signature and date**

Engineering Watchkeeping

Revision N° : 02

Demonstrate ability to prepare and operate air compressors, including a detailed understanding of all associated tanks, pumps and pipework.

Demonstrated ability to transfer ballast water, including a detailed understanding of all associated tanks, pumps and pipework.

Demonstrated ability to transfer fresh water, including a detailed understanding of all associated tanks, pumps and pipework.

Demonstrated ability to carry out machinery and systems checks in engine room related compartments. e.g. battery rooms, fan rooms etc.

Demonstrated ability to determine the level and where applicable the condition of residues in bilges, ballast tanks, slop tanks, sewage tanks and any special arrangements for it's disposal.

Demonstrated ability to determine the condition and level of fuel in the various fuel tanks (storage, settling, clean, day and emergency).

Demonstrated ability to check the mode of operation of the various main and auxiliary systems, including the electrical power distribution system.

Demonstrated ability to operate the automatic and manual controls related to the boiler.

Ship's electrical distribution understood. Generators to breaker panels, including voltage/current trips, transformers, supply voltages, shore connections and emergency switchboard connections.

Steering gear control understood. How bridge inputs result in steering gear movement. What procedures/backup systems are in place when normal bridge inputs are lost?

9.3 General

Duty or Tasks Performed Satisfactorily

**Check off
signature and date**

Taking over a watch routine understood. What specific items and checks are to be carried out before accepting a watch?

--

Handing over watch routines understood. When should the watchkeeping engineer not hand over the watch to the relieving engineer?

--

Watchkeeping Standards STCW 95 A/VIII read and understood.

--

Demonstrated ability to receive reports from engine room staff that relate to the operational status of the engine room and to take appropriate action.

--

Demonstrated ability to operate emergency generator, fire pumps, watertight doors and other equipment in the event of an emergency. What equipment is to be operated when alarms are sounded?

--

Demonstrated ability to isolate and shut down systems in case of emergency.

--

Lubricating system for the main engine(s)/turbines understood in detail. Normal and alarm parameters for pressures and temperatures stated. What safety devices, alarms and shut downs are fitted?

--

Cooling water system for the main engines understood in detail. Normal and alarm parameters for pressures and temperatures stated. What safety devices, alarms and shut downs are fitted?

--

Feed water system for the boilers understood in detail. Normal and alarm parameters for pressures and temperatures stated. What safety devices, alarms and shut downs are fitted?

--

Fuel oil system for the main engine(s)/boilers understood in detail. Normal and alarm parameters for pressures and temperatures stated. What safety devices, alarms and shut downs are fitted?

--

Sewage system understood in detail. What safety devices, alarms and shut downs are fitted?

--

Maintenance duties

10.1 General

Duty or Tasks Performed Satisfactorily

**Check off
signature and date**

Demonstrated ability to select and use tools, both hand and machine, to carry out fabrication and repairs.

--

Demonstrated ability to locate and interpret relevant manuals in order to carry out repairs or modification.

--

Demonstrated ability to decommission, repair, test and place back in operation, equipment and systems in accordance with manuals and good practice.

--

Demonstrated ability to evaluate the need to effect repairs and take corrective action with or without assistance.

--

Demonstrated ability to carry out routine testing and maintenance on electrical components. Demonstrated ability to submit report of results.

--

Demonstrated ability to locate and use relevant manuals and interpret drawings, sketches and other instructions in the maintenance activities of the engine room.

--

Demonstrated ability to select and use special tools for work on machinery and equipment.

--

Demonstrated ability to isolate propulsion system and engage turning gear safely. Bridge permission is required before turning shaft.

--

10.2 Diesel propulsion machinery

Applicants to the Steamship certificate are not required to fully complete this section. However, where certain tasks can be completed, applicants are encouraged to complete them. Chief engineers on steam vessels are encouraged to alter the tasks to suit the vessel.

Duty or Tasks Performed Satisfactorily

**Check off
signature and date**

Demonstrated ability to carry out a crankcase inspection and make a written report.	
Demonstrated ability to take crankshaft deflection readings and make a written report.	
Demonstrated ability to check condition, wear and clearances, overhaul and test fuel injection valves.	
Demonstrated ability to check condition, wear and clearances, overhaul and test air start valves.	
Demonstrated ability to check condition, wear and clearances, overhaul and test cylinder relief valves.	
Demonstrated ability to check condition, wear and clearances, overhaul and test inlet/exhaust valves.	
Demonstrated ability to replace and/or overhaul pistons and piston rings including the checking and adjusting of clearances.	
Demonstrated ability to replace and/or overhaul cylinder heads and associated components.	
Demonstrated ability to replace and/or overhaul turbo chargers including the checking of clearances.	
Demonstrated ability to check/replace top and bottom end bearings.	

Maintenance Duties

Revision N° : 02

Demonstrated ability to check/replace main bearings including thrust bearings.

--

Demonstrated ability to check hold down bolts and chocks for tightness.

--

Demonstrated ability to check tie bolts and main fasteners.

--

10.3 Steam propulsion machinery

Applicants to the steamship certificate are required to complete this section. Applicants to the motor ship certificate are required to complete this section where the vessel has auxiliary boilers. Where there is no steam or hot water heating fitted to the vessel, applicants to the motor certificate are not required to complete this section.

Duty or Tasks Performed Satisfactorily

**Check off
signature and date**

Demonstrated ability to take a boiler off line and out of service.

--

Demonstrated ability to blow down a boiler.

--

Demonstrated ability to open up a boiler for service.

--

Demonstrated ability to examine a boiler and report on its condition internally and externally.

--

Demonstrated ability to inspect water gauge fittings and check that passages, cocks and valves are clear.

--

Demonstrated ability to open up and inspect safety valves. Task is to be supervised by an experienced engineer.

--

Demonstrated ability to inspect feed check valves for correct operation and overhaul if necessary. Task is to be supervised by an experienced engineer.

--

10.4 Auxiliary machinery

Duty or Tasks Performed Satisfactorily

Check off signature and date

Demonstrated ability to carry out routine maintenance on the anchor windlass.

Demonstrated ability to carry out routine maintenance on the cargo winches and cranes.

Demonstrated ability to carry out routine maintenance on the vessel's mooring winches.

Demonstrated ability to carry out routine maintenance on the vessel's survival craft/workboats and launching gear.

Demonstrated ability to carry out routine maintenance on the various cargo hatches and watertight doors.

Demonstrated ability to carry out routine maintenance on the steering gear. How is air purged from the hydraulic system?

Ship operational responsibilities

11.1 General

Duty or Tasks Performed Satisfactorily

**Check off
signature and date**

Demonstrated knowledge of the principle structural members of the vessel and their correct names.	
Demonstrated knowledge of the stability information available on the vessel and the effects of free surface and flooding on the stability of the vessel.	
Demonstrated ability to act as the assistant watchkeeper at sea.	
Demonstrated ability to carry out bunkering operations with special precautions to prevent pollution to the environment.	
Demonstrated ability to carry out bilge and ballast operations with special precautions to prevent pollution to the environment.	
Demonstrated ability to carry out tank sounding survey in the event of a grounding or damage to the vessel.	
Demonstrated ability to recognise and report abnormal or dangerous tank level conditions that could affect the stability or watertight integrity of the vessel.	
Demonstrated ability to prepare engine room and related spaces for heavy weather.	
Demonstrated ability to operate and monitor fire detection equipment.	
Demonstrated ability to ensure that watch personnel make regular inspections of the engine room spaces. Ability to explain the need to be alert for abnormal situations or potential sources of fire.	
Demonstrated ability to use portable fire extinguishers and ensuring that watch personnel are capable of raising the alarm and responding to fires.	

Ship Operational Responsibilities

Revision N° : 02

Demonstrated ability to supervise watch personnel and ensure that the watch is aware of the procedures to follow in emergency situations.

Demonstrated ability to locate and properly use the fixed fire fighting systems and equipment on board the vessel.

Demonstrated ability to locate and use fire fighting outfits and breathing apparatus.

Demonstrated ability to act in accordance with the fire fighting plans during fire drills.

Demonstrated ability to carry out rescue operations wearing breathing apparatus during drills.

Demonstrated ability to carry out muster duties during drills.

Marine Laws and Regulations Knowledge for Applicants to the Fourth-Class Engineer Certificate

ANNEX B – Marine Laws and Regulations

12.1 Introduction

- (1) This annex was developed in order to comply with Table A-III/1 of the STCW Code, *Monitor compliance with legislative requirements*. It will enable the applicants who can not get the basic training on this subject to reach the level of competence required in order to obtain an STCW-endorsed certificate.
- (2) Applicants who intend to complete this annex in lieu of the approved training need to be familiar with the *Canada Shipping Act, 2001* and the *Prevention of Pollution From Ships and for Dangerous Chemicals Regulations, the Ballast Water Control and Management Regulations and the Environment Response Regulations* made pursuant to the Act, as well as with the MARPOL and SOLAS Conventions.
- (3) One should expect that with proper documentation in hand, approximately 20 hours will be required to complete this annex; upon completion, it must be presented to a Marine Safety examiner for assessment.

12.2 Objective

- (1) The objective of this annex is two fold, namely to ensure basic working knowledge of:
 - (a) the Canadian Regulations regarding the specific requirements on pollution prevention on the Great Lakes and other Canadian internal waters, and
 - (b) the IMO Conventions relating to the protection of the marine environment and the safety of life at sea.

12.3 Canadian Laws and Regulations

(1) The legislative process

1. What is the final step in the enactment of a new law?
 - a) Third Reading
 - b) Royal Assent
 - c) approval by the Senate
 - d) the Report Stage

2. Which of the following can be referred to as subordinate legislation?
 - a) Regulations
 - b) Part II of the *Canada Gazette*
 - c) Acts
 - d) Bills

3. At what step in the development of regulations does Privy Council ensure there is no conflict with other legislation?
 - a) Review
 - b) Drafting
 - c) Ministerial approbation
 - d) Prepublication

4. When a bill is introduced in the House, it is said to go through:
 - a) Committee Stage
 - b) Report Stage
 - c) First Reading
 - d) Royal Assent

5. The final form of a regulation is published in:
 - a) The RIAS
 - b) The *Canada Gazette*, Part I
 - c) The *Canada Gazette*, Part II
 - d) The *Canada Gazette*, Part III

NOTE: For the legislative process, see the Privy Council Office web site (<http://www.pco-bcp.gc.ca/raoics-srdc/default.asp?Language=E&page=home>). For the *Canada Shipping Act, 2001* and Regulations, see the Transport Canada (marine) web site (<http://www.tc.gc.ca/acts-regulations/marine/menu.htm>).

(2) Prevention of Pollution from Ships and for Dangerous Chemicals Regulations -Air pollution Regulations:

Where and to whom do these regulations apply?

Under what circumstances may a ship emit smoke of a density greater than what is normally allowed?

(3) Prevention of Pollution from Ships and for Dangerous Chemicals Regulations -Pollutant Substances Pollution Prevention Regulations:

Under which section of the *Canada Shipping Act, 2001* were these Regulations established?

(4) Prevention of Pollution from Ships and for Dangerous Chemicals Regulations -Pollutant Discharge Reporting Regulations

To which ships do these Regulations apply? Which ships are exempted?

Apart from the ship's captain, who may be responsible to make a report in case of discharge of a pollutant and under which circumstances?

(5) Prevention of Pollution from Ships and for Dangerous Chemicals Regulations - Oil Pollution Prevention Regulations

Which ships are required to carry an Oil Record Book?

List all the documents a 5000-ton Oil tanker engaged in international voyages is required to have on board under the Prevention of Pollution from Ships and for Dangerous Chemicals Regulations -Oil Pollution Prevention Regulations.

Which ships are required to have containers or enclosed deck areas for bunkering operations? What is the minimum size of containers? Which ships are exempted from this requirement?

Where and under which conditions may a mixture not exceeding 5 ppm of oil be discharged into the sea?

Which ships are required to have on board a Shipboard Oil Pollution Emergency Plan? What is the reason for this plan?

12.4 MARPOL

(1) What types of ship-generated pollution does MARPOL deal with?

(2) Where and to whom does this convention apply? Which ships are exempted?

(3) Which annexes are considered optional? Has Canada ratified all annexes?

(4) In relation with oil pollution prevention, what does a *special area* mean?

(5) Name the certificate(s) required and issued under this convention. Who must issue them?
When do they cease to be valid?

- (6) Under which conditions may an oil tanker discharge oil or oily mixtures into the sea?
What about a ship other than an oil tanker?

- (7) Where are located the reception facilities for discharging ship's oily residues?

- (8) Which ships are required to be equipped with a sludge tank in order to retain on board the oil residues from the normal engine room operation?

- (9) With regard to the carriage of noxious liquid substances in bulk, which ships are required to carry a Cargo Record Book? What must be the content of this book?

(10) For harmful substances carried in packaged form, what is the required marking and labelling of packages?

(11) Which ships are required to comply with regulations regarding the prevention of pollution by sewage?

(12) When and under what conditions is the discharge of sewage allowed into the sea?

(13) With regard to disposal of garbage at sea, what does *special area* mean?

(14) What are the conditions for disposing of garbage at sea outside special areas?

12.5 SOLAS

(1) What is SOLAS?

(2) Where and to whom does it apply? Which ships are exempted?

(3) List the certificates required and issued under this convention and state their normal period of validity.

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(4) Give a brief outline of Chapter 1 – What does it deal with?

(5) Where is the collision bulkhead located on a passenger ship? What about a cargo ship?

(6) What is the maximum time allowed for the main steering gear to turn the rudder from 35° on either side to 30° on the other side? What about the auxiliary steering gear?

(7) Describe the characteristics of the starting arrangements for an emergency generator.

(8) What is the minimum pressure in the fire mains of a 12,000-ton cargo ship? State the conditions under which this pressure is to be measured. What is the maximum pressure?

(9) How is the minimum speed of descent of a rescue boat determined? What factors must be considered when determining the maximum speed? What is the minimum strength of the launching appliance's winch brakes?

(10) Name the different classes of dangerous goods.

Ship Stability and Construction for Applicants to the Fourth- Class Engineer Certificate

ANNEX C – Ship Stability and Construction

13.1 Introduction

- (1) This annex was developed in response to Table A-III/1 of the STCW Code, *Maintain seaworthiness of the ship*. It will enable the applicants who can not get the basic training on this subject to reach the level of competence required in order to obtain an STCW-endorsed certificate.
- (2) Applicants who intend to complete this annex in lieu of the approved training need to have on hand good manuals on ship stability and naval architecture.
- (3) One should expect that with proper documentation in hand, approximately 40 hours will be required to complete this annex; upon completion, it must be presented to a Marine Safety examiner for assessment.

13.2 Objective

- (1) The objective of this annex is three fold, namely:
 - (a) to ensure basic working knowledge and application of stability, trim and stress tables;
 - (b) understanding of the fundamentals of watertight integrity and actions to be taken in the event of partial loss of intact buoyancy; and
 - (c) general knowledge of the principal structure members of a ship and the proper names for the various parts.

13.3 Ship Stability

(1) Basic knowledge and definitions

What is the Centre of Gravity of a ship?

What is the Centre of Buoyancy?

What is the transversal Metacentre?

What is the longitudinal Metacentre?

What do the acronyms TPC and TPI stand for? What do they mean?

What do the acronyms MCTC and MCTI stand for? What do they mean?

For a specific ship, where can we find the information on the above?

Define briefly the following terms:

Applicant:

Displacement _____

Deadweight _____

Coefficient of form _____

Waterplane area _____

What is *Free Surface Effect*? Generally speaking, how does this affect the stability of a ship?

What is meant by the *trim* of a ship? What makes it change?

With regard to a ship's hull, what do *Hogging* and *Sagging* mean? How are they measured?

How do we find the stress in a ship's hull? How can one find the maximum allowable stress?

Define the propeller pitch. What is meant by *Propeller slip*?

State and explain Archimedes's law.

How is the draft of a ship affected by the density of the water in which it floats? What is meant by *Fresh Water Allowance*?

Explain what happens to the ship's centre of gravity when cargo is added or removed. In which direction does it move? What is the effect of a weight suspended from a crane boom?

What is the *Righting Arm*? How is it calculated?

What is meant by *Intact Stability*?

What is the purpose of watertight bulkheads? Where are they installed on a ship?

Describe the fitting of a watertight bulkhead valve. What arrangement is provided to control this valve from outside the compartment?

What is the function of the watertight doors on board a ship? Where are they located? When are they used?

Describe an arrangement provided to close a watertight door from outside the compartments it isolates. Why does it have an alarm? Where and when does it sound?

Explain how you would make a temporary repair to stop the water entering the engine room through a corroded spool between a sea water inlet valve and the ship's bottom.

(2) Exercises

What is the weight of a steel block 1m x 1m x 0.5m having a density of 7500 kg/m³ ?

According to Archimedes's law, what is the weight of this same block when it is immersed in water having a density of 1000 kg/m³ ?

Calculate the TPC of a box shaped barge 20m long by 5m large floating in water of 1000 t/m³.

What will be the change in the mean draft of this barge when 500t of cargo are discharged?

Draw a diagram of the midship cross section of a general cargo vessel and show the relative positions of the Centre of gravity (G), Centre of buoyancy (B) and Metacentre (M). Give the typical values in meters relative to the keel (K).

Draw the same diagram at an angle of 10° and show the righting arm. Give the value relative to the ship's displacement.

13.4 Ship Construction

(1) Basic knowledge and definitions

Define the following terms relating to a ship's structure:

Frame _____

Longitudinal framing _____

Transverse framing _____

Web frame _____

Stringer _____

Floor _____

Deck Girder _____

Beam knee _____

Pillar _____

Bracket _____

Bilge plate _____

Double bottom _____

(2) Exercises

Explain the purpose of double bottoms

Draw and label a transverse framed double bottom

Define *Pounding* and *Panting*. How are these stresses compensated for?

Draw and label the midship cross section of the vessel you are presently working on, or one that you are familiar with.

Sketch and describe the construction of the bow section of the vessel you are presently working on, or one that you are familiar with. Name all the members.

Sketch the steering gear arrangement of the vessel you are presently working on, or one that you are familiar with, and explain its operation. Explain also the operation of the emergency gear.

Sketch and describe the rudder of the vessel you are presently working on, or one that you are familiar with. Show in detail one pintle bearing.

Draw the shafting arrangement of the vessel you are presently working on, or one that you are familiar with, showing also the thrust bearing and how it is attached to the structure.

Sketch and describe an oil-lubricated stern tube, showing how it is fitted in the ship's structure.