Transport Canada Transports Canada

TP 13721E
(08/2015)

TRAINING RECORD BOOK FOR ENGINEERS (TRBE)

Requirements for Applicants to the STCW-Endorsed Fourth-Class Engineer Certificate

3rd EDITION
AUGUST 2015

TC-1005727

Canada

Responsible Authority	Approval
The Executive Director, Marine Personnel Standards, Pilotage and Medicine is responsible for this document, including any change, correction, or update.	**"Original signed by Bruno Duguay"** Bruno Duguay Acting Executive Director, Marine Personnel Standards, Pilotage and Medicine Marine Safety and Security

Original Date Issued: May 2001 **Date Revised: August 2015**

ISBN 978-0-660-03275-7
Catalogue No. T29-125/2015E

TP 13721E
(08/2015)

TC-1005727

DOCUMENT INFORMATION

Title	**TRAINING RECORD BOOK FOR ENGINEERS – REQUIREMENTS FOR APPLICANTS TO THE STCW-ENDORSED FOURTH-CLASS ENGINEER CERTIFICATE**		
TP No.	**13721E**	**Edition**	**3rd RDIMS # 8157224 v3**
Catalogue No.	**T29-125/2015E**	**ISBN**	**978-0-660-03275-7**
Originator	Amir Maan Marine Personnel Standards and Pilotage Tower B, Place de Ville 330 Sparks St., 8th floor Ottawa, Ontario K1A 0N8	**Telephone** **Fax** **E-mail** **URL**	(613) 990-2075 (613) 990-1538 MarineSafety@tc.gc.ca http://www.tc.gc.ca/MarineSafety

Last Review	
Next Review	

Edition No.	Date of Edition	Affected Pages	Author (s)	Brief Description of Change
01	**January 2006**	**Whole document**	**Paul Mannion**	**This Record Book applies only to the applicants to the Fourth-class Certificate of Competence bearing STCW endorsement. Added annexes B and C.**
02	**July 2007**	**Whole document**	**Amir Maan**	**This document is updated taking into account the coming into force of the *Canada Shipping Act, 2001*.**
03	**August 2015**	**Whole Document**	**Amir Maan**	**Total revision of TP to a new quality format. This document is updated to meet the requirements of 2010 amendments to STCW Convention & Code and taking into account the coming into force of**

TABLE OF CONTENTS

1. SCOPE AND APPLICATION

1.1 PURPOSE

(1) To inform marine stakeholders and seafarers about the requirement to successfully complete a Transport Canada Marine Safety and Security (TCMSS) approved *Training Record Book for Engineers (TRBE).* This is part of the mandatory minimum 6 months of sea service requirement before TCMSS is to examine applicants for the Fourth-class Engineer's certificate of competency (COC) with a STCW endorsement.

(2) To provide details of the on-board training during the required seagoing service.

(3) To provide an approved TRBE, that is to be successfully completed by applicants to the Fourth-class Engineer's COC with a STCW endorsement.

(4) To provide an alternative to the training courses listed below that are integral part of the Practical Skills training for Marine Engineers (PSME) required under Regulation III/1 of STCW Convention and Code, as amended:

(a) Marine Laws and Regulations, and

(b) Ship Construction and Stability.

1.2 SCOPE

(1) Compliance with:

1. *Section 147 of the Marine Personnel Regulations (MPR), as amended,* made pursuant to the *Canada Shipping Act, 2001 (CSA2001).*
2. *Regulation III/1 of the International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978 (STCW Convention), as amended* and mandatory requirements as detailed in Chapter III of Part A of the *Seafarers' Training, Certification and Watchkeeping Code (STCW Code), as amended,* to which Canada is a party, and

1.3 EFFECTIVE DATE

(1) This document enters into force on **July 1st, 2013**.

1.4 AUTHORITY

(1) Section 147 of the *Marine Personnel Regulations (MPR),*as amended, made pursuant to the *Canada Shipping Act, 2001* (2001, c.26).

1.5 BACKGROUND

(1) Canada is party to the International Maritime Organization (IMO) STCW Convention, as amended and must implement all of its applicable provisions, including Part A of the STCW Code, as amended for all STCW-endorsed certificates issued by Canada.

(2) Contained in section A-III/1 of the STCW 2010 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 in a manned engine-room or as designated duty engineers in a periodically unmanned engine-room.

2. SPECIFIC REQUIREMENTS

2.1 FOURTH-CLASS ENGINEER CERTIFICATE WITH A STCW ENDORSEMENT

(1) Candidates applying for a 4th Class Engineer's COC with a STCW-endorsement, must provide, in addition to the testimonials and the training certificates required by the MPR, as amended, a fully completed TCMSS's approved TRBE, as detailed in this document.

2.2 COMPLETION OF TRAINING RECORD BOOK

(1) Trainees are required to complete progressively all the tasks listed in the Annex A-TRBE to ensure meeting the competences required by the section A-III/1 of the STCW2010 Code. In case any listed machinery or equipment not fitted on board the vessel to which a trainee is signed on, tasks with respect to such machinery/equipment are to be completed with the help of text books/reference books or other resource considering a typical ship.

(2) Applicants who are registered in an *Engineer Officer Education and Training (EOET) Programs*, with a TCMSS's recognized institution, are required to complete Annex "A" of this document, in the course of their mandatory six months of sea service. There is no requirement for them to complete Annex "B" and "C".

(a) While completing the sea service requirements of the certificate; the TRBE, as specified in Annex "A" of this document, is to be signed off by the designated on board training officers, the Company training officer and the Chief Engineer.

(b) Applicants registered in an *EOET Programs*, with a TCMSS's recognized institution, prior to July 1st 2013, may choose to complete the previous TCMSS approved TRBE, in lieu of the one specified in Annex "A" of this document.

(3) Applicants not registered in an *EOET Programs*, with a TCMSS's recognized institution, are required to complete Annex "A", in the course of their mandatory six months of sea service, together with Annexes "B" and "C" of this document.

(a) While completing the sea service requirements of the certificate; the TRBE, as specified in Annex "A" of this document, is to be signed off by the designated on board training officer, the Company training officer and the Chief Engineer.

(b) Applicants who acquired sea service, and started to complete a previously approved TCMSS's TRBE, prior to July 1st 2013, may choose to continue with the previously approved TCMSS's TRBE, in lieu of the TRBE specified in Annex "A" of this document.

3 ASSESSMENT BY TCMSS EXAMINER OF ENGINEERS

3.1 GENERAL

(1) TCMSS Examiner of Engineers will accept successfully completed and duly signed TCMSS's approved TRBE as evidence of the duties and competencies acquired during the mandatory service period aboard ships.

(2) TCMSS Examiners will review the candidate's TRBE for completeness, and satisfy themselves that each candidate has obtained the necessary sign-offs from the designated on board training officers, the Chief Engineers and the company training officers.

(3) Training Record Books remain the property of the candidate and will be returned to the candidate after review.

4. APPROVAL OF TRAINING RECORD BOOK FOR ENGINEERS

4.1 GENERAL

(1) Only TRBE as specified in Annex "A" of this document is approved by TCMSS.

(2) The content of this approved TRBE follows the structure of the STCW Convention given in section A-III/1 of the STCW Code, as amended. Nothing should prevent a company/organization from adding the assignments presented in section A-III/1 of the Code in greater detail. Also Organizations/Companies may add some of their organization's information/instructions as additional to the approved TRBE. Companies have responsibilities as outlined in regulation I/14 of the STCW Convention and section A-I/14 of the STCW Code, as amended.

5. ANNEX A

The latest edition of the "**On Board Training Record Book for Engine Cadets"** published by the International Shipping Federation (ISF) in conformity with the requirements of 2010 amendments to the STCW Convention and Code.

The ISF Book for Engine Cadets, is recognized by the IMO as it contains structured on board training tasks formulated around the revised standards stipulated by STCW 2010.

The "**On Board Training Record Book for Engine Cadets"** published by the ISF, is to be successfully completed by applicants to the STCW-endorsed Fourth-Class Engineer's COC.

ISF publications are available at the following:

Marisec Publications
12 Carthusian Street
London EC1M 6EZ,
U.K.
Tel: +44 20 7417 2855
Fax: +44 20 7417 8877
www.marisec.org

ANNEX B

Marine Laws and Regulations Knowledge for Applicants to the STCW-endorsed Fourth-Class Engineer's Certificate

6. ANNEX B – MARINE LAWS AND REGULATIONS

6.1 INTRODUCTION

(1) TCMSS developed this Annex to meet the requirements of Table A-III/1 of Part A of the STCW Code, as amended, Mo*nitor compliance with legislative requirements*. It will enable applicants who cannot get the basic training on this subject to reach the level of competence required to obtain an STCW-endorsed 4th Class Engineer's certificate.

(2) Applicants who plan to complete this Annex instead of taking the approved training must be familiar with:

1. Canada Shipping Act, 2001 and its Regulations, with specific reference to the following:

   (a) Administrative Monetary Penalties Regulations

   (b) Ballast Water Control and Management Regulations

   (c) Fire and Boat Drills Regulations

   (d) Fire Detection and Extinguishing Equipment Regulations

   (e) Large Fishing Vessel Inspection Regulations

   (f) Life Saving Equipment Regulations

   (g) Marine Machinery Regulations

   (h) Marine Personnel Regulations

   (i) Safe Working Practices Regulations

   (j) Safety Management Regulations

   (k) Small Fishing Vessel Inspection Regulations

   (l) Small Vessel Regulation

   (m) Tackle Regulations

   (n) Vessel Certificates Regulations

   (o) Vessel Clearance Regulations

   (p) Vessel Pollution and Dangerous Chemicals Regulations

2. Canada Labour Code with specific reference to Maritime Occupational Health and Safety Regulations

3. Arctic Waters Pollution Prevention Act and its Regulations and Orders, with specific reference to the following:

   (a) *Arctic Waters Pollution Prevention Regulation*

(b) *Steering Appliances and Equipment Regulations*
(c) *Shipping Safety Control Zones Order*

4. Marine Transportation Security Act and its Regulations, with specific reference to the following:

(a) Marine Transportation Security Regulations (MTSR)

5. Criminal Code, as it relates to the operation of a ship

6. MARPOL and SOLAS Conventions.

(3) Anyone with proper documentation will need about 20 hours to complete this Annex. Once completed, the applicant must present it to a TCMSS Examiner of Engineers for assessment.

6.2 OBJECTIVE

(1) The Annex has two objectives, namely to ensure basic working knowledge of:

(a) the Canadian Acts and Regulations and their specific requirements for preventing pollution 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.

6.3 CANADIAN LAWS AND REGULATIONS

(1) The legislative process

1. What is the final step in enacting 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.parl.gc.ca/About/Senate/Today/laws-e.html) For the *Canada Shipping Act, 2001*, *Canada Labour Code* and *Regulations*, see the Transport Canada (marine) web site:

(http://www.tc.gc.ca/acts-regulations/marine/menu.htm).

(2) Vessel Pollution and Dangerous Chemicals Regulations –Part 2- Division 6- Air:

(i) Where and to whom do these regulations apply?

_____
_____
_____
_____
_____
_____
_____

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

_____
_____
_____
_____
_____

(3) Vessel Pollution and Dangerous Chemicals Regulations – Division 3-Pollutants:

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

_____
_____
_____

(4) Vessel Pollution and Dangerous Chemicals Regulations – Pollutant Discharge Reporting:

(i) To which ships do these Regulations apply? Which ships are exempted?

_____
_____
_____
_____
_____

(ii) Apart from the ship's Master, who may be responsible to make a report in case of discharge of a pollutant and under what circumstances?

_____
_____
_____
_____
_____

(5) Vessel Pollution and Dangerous Chemicals Regulations – Part 2-Division 1-Oil:

(i) Which ships must carry an Oil Record Book?

_____
_____

(ii) List all the documents a 5000-ton Oil tanker engaged in international voyages must have on board under the Vessel Pollution and Dangerous Chemicals Regulations – Part2-Division 1-*Oil*.

(iii) 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?

(iv) Where and under what conditions may a mixture not exceeding 5 ppm of oil be discharged into the sea?

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

(6) Part 2 of Canada Labour Code:

(i) What are the fundamental rights of the employee?

_____
_____
_____
_____
_____

(ii) Describe the obligations of the employer.

_____
_____
_____
_____
_____
_____

(7) *Maritime Occupational Health and Safety Regulations*:

(i) Where and to whom do these regulations apply?

_____
_____
_____
_____
_____

(ii) Under which section & part of the *Canada Labour Code* is the Health and Safety Officer designated?

_____
_____
_____
_____

6.4 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 what 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 the reception facilities for discharging ship's oily residues located?

(8) Which ships must 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 labeling 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?

6.5 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.

(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.

ANNEX C

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

7. ANNEX C – SHIP STABILITY AND CONSTRUCTION

7.1 INTRODUCTION

(1) TCMSS developed this Annex to comply with the requirements of Table A-III/1 of Part A of the STCW Code, as amended, *Maintain seaworthiness of the ship*. It will enable the applicants who cannot get the basic training on this subject to reach the level of competence required to obtain a STCW- endorsed Fourth-class Engineer's certificate.

(2) Applicants who plan to complete this Annex instead of taking the approved training need to have on hand good manuals on ship stability and naval architecture.

(3) Anyone with the proper documentation will need about 40 hours to complete this Annex. When it is completed, the applicant must present it to a TCMSS Examiner of Engineers for assessment.

7.2 OBJECTIVE

(1) This Annex has three objectives, namely to ensure:

(a) 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 including those of a fishing vessel and the proper names for the various parts of a ship and a fishing vessel.

7.3 SHIP STABILITY

(1) Basic knowledge and definitions

(i) What is the Centre of Gravity of a ship?

_____
_____
_____

(ii) What is the Centre of Buoyancy?

_____
_____
_____
_____

(iii) What is the transversal Metacentre?

_____
_____
_____

(iv) What is the longitudinal Metacentre?

_____
_____
_____

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

_____
_____
_____
_____

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

_____
_____
_____
_____
_____

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

_____
_____

(viii) Define briefly the following terms:

(a) Displacement

_____
_____

(b) Deadweight

_____
_____

(c) Coefficient of form

_____
_____

(d) Waterplane area

_____
_____

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

_____
_____
_____
_____

(x) What is meant by the trim of a ship? What makes it change?

_____
_____
_____
_____

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

_____
_____
_____
_____

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

_____
_____
_____
_____

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

_____
_____
_____

(xiv) State and explain Archimedes's law.

(xv) 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*?

(xvi) 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?

(xvii) What is the *Righting Arm*? How is it calculated?

_____
_____

(xviii) What does *Intact Stability* mean?

_____
_____
_____
_____
_____
_____
_____

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

_____
_____
_____
_____
_____

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

_____
_____
_____
_____
_____

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

_____
_____
_____
_____
_____
_____

(xxii) 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?

_____
_____
_____
_____
_____
_____

(xxiii) 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

(i) What is the weight of a steel block 1m x 1m x 0.5m having a density of 7500 kg/m^3?

_____
_____
_____

(ii) 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/m^3?

_____
_____
_____
_____

(iii) Calculate the TPC of a box shaped barge 20m long by 5m large floating in water of 1000 kg/m^3.

_____
_____
_____

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

_____
_____
_____
_____

(v) 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).

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

7.4 SHIP CONSTRUCTION

(1) Basic knowledge and definitions

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

(a) Frame

_____
_____

(b) Longitudinal framing

_____
_____

(c) Transverse framing

_____
_____

(d) Web frame

_____
_____

(e) Stringer

_____
_____

(f) Floor

_____
_____

(g) Deck Girder

_____
_____

(h) Beam knee

_____
_____

(j) Pillar

_____
_____

(k) Bracket

_____
_____

(l) Bilge plate

_____
_____

(m) Double bottom

_____
_____

(ii) Briefly describe the following:

(a) Stern trawler:

_____
_____
_____

(b) Multi rig trawler

_____
_____

(c) Long line vessel

_____
_____
_____

(d) Bollards

_____
_____
___

(iii) Exercises

(i) Explain the purpose of double bottoms.

_____
_____

_____
_____
_____
_____
_____
_____

(ii) Draw and label a transverse framed double bottom.

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

_____
_____
_____
_____
_____

_____
_____
_____
_____
_____

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

(v) 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.

(vi) 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.

(vii) 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.

(viii) 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.

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