



National Craft Assessment and Certification Program S P E C I F I C A T I O N S

BOILERMAKER – PRESSURE VESSEL V2 BLMK34_02

October 2014

Focus Statement

A journey level boilermaker is skilled in all aspects of safe boiler and boiler component assembly and maintenance including welding, pipe fabrication, and stress relieving. A boilermaker is also knowledgeable in oxyfuel cutting, identifying and installing valves, pipe hangers and supports, rigging, and able to read boiler drawings and detail sheets.

Overview

- Two-hour closed-book examination
- Permitted to use a basic function, non-printing calculator
- No extra papers, books, notes or study materials are allowed
- Approved reference: *The Pipefitters Blue Book* by W.V. Graves
- The minimum passing score is 75
- A corresponding hands-on Performance Verification is available

NCCER Curriculum

All NCCER knowledge assessments are referenced to NCCER's curriculum modules as listed on this specification sheet. You may order modules from Pearson (800.922.0579) or from NCCER's Online Catalog at www.nccer.org.

Assessment Development

All questions are developed and approved by subject matter experts under the direction of NCCER.

Credentials

Upon successful completion of the knowledge assessment, NCCER will send applicable credentials to the assessment center.

Score Report and Training Prescription

Each candidate will have access to their assessment results including their overall score and recommended training.

NCCER Registry

Knowledge assessment results are recorded in NCCER's Registry and become a part of the portable record of an individual's NCCER credentials.

Knowledge Assessment Contents:

Content Domain	Number of Questions
Boilermaker Fundamentals [34102-10, 34103-10, 34104-10]	10
Cutting Basics [34105-10, 34106-10, 34210-11, 29103-09]	10
Welding Basics [34107-10, 34108-10, 34206-11, 34407-12]	12
Pipe Support [34202-11, 34203-11, 34205-11]	8
Rigging [15206-07, 34410-12]	6
Construction Drawings [34204-11, 34402-12]	6
Math [34401-12]	4
Boiler Components [34201-11, 34301-11, 34302-11, 34306-11]	19
Pipe Fabrication [34207-11, 34208-11, 34308-11, 08402-07]	15
Tube Work [34303-11]	5
Total Number of Questions	95

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Learning Objectives related to Assessment:

Module Number:	Objective:
34102-10	Boilermaking Safety
	List the specific hazards associated with the boilermaking field.
	Describe the respiratory hazards encountered by boilermakers.
	Identify the hazards associated with working at heights.
	Describe the equipment used to work at heights and identify the certification requirements needed to operate that equipment.
34103-10	Boilermaking Tools
	List the safety precautions associated with: <ul style="list-style-type: none"> • Hand tools • Electric tools • Pneumatic tools • Hydraulic tools
	Identify tools used by boilermakers: <ul style="list-style-type: none"> • Hand tools • Electrical tools • Pneumatic tools • Hydraulic tools
	Select the tools required for given applications.
34104-10	Basic Materials
	Describe the different types of iron and steel.
	Identify codes and markings used in material identification.
34105-10	Oxyfuel Cutting
	State safety precautions associated with oxyfuel cutting.
	Identify and explain oxyfuel equipment components.
	Explain and demonstrate how to set up, light, and adjust oxyfuel equipment.
	Explain and demonstrate how to shut down, disassemble, and change out oxyfuel equipment.
	Describe and demonstrate the steps needed to perform specific oxyfuel cutting tasks: <ul style="list-style-type: none"> • Straight line and square shapes • Piercing and slot cutting • Bevels • Washing
	Describe the operation of motorized, portable oxyfuel cutting machines.
34106-10	Cutting and Fitting Gaskets
	Identify and explain gasket types.
	Identify and explain gasket materials.
	Lay out and cut gaskets.
34107-10	Base Metal Preparation
34108-10	Welding Basics
	Identify the different welding processes and welding equipment commonly used in boiler work.
	Set up a shield-gas purge on a pipe to be welded.
	Identify the specialized personal protective equipment needed when performing welding and demonstrate the ability to use this equipment properly.
	Identify the specific safety hazards associated with welding and cutting in a boiler environment.

	Identify the types of welding joints, their critical dimensions, and their applications.
	Identify the different code requirements that apply to the construction and maintenance of boilers.
	Explain the different qualification and certification requirements that apply to welders working on a boiler.
	Identify welding rods and/or filler metals by their markings.
34201-10	Boiler Design and Components
	Explain the different boiler configurations.
	Explain the different boiler applications.
	Identify boiler components.
	Explain different boiler component functions.
34202-10	Identifying and Installing Valves
	Identify types of valves that start and stop flow.
	Identify types of valves that regulate flow.
	Identify types of valves that relieve pressure.
	Identify types of valves that regulate the direction of flow.
	Interpret valve markings and nameplate information.
34203-10	Pipe Hangers and Supports
	Identify types of pipe hangers and supports.
	Identify and interpret pipe support drawings and symbols.
	Determine field placement of hangers.
	Identify and install concrete fasteners.
	Identify and explain the types of variable spring can supports.
	Identify and explain the types of constant spring can supports.
	Explain how to install spring can supports.
	Explain how to maintain spring can supports.
34204-10	Drawings and Detail Sheets
	Identify parts of drawings.
	Identify types of drawings.
	Interpret drawing indexes and line lists.
34205-10	Fasteners and Anchors
	Identify and explain the use of threaded fasteners.
	Identify and explain the use of non-threaded fasteners.
	Identify and explain the use of anchors.
34206-10	Welding Symbols
	Identify and explain the various parts of a welding symbol.
34207-10	Socket Weld Pipe Fabrication
	Identify and explain socket weld fittings.
	Read and interpret socket weld piping drawings.
	Determine pipe lengths between socket weld fittings.
34208-10	Butt Weld Pipe Fabrication
	Identify butt weld piping materials and fittings.
	Read and interpret butt weld piping drawings.
	Determine pipe lengths between fittings.
34210-10	Air Carbon Arc Cutting and Gouging
	Identify and explain the air carbon arc cutting (CAC-A) process and equipment.
29103-09	Plasma Arc Cutting
	Select the correct amperage and gas pressures or flow rates for the types and thickness of metal to be cut.
34301-12	Boiler Pressure Components
	Identify the pressure components of a boiler and their locations.

	Explain the procedures required to repair the pressure components of a boiler.
34302-12	Boiler Nonpressure Components
	Identify the nonpressure components of a boiler and their locations.
	Explain the procedures required to repair the nonpressure components of a boiler.
34306-12	Boiler Auxiliaries
	Identify and describe airflow systems.
	Explain how solid fuels (coal, biomass, and trash) are used to fire furnaces.
	Explain how a semi-solid fuel, such as black liquor, is used to fire furnaces.
	Describe ash removal systems and their maintenance.
	Explain the equipment used in environmental protection.
	Identify and describe a feedwater system and blow down tank.
34303-12	Advanced Tube Work
	Explain the method for identifying problem tubes.
	Describe the method for extracting tubes.
	Describe the method for rolling tubes.
	Explain the method for plugging tubes.
34308-12	Testing Piping Systems and Equipment
	List pretest requirements.
	Describe service and flow tests.
	Explain head pressure tests.
	Describe hydrostatic tests.
	Explain how to perform steam blow tests.
15206-07	Rigging
	Identify and describe the uses of common rigging hardware and equipment.
	Inspect common rigging equipment.
	Identify special rigging equipment, including: <ul style="list-style-type: none"> • Chain hoists • Come-alongs • Jacks • Tugger
	Identify knots used in rigging.
	Identify the correct hand signals to guide a crane operator.
	Identify basic rigging and crane safety procedures.
	Explain load balancing.
34401-12	Advanced Trade Math
	Use tables of equivalents.
	Use unit conversion tables.
	Perform right angle trigonometry.
	Calculate weights of objects.
	Calculate takeouts using trigonometry.
34410-12	Advanced Rigging
	Explain how cribbing is used to support loads.
	Describe how grip hoists and skids are used to move loads laterally.
34402-12	Advanced Boilermaking Construction Drawings
	Identify symbols and abbreviations on piping and instrumentation drawings (P&IDs).
	Identify piping arrangement drawings.
	Read and interpret the following: <ul style="list-style-type: none"> • GPS coordinates, control points, and elevation • P&IDs, plan views, and section views • Isometric drawings

	<ul style="list-style-type: none"> • Spool drawings taken from isometric drawings • Boiler plan views, section views, and details
08402-07	Advanced Pipe Fabrication
	Calculate simple piping offsets.
	Calculate three-line, 45-degree, unequal-spread offsets around a vessel.
	Calculate three-line, 45-degree, unequal-spread offsets.
	Layout three- and four-piece mitered turns.
	Layout and fabricate a fishmouth.
	Layout and fabricate a wye.
34407-12	Quality Assurance
	Identify and explain weld imperfections and their causes.
	Identify and explain nondestructive examination practices.