



LIMITED POWER ENGINEER'S (COMMERCIAL) SYLLABUS

GENERAL INFORMATION

This Syllabus is intended to assist candidates in their preparation for writing the examination. It contains the recommended body of knowledge required. It is strongly advised that, before undertaking this Examination, the candidate completes an appropriate study course and is familiar with operation of boilers in general. These courses may be offered by various educational institutions in Saskatchewan.

EXAMINATION INFORMATION

- Exam Type:** 70 question multiple choice
Writing Time: 1.5 hrs
Exam Materials: *The Boiler and Pressure Vessel Act, 1999*
The Boiler and Pressure Vessel Regulations (effective Jan 1, 2007)
CSA B51-03 Boiler, Pressure Vessel and Pressure Piping Code
Non programmable calculator
Passing Grade: 65%

To apply to write this examination the following forms must be filled in as complete as possible and submitted to the ministry with the fee required 21 days prior to the scheduled sitting.

- ***LIB-2010 Application for Power Engineering Exams***
- ***LIB-0003 Client Authorization Payment Form***

The most current and up to date forms can be found on the ministries website at the link below:

<http://www.cps.gov.sk.ca/Boiler-and-Pressure-Vessel-Safety-forms>

The forms and payment can be faxed, mailed, or dropped off in person to the addresses below. If mailing please ensure it's received by our offices 21 days prior to the scheduled sitting.

Manager of Examination & Certification
Boiler and Pressure Vessel Safety
330 – 1855 Victoria Avenue
REGINA SK S4P 3T2

Manager of Examination & Certification
Boiler and Pressure Vessel Safety
952 – 122 3rd Avenue N
SASKATOON SK S4P 3T2

Please be aware that candidates failing to obtain a passing grade will be required to wait 30 days before they will be eligible to reapply for examination.



SYLLABUS INFORMATION

The Boiler and Pressure Vessel Act & Regulations and Reference Codes

1. A general knowledge of *The Boiler and Pressure Vessel Act and Regulations*.
2. Operator staffing requirements for both high and low pressure boilers.
3. Duties of an operator or owner as specified by *The Boiler and Pressure Vessel Act*
4. An awareness of the purpose and importance of the CSA and ASME Codes.

Boiler Principles and Thermodynamics

1. Knowledge of and conversion ability for the Fahrenheit and Celsius temperature scales.
2. Heat characteristics and methods of heat transmission (radiation; conduction; convection; sensible and latent heat; vaporization).
3. Properties of steam and water (relationship of pressure to boiling point; expansion properties of steam).
4. Temperature measurement (thermometer types).

Boiler Design

1. Boiler terminology (defining common boiler terms)
2. Boiler classifications (fire tube; water tube; vertical; tubeless; electric packaged boilers; comparison between types).
3. Refractory and insulation (purpose and composition).

Boiler Fittings and Accessories

1. Definitions and Code requirements.
2. Safety valves (their purpose; construction; characteristics; testing; blow down adjustments).
3. Steam pressure gauges (operating principle; related fittings).
4. Water column and gauge glass (mounting; testing; related fittings; try-cocks; gauge glass replacement; water column advantages).
5. Feed water blow-off, steam outlet and stop valves (type and number of valves required; blow-off opening and closing sequence).
6. Valve types, air vents and steam traps (purposes; maintenance; water hammer problems; characteristics).
7. Blow-off and condensate tanks (their purpose and principle of operation).

Theory of Combustion and Combustion System Components

1. Products of complete and incomplete combustions: theoretical and excess air.
2. Natural and forced draft.
3. Natural gas firing (burner types; air supply requirements; programming control)



Automatic boiler controls

1. Low water fuel cut-offs (purpose; principle of operation; types; mercury switches; feed water pump control; Code requirements; testing and maintenance).
2. Pressure controls (operating principle; on/off, and modulating types; testing; parts and adjustment; high limit control requirement; low gas and air pressure cut-off).
3. Flame protection devices (operating principles and testing of the various types).
4. Programming controls (purpose; operation sequence; trouble shooting).

Boiler Water Treatment

1. Causes of corrosion scale, foaming, and priming.
2. Methods of external water treatment (filters; softeners; demineralizers).
3. Methods of internal water treatment (scale prevention; sludge conditioning; prevention of foaming; pH control; caustic embrittlement prevention; corrosion prevention).
4. Chemical feeder types.
5. Function of blow-off in water treatment programs.
6. Implementing a water treatment program.

Pumps

1. Theory of pumping, definitions and common terms.
2. Centrifugal pumps, their characteristics, and operating principles.
3. Pump parts (casing; impellers; wearing rings; stuffing boxes; mechanical seals; bearings).
4. Pump operation and maintenance (priming; flexible couplings; packing procedures; lubrication).

Boiler Operation and Maintenance

1. Start-up, shut-down, and routine operating procedures (abnormal conditions; uneven expansion; thermal shock; trouble shooting).
2. Emergency conditions (low and high water level; flame or fan failure; boiler explosions).
3. Boiler cleaning and inspections (fireside and waterside cleaning; inspection procedures; hydrostatic tests; minor repairs).
4. Operating and maintenance logs (their purpose and use).

Building Safety

1. Fire prevention and protection (classification of fires; extinguisher types; application and operation; sprinkler systems; fire and smoke alarms).

End

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