

***Special Steam-powered
Traction Engine Operator's
Certificate of Competency***

GENERAL INFORMATION AND EXAMINATION SYLLABUS

AB-240

Edition 1, Revision 0 – Issued July 9, 2014

1.0 GENERAL INFORMATION:

This Syllabus is intended to assist candidates in their preparation for writing the Special Steam-powered Traction Engine Operator's Certificate of Competency examination that has been approved by the Administrator. Before undertaking the examination, the candidate should be familiar with the operation and maintenance of steam traction engines in general.

Operation of steam locomotives is not covered by this document. A steam locomotive operating on a railroad subject to provincial legislation that has a capacity greater than 20 kilowatts must be supervised by a person who holds a Power Engineer's Certificate of Competency of a class that meets or exceeds the requirements shown in Table 1 of the Power Engineers Regulation.

2.0 CERTIFICATION REQUIREMENT:

A historic boiler that has a capacity of 20-250 kilowatts and is operating in a display or for the purpose of entertainment must be supervised by a person who holds a Special Steam-powered Traction Engine Operator's certificate of competency.

3.0 SUPERVISION:

A steam power traction engine that has a capacity not exceeding 250 kilowatts and is operating in a display or for the purpose of entertainment must be supervised by a person who holds a Special Steam-powered Traction Engine Operator's certificate of competency.

During the operation of the historic boiler, the certified operator must:

- (a) *provide constant supervision of the boiler,*
- (b) *put the boiler into a safe shutdown condition before leaving it,*
- (c) *update and maintain the log book,*
- (d) *ensure the boiler is supervised in accordance with the recommendations set out in the ASME Boiler and Pressure Vessel Code, Section VII,*
- (e) *ensure that an accurate record is kept of the boiler's checks as set out in the ASME Boiler and Pressure Vessel Code, Section VII, and*

- (f) *notify the owner of the boiler and the Administrator of any unsafe condition, accident or fire involving the boiler.*

PER Section 2(12)

4.0 ELIGIBLE TO WRITE:

To qualify to take a Special Steam-powered Traction Engine Operator's Certificate of Competency examination, a candidate must have successfully completed a course satisfactory to the Administrator.

5.0 ELIGIBLE FOR CERTIFICATION:

For a candidate to qualify for a Special Steam-powered Traction Engine Operator's Certificate of Competency they must:

- (a) *pass the Special Steam-powered Traction Engine Operator's Certificate of Competency examination,*
- (b) *complete 100 hours of supervised operation experience, and*
- (c) *pass a practical examination that is satisfactory to the Administrator regarding the safe operation of a historic boiler*

6.0 PRACTICAL TIME REQUIREMENTS:

The practical training time requirements is 100 hours on a historic boiler, of which at least 50% of the time shall be while the plant is under steam and in operation, the remainder of the required time may include maintenance, start-up or lay up of the historic boiler.

7.0 PROOF OF PRACTICAL EXPERIENCE MUST BE PROVIDED BY:

Completing and forwarding the Declaration of Qualifying Experience signed by the certified steam traction power plant operator of the historic boiler upon which the experience was gained.

Forwarding training records showing dates, type of experience gained, signatures of the steam plant owners and certified steam traction plant operator,

(if not one and the same) that documents the candidate's experience. *Attach these to the application form.*

8.0 HISTORIC BOILER PRACTICAL TEST:

Tasks to be performed by the operator before the ABSA Safety Codes Officer.

- (a) *Bring the traction engine up to operating pressure, this may be required from a cold start.*
- (b) *Maintain the boiler level using both types of feeding devices.*
- (c)
 - (i) *Demonstrate the procedure in testing the safety valve, or*
 - (ii) *Explain the procedure in testing the safety valve.*
- (d) *Blow-down boiler, monitor boiler water in sight glass. Use tri-cocks if installed*
- (e) *Operate engine on level, uphill and downhill terrain.*
- (f)
 - (i) *Demonstrate the emergency shutdown of the traction engine, or*
 - (ii) *Explain the emergency shutdown of the traction engine.*

9.0 EXAMINATION INFORMATION :

Exam Type: 50 multiple-choice questions

Writing Time: 1.5 hour

Exam Materials: Safety Codes Act

Power Engineers Regulation

CSA B51 Boiler, pressure vessel and pressure piping code

Passing Grade: 65%

To apply to write this examination, the form, AB-66 Application to Write a Power Engineering Examination, must be completed and submitted to ABSA, with the required fee, a minimum of 21 days prior to the scheduled sitting.

The most current and up-to-date forms can be found on our website at:



<http://www.absa.ca>

The form and payment can be faxed, mailed, or dropped off in person to the address below. If mailed please ensure it is received by our office a minimum of 21 days prior to the scheduled sitting.

ABSA
9410-20 Avenue NW
Edmonton, AB T6N 0A4

10.0 TRANSITION PERIOD:

Effective until November 1, 2015, a candidate is qualified for a Special Steam-powered Traction Engine Operator's Certificate of Competency if on December 1, 2013 the candidate:

- (a) *holds a valid Special Boiler Operator's Certificate of Competency or, at minimum, a 5th Class Power Engineer's Certificate of Competency,*
- (b) *has operated or assisted with the operation of a historic boiler for a time period that is satisfactory to the Administrator, and*
- (c) *if requested, is able to pass a practical examination that is satisfactory to the Administrator regarding the safe operation of a historic boiler.*

The fee for the certificate issue will be \$162.00. Client will fill in ABSA form AB-66 and submit a declaration letter of their practical experience.

11.0 CERTIFICATE RENEWAL:

A Special Steam-powered Traction Engine Operator's Certificate of Competency expires 2 years from the date of issue. To be eligible for renewal the applicant must pass a practical examination that is satisfactory to the Administrator regarding the safe operation of a historic boiler.

12.0 BODY OF KNOWLEDGE:

The topics that follow are intended to be a study guide, and do not imply that additional knowledge obtained from experience is not needed to successfully challenge the examination. The candidate is expected to understand, identify and describe the function and use as indicated in each of the topics listed below.

12.1 Safety Codes Act, Power Engineers Regulation and Reference Codes

- a. A general knowledge of the Safety Codes Act and Power Engineers Regulation
- b. An awareness of the purpose and importance of the CSA and ASME Codes
- c. Duties of an Operator as specified by the Power Engineers Regulation
- d. Operator staffing requirements for historic boilers

12.2 Safety

The candidate is expected to be able to fully explain the dangers associated with the operation of a steam traction plant, and all its components, and state the precautions to be taken to minimize or prevent the danger.

12.3 Fundamentals of Thermodynamics

- a. Knowledge of and conversion ability for the Fahrenheit and Celsius temperature scales
- b. Heat characteristics and methods of heat transmission (radiation; conduction; convection; sensible and latent heat; vaporization)
- c. Properties of steam and water (relationship of pressure to boiling point; saturated, superheated; expansion properties of steam)
- d. Temperature measurement (thermometer types)

12.4 Boiler Design and Types

- a. Boiler terminology (defining common boiler terms)
- b. Various boiler types; their advantages and disadvantages (fire tube, water tube, scotch, HRT & vertical)

12.5 Construction, Materials and Parts

- a. Boiler Plate and riveted joints (tensile strengths of plate, types of riveted joints and their strengths)
- b. Locomotive boiler parts (barrel; heads; dome; firebox; crown sheet; water legs; stays; tube sheet; tubes; dry pipe)
- c. Engine parts and terms (fly wheel; crankshaft; piston; cylinder; steam chest and valves; governor; lap; lead; head; dead centre; cross head; connecting rod; compensating, reversing, and differential gears; friction clutch)

12.6 Fuels and Combustion

- a. Principles and causes of furnace explosions
- b. Various fuels (coal; wood; special firing applications)
- c. Special combustion components (spark arrester, special grates; fire brick arch)
- d. Firing techniques (fire door closed; purging; coal & wood burning; draft control)
- e. Soot, ash and clinker formation and removal

12.7 Boiler Operation and Maintenance

- a. Start up and shutdown procedures (starting the fire; condensation problems during start up)
- b. Abnormal conditions (low water; safety valve seized open or closed; priming or foaming; explosions)
- c. Boiler cleaning, inspection and prolonged shutdown (fireside and water side cleaning; hydrostatic testing)

- d. Engine adjustments (valve settings methods; knocking causes and remedies)
- e. Boiler repairs (replacement of tubes; stay repairs or replacement; piping repair)
- f. Corrosion and fault locations on the fire and waterside, procedures of identify and NDE testing
- g. Thermal stress, crack detection, hydrostatic testing, tightening of components under pressure
- h. Effects of hills and grades on traction boiler operation, concerns and actions
- i. Operating the engine on inclined surfaces.

12.8 Feedwater piping system/pumps and injectors

- a. Feedwater system components (steam and water supply line; feedwater line; pump or injector).
- b. Pump types and terms (simplex; duplex; crosshead; gear).
- c. Types of injectors and injector components (principle of operation; parts).
- d. Operational problems (starting, stopping, causes of injector or pump malfunction).
- e. Boiler water testing; testing requirements, different types of tests and procedures; water test analysis.
- f. Pipe fittings, valves, gaskets (types and applications).

12.9 Steam Engines

- a. Principles of operation of simplex and compound engines, engine components
- b. Valve gears: Stephenson & Woolf, gear components, setting the Stephenson Simple D Valve
- c. Types of governors, governor components, principles of governor operation

- d. Indicator diagrams, indicated and brake horse power and how calculated
- e. Starting, operating, stopping and maintenance and lay-up requirements.

12.10 Lubrication and Packing

- a. Repacking of glands (proper alignment of components; correct packing tightness)
- b. Lubrication of bearings (frequency; overheating; adjustments)
- c. Lubrication types and applications methods (gravity drip oiler; oil and grease cups; hydrostatic lubricators)