

LIMITED POWER ENGINEER'S (OILFIELD) SYLLABUS

GENERAL INFORMATION

This Syllabus is intended to assist candidates in their preparation for writing this 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 are offered by various educational institutions and consultants 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 Authority 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 Authority's website at the link below:

<http://www.tsask.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 S7K 2H6

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.

Basic Principles of 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).

Common Well-Site Boiler Design

1. Boiler terminology (defining common boiler terms).
2. Boiler classifications (firetube, watertube, locomotive, scotch; and packaged boilers; comparison between types).
3. Gas flow patterns and water circulation.
4. Common oilfield boiler makes and specific characteristics (Lister; Napanee, Volcano, Saskatoon).

Boiler Water Treatment

1. Causes of corrosion scale, foaming, and priming.
2. Methods of external water treatment (filters; softeners).
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. Sampling methods.
7. Various testing procedures and terminology (pH; hardness; total alkalinity; sodium sulphite; phosphate; dissolved solids test).
8. Implementing a water treatment program.

Pumps and Injectors

1. Terms and theory of pumping.
2. Types of pumps, their characteristics, and applications (reciprocating; rotary; centrifugal; turbine).
3. Pump parts (casing; impellers; wearing rings; gears; pistons; cylinders; suction and discharge valves).
4. Pump operation and maintenance (priming, cavitation, flexible couplings, mechanical seals, packing procedures, general operation and maintenance; trouble shooting).

Automatic Boiler Controls

1. Impurities and sources, chemical symbols, suspended matter, reasons for water treatment.
2. Low water fuel cut-offs (purpose; principle of operation; types; mercury switches; feed water pump control; Code requirements; testing and maintenance).
3. Pressure controls (operating principle; on modulating; testing; parts and adjustment; high limit control requirement.)
4. Flame protection devices (operating principles and testing of the various scanner types).
5. Other control devices (high fire; low fire; low air pressure; damper positioning; automatic/manual selector switch).
6. Programming controls (purpose; operation sequence; trouble shooting).

Boiler Operation and Maintenance

1. Start up and shutdown procedures (abnormal conditions; uneven expansion; thermal shock; cutting in additional boiler).
2. Operating and maintenance procedures (operating logs; low and high water levels; flame failure; routine operating checks).
3. Boiler cleaning, inspections, repair and prolonged lay-up (fireside and waterside cleaning; external and internal inspection procedures; hydrostatic test; mechanical and chemical cleaning; dry and wet lay-up; tube plugging and replacement procedures; detection of cracks).
4. Emergency condition (low and high water level; flame or fan failure; boiler explosions).
5. Piping, fittings, and valves (identification; maintenance; required tools).

Site Safety

1. Electrical safety and rescue.
2. Elementary knowledge of First Aid and CPR.
3. Safe operating and maintenance procedures (safe entry practices; proper boiler operation).
4. Safety orientation and equipment (causes of accidents; safety meetings; eye, ear, head, hand, foot, and breathing protection devices).
5. Fire prevention and protection (classification of fires; extinguisher types; application and operation).

End

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