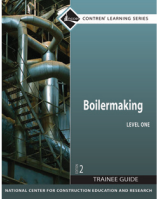


**L1 BOILERMAKING**

LEVEL 1



**Curriculum Notes**

- 182.5 Hours (Includes 72.5 hours of *Core Curriculum*, which is a prerequisite for Level 1 completion and must be purchased separately. See p. 11 for ordering information.)
- Revised: 2010, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from [www.nccerirc.com](http://www.nccerirc.com).

PAPERBACK	ISBN
Trainee Guide: \$67	978-0-13-213702-7
Instructor's Guide: \$67	978-0-13-213704-1

## MODULES

All of the modules listed below are included in the Trainee Guide and the Instructor's Guide. The following ISBN and pricing information is for ordering individual modules only.

### Introduction to Boilermaking (10 Hours)

Trainee \$20 ISBN 978-0-13-213693-8  
 Instructor \$20 ISBN 978-0-13-213738-6  
 (Module ID 34101-10) Provides an overview of the boilermaker craft, including a description of career opportunities.

### Boilermaking Safety (12.5 Hours)

Trainee \$20 ISBN 978-0-13-213694-5  
 Instructor \$20 ISBN 978-0-13-213739-3  
 (Module ID 34102-10) Covers safety issues specific to boilermakers on the job.

### Boilermaking Tools (15 Hours)

Trainee \$20 ISBN 978-0-13-213696-9  
 Instructor \$20 ISBN 978-0-13-213740-9  
 (Module ID 34103-10) Introduces the hand and power tools used by boilermakers, and the associated safety concerns.

### Basic Materials (10 Hours)

Trainee \$20 ISBN 978-0-13-213697-6  
 Instructor \$20 ISBN 978-0-13-213741-6  
 (Module ID 34104-10) Identifies materials used in the construction of boilers, including material properties, standards and codes, and material markings.

### Oxyfuel Cutting (17.5 Hours)

Trainee \$20 ISBN 978-0-13-213698-3  
 Instructor \$20 ISBN 978-0-13-213742-3  
 (Module ID 34105-10) Explains the safety requirements associated with oxyfuel cutting. Describes straight line, bevel, piercing, and washing techniques.

### Cutting and Fitting Gaskets (12.5 Hours)

Trainee \$20 ISBN 978-0-13-213699-0  
 Instructor \$20 ISBN 978-0-13-213743-0  
 (Module ID 34106-10) Describes gasket materials used in mating flanges and procedures for laying out and cutting a flange gasket.

### Base Metal Preparation (10 Hours)

Trainee \$20 ISBN 978-0-13-213700-3  
 Instructor \$20 ISBN 978-0-13-213744-7  
 (Module ID 34107-10) Describes how to clean and prepare base metals for cutting and welding.

## Welding Basics (22.5 Hours)

Trainee \$20 ISBN 978-0-13-213701-0  
 Instructor \$20 ISBN 978-0-13-213746-1  
 (Module ID 34108-10) Describes welding and cutting processes and related equipment. Includes filler metals, joint design, and the codes that govern welding practices.

**L2 BOILERMAKING**

LEVEL 2

**Curriculum Notes**

- 185 Hours
- Revised: 2011, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from [www.nccerirc.com](http://www.nccerirc.com).

PAPERBACK	ISBN
Trainee Guide: \$97	978-0-13-213705-8
Instructor's Guide: \$97	978-0-13-213706-5

## MODULES

All of the modules listed below are included in the Trainee Guide and the Instructor's Guide. The following ISBN and pricing information is for ordering individual modules only.

### Boiler Systems and Components (22.5 Hours)

Trainee \$20 ISBN 978-0-13-257786-1  
 Instructor \$20 ISBN 978-0-13-257797-7  
 (Module ID 34201-11) Introduces boiler configurations and applications. Identifies boiler components and explains their functions.

### Identifying and Installing Valves (20 Hours)

Trainee \$20 ISBN 978-0-13-257787-8  
 Instructor \$20 ISBN 978-0-13-257798-4  
 (Module ID 34202-11) Identifies valves found in boiler systems. Describes valve components and explains their functions. Explains how to select, store, handle, and install valves, and describes valve markings and nameplate information.

### Pipe Hangers and Supports (25 Hours)

Trainee \$20 ISBN 978-0-13-257788-5  
 Instructor \$20 ISBN 978-0-13-257799-1  
 (Module ID 34203-11) Identifies pipe hangers and supports and explains how to interpret pipe support drawings and symbols. Explains how to select, store, handle, install, and maintain spring can supports.

### Drawings and Detail Sheets (15 Hours)

Trainee \$20 ISBN 978-0-13-257789-2  
 Instructor \$20 ISBN 978-0-13-257800-4  
 (Module ID 34204-11) Explains how to read drawings and their symbols. Covers plot plans, structural drawings, elevation drawings, as-built drawings, equipment arrangement drawings, piping and instrumentation drawings, isometric drawings, spool sheets, detail sheets, and orthographic drawings.

### Fasteners and Anchors (5 Hours)

Trainee \$20 ISBN 978-0-13-257790-8  
 Instructor \$20 ISBN 978-0-13-257801-1  
 (Module ID 34205-11) Covers threaded and non-threaded fasteners and anchoring devices. Explains how to select fasteners and anchors for given applications. Describes how to install threaded, non-threaded, and insulated fasteners and anchors.

## Welding Symbols (5 Hours)

Trainee \$20 ISBN 978-0-13-257792-2  
 Instructor \$20 ISBN 978-0-13-257802-8  
 (Module ID 34206-11) Explains how to read symbols on welding drawings, specifications, and welding procedure specifications. Describes the symbols for fillet welds, groove welds, miscellaneous other welds, and non-destructive tests.

## Socket Weld Pipe Fabrication (25 Hours)

Trainee \$20 ISBN 978-0-13-257793-9  
 Instructor \$20 ISBN 978-0-13-257803-5  
 (Module ID 34207-11) Describes different types of socket weld piping materials and fittings and how to read socket weld piping drawings. Explains how to determine pipe lengths between socket weld fittings, as well as how to mate socket weld fittings to pipe.

## Butt Weld Pipe Fabrication (40 Hours)

Trainee \$20 ISBN 978-0-13-257794-6  
 Instructor \$20 ISBN 978-0-13-257804-2  
 (Module ID 34208-11) Covers preparing pipe ends for butt welding; determining pipe lengths between butt weld fittings; and using welding jigs to align pipe and butt weld fittings for welding. Explains how to select and install backing rings.

## Tube Weld Preparation and Fitting (15 Hours)

Trainee \$20 ISBN 978-0-13-257795-3  
 Instructor \$20 ISBN 978-0-13-257805-9  
 (Module ID 34209-11) Describes methods used to gain access to boiler tubes needing repair, and to prepare boiler tubes for replacement. Explains how to fit-up a section of boiler tube. Describes welding procedures for making butt welds on standard carbon steel tubes and composite tubes.

## Air Carbon Arc Cutting and Gouging (12.5 Hours)

Trainee \$20 ISBN 978-0-13-257796-0  
 Instructor \$20 ISBN 978-0-13-257806-6  
 (Module ID 34210-11) Describes air carbon arc cutting (CACA) equipment and processes. Explains how to select and install CACA electrodes, and how to prepare the work area and CACA equipment for safe operation. Provides instructions for using CACA equipment for washing and gouging activities.

**L3 BOILERMAKING**

LEVEL 3

**Curriculum Notes**

- 162.5 Hours
- Revised: 2011, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from [www.nccerirc.com](http://www.nccerirc.com).

PAPERBACK	ISBN
Trainee Guide: \$97	978-0-13-257824-0
Instructor's Guide: \$97	978-0-13-266245-1

## MODULES

All of the modules listed below are included in the Trainee Guide and the Instructor's Guide. The following ISBN and pricing information is for ordering individual modules only.

### Plasma Arc Cutting (7.5 Hours)

(Module ID 29103-09; from *Welding Level One*)  
 Trainee \$20 ISBN 978-0-13-266355-7  
 Instructor \$20 ISBN 978-0-13-266365-6

## Boilermaking Level 3 (continued)

### Boiler Pressure Components (25 Hours)

Trainee \$20 ISBN 978-0-13-266356-4  
Instructor \$20 ISBN 978-0-13-266366-3  
(Module ID 34301-11) Describes the pressure components of a boiler system and their locations. Explains the procedures required to repair pressure components of a boiler.

### Boiler Nonpressure Components (12.5 Hours)

Trainee \$20 ISBN 978-0-13-266357-1  
Instructor \$20 ISBN 978-0-13-266367-0  
(Module ID 34302-11) Describes the nonpressure components of a boiler system and their locations. Explains the procedures required to repair nonpressure components of a boiler.

### Boiler Auxiliaries (25 Hours)

Trainee \$20 ISBN 978-0-13-266358-8  
Instructor \$20 ISBN 978-0-13-266368-7  
(Module ID 34306-11) Describes the air flow systems within a boiler system and the different fuels used to fire boiler system furnaces. Describes ash removal systems and the equipment used to protect the environment. Covers the feed water system into a boiler and the blow down from a boiler system.

### Brick, Refractory, Insulation, and Lagging (BRIL) (5 Hours)

Trainee \$20 ISBN 978-0-13-266359-5  
Instructor \$20 ISBN 978-0-13-266369-4  
(Module ID 34305-11) Describes types of BRIL and explains their functions. Also addresses hazards associated with BRIL.

### Advanced Tube Work (20 Hours)

Trainee \$20 ISBN 978-0-13-266360-1  
Instructor \$20 ISBN 978-0-13-266371-7  
(Module ID 34303-11) Explains the methods used to identify problem tubes and extract them. Also describes the methods used for replacing and plugging tubes.

### Testing Piping Systems and Equipment (20 Hours)

Trainee \$20 ISBN 978-0-13-266361-8  
Instructor \$20 ISBN 978-0-13-266372-4  
(Module ID 34308-11) Lists pretest requirements for boiler system piping systems and equipment. Describes service and flow tests, head pressure tests, and hydrostatic tests performed on boiler system piping systems and equipment.

### Rigging (22.5 Hours)

(Module ID 15206-07; from *Millwright Level Two*)

Trainee \$20 ISBN 978-0-13-266363-2  
Instructor \$20 ISBN 978-0-13-266373-1

### Towers and Exchangers (25 Hours)

Trainee \$20 ISBN 978-0-13-266364-9  
Instructor \$20 ISBN 978-0-13-266374-8  
(Module ID 34307-11) Explains the functions of towers and exchangers and the basic distillation process. Describes various types of towers and exchangers and their components.

## L4 BOILERMAKING

LEVEL 4

### Curriculum Notes

- 165 Hours
- Revised: 2012, Second Edition
- Instructor's Guide includes access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from [www.nccerirc.com](http://www.nccerirc.com).

### PAPERBACK

ISBN

Trainee Guide: \$97 978-0-13-292141-1  
Instructor's Guide: \$97 978-0-13-292169-5

### MODULES

All of the modules listed below are included in the Trainee Guide and the Instructor's Guide. The following ISBN and pricing information is for ordering individual modules only.

#### Advanced Mechanical Trade Math (15 Hours)

Trainee \$20 ISBN 978-0-13-292236-4  
Instructor \$20 ISBN 978-0-13-292246-3  
(Module ID 34401-12) Covers tables of equivalents and units of conversion. Explains the basics of trigonometry and how to apply them to the installation of pipe. Explains how to calculate the weight of objects.

#### Advanced Rigging (20 Hours)

Trainee \$20 ISBN 978-0-13-292237-1  
Instructor \$20 ISBN 978-0-13-292247-0  
(Module ID 34410-12) Explains how to determine the center of gravity for objects to be rigged and how a load's weight and center of gravity affect lifting devices such as cranes. Describes how to use cribbing to support lifted loads. Covers the use of slings and spreader or equalizer bars to lift loads. Describes the tools used to move loads laterally. Explains how to determine the center of gravity of asymmetrical loads.

#### Advanced Boilermaking Construction Drawings (20 Hours)

Trainee \$20 ISBN 978-0-13-292238-8  
Instructor \$20 ISBN 978-0-13-292248-7  
(Module ID 34402-12) Covers symbols and abbreviations used on piping and instrumentation drawings and piping arrangement drawings. Explains how to read and interpret different types of construction drawings. Explains how to sketch an isometric drawing from a plan view drawing, and how to calculate line lengths from isometric drawings.

#### Advanced Pipe Fabrication (20 Hours)

(Module ID 08402-07; from *Pipefitting Level Four*)

Trainee \$20 ISBN 978-0-13-292239-5  
Instructor \$20 ISBN 978-0-13-292249-4

### Stress Relieving (10 Hours)

Trainee \$20 ISBN 978-0-13-292240-1  
Instructor \$20 ISBN 978-0-13-292251-7  
(Module ID 34406-12) Covers metal distortion and ways to prevent it. Explains thermal growth in metals, and how to calculate thermal growth in given metals. Explains how misalignment creates stress in metals. Describes ways to relieve stress in piping that is experiencing distortion due to welding, thermal growth, or misalignment.

### Quality Assurance (10 Hours)

Trainee \$20 ISBN 978-0-13-292241-8  
Instructor \$20 ISBN 978-0-13-292252-4  
(Module ID 34407-12) Covers codes governing welding and boilers. Describes weld imperfections and their causes. Identifies and explains different nondestructive and destructive testing methods. Explains how to make visual inspections of fillet welds. Describes welder qualification testing, and stresses the importance of quality workmanship.

### Advanced Exchangers (25 Hours)

Trainee \$20 ISBN 978-0-13-292242-5  
Instructor \$20 ISBN 978-0-13-292253-1  
(Module ID 34411-12) Identifies different types of heat exchangers and their components. Describes methods used to test exchangers, and how to pull exchanger bundles. Explains how to replace a flange and a nozzle on an exchanger.

### Advanced Towers (25 Hours)

Trainee \$20 ISBN 978-0-13-292244-9  
Instructor \$20 ISBN 978-0-13-292254-8  
(Module ID 34412-12) Identifies different types of towers and their components. Explains how to remove and replace different types of packing used in towers. Describes methods used to make field repairs to tower trays. Explains how to remove a tower distributor for maintenance.

### Fundamentals of Crew Leadership (20 Hours)

(Module ID 46101-11; see p. 69)

Trainee \$43 ISBN 978-0-13-292245-6  
Instructor \$43 ISBN 978-0-13-292255-5

