



Oklahoma Department of Labor Safety Standards Division Body of Knowledge Boiler Operator License

Revision 16, February 2017

Boiler operators must have knowledge *on a variety of subjects dealing with the operation of boilers. Knowledge in areas relating to the theory of operation, safe practices, controls, repairs, maintenance, water chemistry and local jurisdictional requirements* is needed if boilers are to be safely operated. The Oklahoma Boiler Operator License Examination is designed to determine if individuals have such knowledge. This Body of Knowledge is a study guide that provides a list of specific topics in which the operator should be knowledgeable.

Also contained in this Body of Knowledge are the procedural requirements that have been established regarding the administration of the examination leading to the issuance of a Boiler Operator License.

Only information covered in the categories outlined in this Body of Knowledge will be utilized for the examination questions. Not every category will be included on every examination.

The primary reference documents used in the development of this Body of Knowledge are included, and no questions will be included on the examination that are not based solely on information contained in one or more of the listed reference documents.

Applicants for examination should note that reference documents are revised on a periodic basis.

Code books, reference documents or any other form of answer containing material **will not be allowed** to be used during the administration of the examination.

Body of Knowledge Oklahoma Boiler Operator License

EXAMINATION CONSTRUCTION

Types of Examinations:

Class 1 - 100 questions

Class 2 - 50 questions

Class 3 - 50 questions

Class 4 - 50 questions

Minimum passing grade is 70

Questions will be of the multiple choice and true or false type

ADMINISTRATION OF EXAMINATIONS

Candidates will be given two (2) hours in which to complete the examination for Class 2,3, and 4 Licenses, and three (3) hours in which to complete the examination for the class 1 license.

The examination will be of the **closed book** type.

All materials needed for the examination will be provided.

Answers will be recorded on the forms provided.

Examination booklets **will not be written in.**

Only one person will be allowed to leave the examination area at a time.

Proctor(s) **shall** be present at all times that examinations are being taken.

Examination material is not allowed to leave the testing area.

Examination participants **must** present photo identification.

All examinations will be inventoried and returned to the Department of Labor.

Duplication or reproduction of the examination is expressly forbidden.

Tests administered by the Department of Labor will be conducted on the first Tuesday of February, May, August and November of each year based on the number of test applicants. Applications to participate in a state administered examination **must** be received not later than the close of business on the 15th day of the month preceding the desired test month to allow for test site selection, organization and notification.

Testing conducted by recognized training facilities may be conducted in conjunction with the scheduled course(s) as determined by the course administrator and may be used to serve as a portion of the course final examination.

REFERENCE PUBLICATIONS

The following reference publications and documents were used in the construction of the examination for the Oklahoma Boiler Operator License. The candidate should study the referenced

documents and publications thoroughly since no outside material will be allowed to be used during the examination. The candidate will be required to answer all test questions from memory.

The Oklahoma Boiler and Pressure Vessel Safety Act

Low Pressure Boilers, Frederick M. Steingress, American Technical Publishers.

Low Pressure Boilers Workbook, Frederick M. Steingress, American Technical Publishers

High Pressure Boilers, Current Edition, Frederick M. Steingress and Harold J. Frost, American Technical Publishers.

Boiler Operator's Guide, Current Edition, Anthony L. Kohan, McGraw Hill

Controls and Safety Devices for Automatically Fired Boilers, ASME CSD-1

RECOGNIZED TESTING/TRAINING PROVIDERS

Advanced Technologies
David Farthing, Administrator
5830 NW Expressway #329
Oklahoma City, OK 73132
405-249-9324
www.advancedtech.org
E-mail: dfarthing@advancedtech.org

Jim Greenawalt
Green Light Training
11621 N. Victoria Dr.
Oklahoma City, OK 73120
405-755-2256
jwgreen7@cox.net

Metro Technology Centers
405-424-TECH
www.metrotech.org

Talon Resources Inc.
Jody Riepe
PO Box 891643
Oklahoma City, OK 73189-1643
405-831-7586
www.talonresources.com
Email: support@talonresources.com

Versa Tech Training, LLC.
Bruce McDaniel
P.O. Box 464
Dangerfield, TX
75638
Email: Boiler1947@aol.com

Mid-Del Technology Center
3921 SE 29th Street
Del City, Oklahoma 73115

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1.0 Oklahoma Boiler and Pressure Vessel Safety Act.

Within the state of Oklahoma, the guiding document regarding boilers is the Oklahoma Boiler and Pressure Vessel Safety Act. The boiler operator must be familiar with the Act and the requirements contained therein. The operator must recognize the safety provisions of the Act and the relationship that they have to the safe operation of boilers, including:

- 1.1 The two major divisions of the Oklahoma Boiler and Pressure Vessel Safety Act.
- 1.2 Statutory requirements, including:
 - 1.2.1 Definitions.
 - 1.2.2 Exemptions.
 - 1.2.3 Formulation of rules and regulations, promulgation.
 - 1.2.4 Application of rules and regulations
 - 1.2.5 Maximum allowable working pressure determination.
 - 1.2.6 Licensing requirements.
 - 1.2.7 Certificates of Competency:
 - 1.2.7.1 Special Inspectors
 - 1.2.7.2 Owner User Inspectors
 - 1.2.8 Bureau of boiler inspection.
 - 1.2.9 Inspection frequencies.
 - 1.2.10 Inspection reports
 - 1.2.11 Certificates of Operation.
 - 1.2.12 Fees
 - 1.2.13 Accidents and incident reporting and investigation.
- 1.3 Administrative Rules
 - 1.3.1 Purpose and definitions.
 - 1.3.2 Minimum construction standards.
 - 1.3.3 Frequency and criteria of inspections.
 - 1.3.4 Notification of inspection.

- 1.3.5 Adoption of national standards.
- 1.3.6 Special inspector requirements and procedures.
- 1.3.7 Owner User inspection requirements and procedures.
- 1.3.8 Defective conditions disclosed at time of inspection.
- 1.3.9 Validity of Certificates of Operation.
- 1.3.10 Boiler stamping.
- 1.3.11 Penalty for operating an unsafe boiler.
- 1.3.12 Condemned boilers.
- 1.3.13 Installation and reinstallation of new and used boilers
- 1.3.14 Working pressure for existing installations.
- 1.3.15 Repairs and/or alterations.
- 1.3.16 Safety appliances
- 1.3.17 Requirements for new installations
- 1.3.18 Application of state serial numbers
- 1.3.19 Variation and penalties

1.3.20 Existing Installations

1.3.20.1 Power Boilers, including:

- a. Age limit of existing boilers.
- b. Maximum allowable working pressure for standard boilers.
- c. Maximum allowable working pressure for non-standard boilers.
- d. Safety valves.
- e. Boiler feeding.
- f. Water level indicators.
- g. Steam gauges.
- h. Stop valves.
- i. Blowoff connections.
- j. Repairs and renewals of boiler fittings and appliances.
- k. Conditions not covered.

1.3.20.2 Heating Boilers, including:

- a. Standard and non-standard boilers, including riveted and cast iron.
- b. Safety valves and safety relief valves.
- c. Water supply.
- d. Steam gauges.
- e. Pressure/altitude gauges.
- f. Pressure/temperature controls.
- g. Water gauge glasses.
- h. Stop valves and check valves.
- i. Feedwater connections.
- j. Return pumps.
- k. Repairs and renewals of fittings and appliances.

1.3.20.3 General Requirements, including:

- a. Inspection of boilers
- b. Preparation for inspection
- c. Boilers improperly prepared for inspection
- d. Removal of covering to permit inspection
- e. Pressure tests
- f. Automatic low water fuel cutoff and/or water feeding device.
- g. Pressure reducing valves.
- h. Boiler blowoff equipment.
- i. Location of discharge piping outlets.
- j. Repairs and alterations.
- k. Supports.
- l. Clearance.
- m. Ladders and runways.
- n. Exit from boiler.
- o. Maintenance requirements.
- p. Air and ventilation requirements.
- q. Conditions not covered.

2.0 Low Pressure Boilers

Low pressure boilers, either low pressure steam, closed loop water heating, or hot water supply type comprise the majority of boilers in use in the state of Oklahoma today. The operator must be knowledgeable in areas regarding the care and safe operation of low pressure boilers such as:

2.1 Boiler operation principles, including:

- 2.1.1 Boiler operation theory.
- 2.1.2 Thermodynamics.
- 2.1.3 Combustion.
- 2.1.4 Boiler systems.
- 2.1.5 Boiler design and construction, including:

- a. ASME Code stamping associated with low pressure boilers

2.2 Boiler fittings, including:

- 2.2.1 Safety valves.
- 2.2.2 Gauges.
- 2.2.3 Water columns, installation and operation.
- 2.2.4 Boiler blowdown systems, installation, purpose and use.

- 2.2.5 Boiler controls, both pressure and temperature.
- 2.3 Boiler feedwater systems, including:
 - 2.3.1 Feedwater system components.
 - 2.3.2 Make-up feedwater requirements and regulation.
 - 2.3.3 Low water fuel cut-offs and flow sensing devices.
- 2.4 Steam Systems.
- 2.5 Fuel systems, including:
 - 2.5.1 ASME CSD-1
 - 2.5.2 Fuel oil and natural gas system components, operation and safety.
- 2.6 Draft systems.
- 2.7 Boiler water treatment, including:
 - 2.7.1 Boiler water conditions, including:
 - 2.7.1.1 Scale
 - 2.7.1.2 Corrosion
 - 2.7.1.3 Caustic embrittlement
 - 2.7.1.4 Priming and carryover
 - 2.7.1.5 Foaming
 - 2.7.2 Boiler water analysis.
 - 2.7.3 Boiler water treatment, internal and external.
- 2.8 Boiler operating procedures, including:
 - 2.8.1 Procedures to follow when taking over a shift.
 - 2.8.2 Boiler start-up procedures.
 - 2.8.3 Boiler maintenance procedures.
 - 2.8.4 Boiler shut-down procedures.
 - 2.8.5 Boiler inspection.
 - 2.8.6 Hydrostatic testing.
 - 2.8.7 Boiler trouble shooting.
 - 2.8.8 Boiler lay-up.
- 2.9 Hot water heating systems, including:
 - 2.9.1 Types of hot water heating systems.
 - 2.9.2 System operation.

- 2.9.3 Component requirements for each type of system.
- 2.10 Boiler operation safety, including:
 - 2.10.1 Governmental and regulatory agencies.
 - 2.10.2 Boiler room fire safety.
 - 2.10.3 Confined spaces.
 - 2.10.4 Hazardous materials.
 - 2.10.5 Personal protective equipment.
 - 2.10.6 Lock-out/tag-out.

3.0 High pressure boilers

Although not as common in usage, high pressure boilers are integral components in many of today's businesses and pose specific hazards associated with the generation and use of steam at high pressure. The boiler operator should be knowledgeable in the care and safe operation of high pressure boilers, including:

- 3.1 Steam boilers, including:
 - 3.1.1 Types and classifications, including:
 - a. ASME code stamping associated with high pressure boilers.
 - 3.1.2 Principles of operation.
- 3.2 Steam boiler fittings and accessories, including:
 - 3.2.1 Safety valves.
 - 3.2.2 Gauge glasses, including installation and blowdown.
 - 3.2.3 Steam pressure gauges.
 - 3.2.4 Boiler internal components.
 - 3.2.5 Stop valves.
 - 3.2.6 Blowdown systems
- 3.3 Boiler room systems, including:
 - 3.3.1 Steam systems.
 - 3.3.2 Feedwater systems
 - 3.3.3 Fuel systems.
 - 3.3.4 Draft systems.
- 3.4 Steam and water accessories, including:
 - 3.4.1 Feedwater heating systems and devices.

- 3.4.2 Deaeration systems.
- 3.4.3 Economizers
- 3.4.4 Feedwater pumps
- 3.4.5 Feedwater regulation

- 3.5 Fuel burning equipment
 - 3.5.1 ASME CSD-1 requirements
 - 3.5.2 Burners.

- 3.6 Draft

- 3.7 Combustion

- 3.8 Combustion controls, including CSD-1 requirements.

- 3.9 Instruments

- 3.10 Boiler water treatment, including:
 - 3.10.1 Boiler water conditions.
 - 3.10.2 Internal and external boiler water treatment.

- 3.11 Steam boiler operation, including:
 - 3.11.1 Operator duties and responsibilities.
 - 3.11.2 Boiler start-up and shut-down.
 - 3.11.3 Boiler lay-up.
 - 3.11.4 Inspection.
 - 3.11.5 Emergency procedures, including high and low water.
 - 3.11.6 Routine maintenance.
 - 3.11.7 Boiler room safety.