National Construction CAREER TESTS

Comprehensive Objectives for Welding

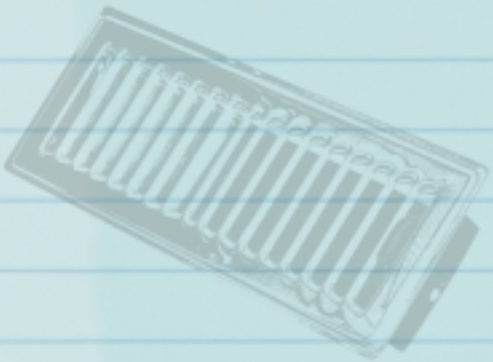
ENHANCE ACADEMIC STANDARDS

National Construction Career Tests

Standardized achievement tests based upon industry skill standards

NCCT Development

- Aligned to national industry skill standards (linked to industry-developed curricula, Contren™ Learning Series)
- Validated by a team of industry and academic experts
- Measures the nation's 10 foundation knowledge and skill areas for the national Career Clusters initiative
- Meets the standards of the American Psychological Association

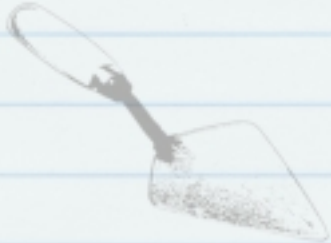


NCCT Administration

- Paper/pencil or Web-based
- Proctored tests
- Test results under strict security
- Test administration controlled by Prov

NCCT Scoring

- Paper/pencil scoring results via your fax machine in 30 minutes
- Web-based scoring results within two minutes
- Generates custom student/test site reports instantly



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nccer

contren™ Learning Series

Welding
Contents

NATIONAL CONSTRUCTION CAREER TEST

Overview

This written assessment is a two (2) hour closed book examination. You will be permitted to use a basic function, non-printing calculator during the examination. The test center will provide any necessary pencils. No extra papers, books, notes or study material are allowed in the testing area.

Study Material

The Welding NCCT Written Test is referenced to Contren™ Learning Series modules and to the American Welding Society's EG2.0-95 for Entry-Level Welders. You may order Contren™ modules from Prentice Hall at 1-800-922-0579 or www.crafttraining.com. To be a part of the AWS S.E.N.S.E. program for Entry-Level Welders, call 1-800-443-9353, ext. 455 or visit www.aws.org/education/sense for more information.

Test Development

All questions on each Test have been developed and approved by Subject Matter Experts from the respective craft. Test item development and test administration is under the direction of Prov, a test development company partner.

Test Results

Each student will be provided an individualized Test Report by the test center. This Test Report will provide results by topic area covered in the assessment as well as the overall score.

Module Number	AWS EG2.0-95	Topic Area	Number of Questions
00101-00	¶ 3.2.1.1	Basic Safety	5
00102-00		Introduction to Construction Math	4
29101-03	¶ 3.2.1.1	Welding Safety	4
29102-03	¶ 3.2.1.1	Oxyfuel Cutting	4
29103-03	¶ 3.2.1.1	Base Metal Preparation	4
29104-03	¶ 3.2.1.6	Weld Quality	4
29105-03	¶ 3.2.1.3	SMAW – Equipment and Setup	4
29106-03		Shielded Metal Arc Electrodes and Selection	4
29107-03	¶ 3.2.1.3	SMAW – Beads and Fillet Welds	2
29108-03	¶ 3.2.1.3	SMAW – Groove Welds with Backing	2
29109-03		Joint Fit-up and Alignment	4
29110-03	(AWS EG3.-096 ¶ 3.2.1.6)	SMAW – Open V-Groove Welds	2
29111-03		SMAW – Open Root Pipe Welds	2
29201-03	¶ 3.2.1.2	Welding Symbols	4
29202-03	¶ 3.2.1.2	Reading Welding Detail Drawings	4
29203-03	(AWS EG3.-096 ¶ 3.2.1.6)	SMAW – Stainless Steel Groove Welds & Pipes	2
29204-03	¶ 3.2.1.5	Air Carbon Arc Cutting and Gouging	2
29205-03	¶ 3.2.1.5	Plasma Arc Cutting	2
29206-03		GMAW & FCAW – Equipment and Filler Metals	4
29207-03	¶ 3.2.1.3	GMAW & FCAW – Plate	2
29208-03		GTAW – Equipment and Filler Metal	4
29209-03	¶ 3.2.1.3	GTAW – Plate	2
29210-03	¶ 3.2.1.3	GTAW – Aluminum Plate	2
		Total Number of Questions	**73**

**All NCCER Written Tests are referenced to Contren™ Learning Series modules. You may order modules from Prentice Hall at 1-800-922-0579 or by visiting www.crafttraining.com.*

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WELDING
Competencies / Objectives

BASIC SAFETY (MODULE 00101-00)

- Identify the responsibilities and personal characteristics of a professional craftsperson.
- Explain the role that safety plays in the construction crafts.
- Describe what job-site safety means.
- Explain the appropriate safety precautions around common job-site hazards.
- Demonstrate the use and care of appropriate personal protective equipment.
- Follow safe procedures for lifting heavy objects.
- Describe safe behavior on and around ladders and scaffolds.
- Explain the importance of the HazCom (Hazard Communication Standard) requirement and MSDSs (Material Safety Data Sheets).
- Describe fire prevention and fire fighting techniques.
- Define safe work procedures around electrical hazards.

INTRODUCTION TO CONSTRUCTION MATH (MODULE 00102-00)

- Add, subtract, multiply, and divide whole numbers, with and without a calculator.
- Use a standard ruler and a metric ruler to measure.
- Add, subtract, multiply, and divide fractions.
- Add, subtract, multiply, and divide decimals, with and without a calculator.
- Convert decimals to percents and percents to decimals.
- Convert fractions to decimals and decimals to fractions.
- Explain what the metric system is and how it is important in the construction trade.
- Recognize and use metric units of length, weight, volume, and temperature.
- Recognize some of the basic shapes used in the construction industry and apply basic geometry to measure them.

WELDING SAFETY (MODULE 29101-03)

- Identify some common hazards in welding.
- Explain and identify proper personal protection used in welding.
- Demonstrate how to avoid welding fumes.
- Explain some of the causes of accidents.
- Identify and explain uses for material safety data sheets.
- Demonstrate safety techniques for storing and handling cylinders.
- Explain how to avoid electric shock when welding.
- Demonstrate proper material handling methods.

OXYFUEL CUTTING (MODULE 29102-03)

- Identify and explain the use of oxyfuel cutting equipment.
- Set up oxyfuel equipment.
- Light and adjust an oxyfuel torch.
- Shut down oxyfuel cutting equipment.
- Disassemble oxyfuel equipment.
- Change empty cylinders.
- Perform oxyfuel cutting:
  - Straight line and square shapes
  - Piercing and slot cutting
  - Bevels
  - Washing
  - Gouging
- Operate a motorized, portable oxyfuel gas cutting machine.

BASE METAL PREPARATION
(MODULE 29103-03)

- Clean base metal for welding or cutting.
- Identify and explain joint design.
- Explain joint design considerations.
- Using a nibbler, cutter, or grinder, mechanically prepare the edge of a mild steel plate 1/4" to 3/4" thick at 221/2° (or 30° depending on equipment available).
- Using a nibbler, cutter, or grinder, mechanically prepare the end of a pipe with a 30° or 371/2° bevel (depending on equipment available) and a 3/32" land. Use 6", 8", or 10" Schedule 40 or Schedule 80 mild steel pipe.
- Select the proper joint design based on a welding procedure specification (WPS) or instructor direction.

WELD QUALITY (MODULE 29104-03)

- Identify and explain codes governing welding.
- Identify and explain weld imperfections and their causes.
- Identify and explain nondestructive examination practices.
- Identify and explain welder qualification tests.
- Explain the importance of quality workmanship.
- Identify common destructive testing methods.

SMAW – EQUIPMENT AND SETUP
(MODULE 29105-03)

- Identify and explain shielded metal arc welding (SMAW) safety.
- Identify and explain welding electrical current.
- Identify and explain arc welding machines.
- Explain setting up arc welding equipment.
- Set up a machine for welding.
- Identify and explain tools for weld cleaning.

SHIELDED METAL ARC ELECTRODES AND SELECTION
(MODULE 29106-03)

- Identify factors that affect electrode selection.
- Explain the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME) filler metal classification system.
- Identify different types of filler metals.
- Explain the storage and control of filler metals.
- 5. Explain filler metal traceability requirements and how to use applicable code requirements.
- 6. Identify and select the proper electrode for an identified welding task.

SMAW – BEADS AND FILLET WELDS
(MODULE 29107-03)

- Set up shielded metal arc welding (SMAW) equipment.
- Describe methods of striking an arc.
- Properly strike and extinguish an arc.
- Describe causes of arc blow and wander.
- Make stringer, weave, and overlapping beads.
- Make fillet welds in the:
  - Horizontal (2F) position
  - Vertical (3F) position
  - Overhead (4F) position

SMAW – GROOVE WELDS WITH BACKING (MODULE 29108-03)

- Identify and explain groove welds.
- Identify and explain groove welds with backing.
- Set up shielded metal arc welding (SMAW) equipment for making V-groove welds.

- Perform SMAW for V-groove welds with backing in the:
  - Flat (1G) position
  - Horizontal (2G) position
  - Vertical (3G) position
  - Overhead (4G) position

JOINT FIT-UP AND ALIGNMENT (MODULE 29109-03)

- Identify and explain job code specifications.
- Use fit-up gauges and measuring devices to check joint fit-up.
- Identify and explain distortion and how it is controlled.
- Fit up joint using plate and pipe fit-up tools.
- Check for joint misalignment and poor fit-up before and after welding.

SMAW – OPEN V-GROOVE WELDS (MODULE 29110-03)

- Prepare shielded metal arc welding (SMAW) equipment for open-root V-groove welds.
- Perform open-root V-groove welds in the:
  - Flat (1G) position
  - Horizontal (2G) position
  - Vertical (3G) position
  - Overhead (4G) position

SMAW – OPEN ROOT PIPE WELDS (MODULE 29111-03)

- Prepare shielded metal arc welding (SMAW) equipment for open-root V-groove pipe welds.
- Identify and explain open-root V-groove pipe welds.
- Perform SMAW for open-root welds in the:
  - Flat (1G-ROTATED) position
  - Horizontal (2G) position
  - Multiple (5G) position
  - Multiple inclined (6G) position

WELDING SYMBOLS (MODULE 29201-03)

- Identify and explain the various parts of a welding symbol.
- Identify and explain fillet and groove weld symbols.
- Read welding symbols on drawings, specifications, and welding procedure specifications (WPSs).
- Interpret welding symbols from a print.
- Draw welding symbols.

READING WELDING DETAIL DRAWINGS (MODULE 29202-03)

- Identify and explain a welding detail drawing.
- Identify and explain lines, material fills, and sections.
- Identify and explain object views.
- Identify and explain dimensioning.
- Identify and explain notes and bill of materials.
- Interpret basic elements of a welding detail drawing.
- Develop basic welding drawings.

SMAW – STAINLESS STEEL GROOVE WELDS & PIPES (MODULE 29203-03)

- Identify and explain stainless steel metallurgy.
- Identify and explain the selection of electrodes for welding stainless steel.
- Identify and explain welding variations for stainless steel.
- Prepare arc welding equipment for stainless steel welds.
- Explain stainless steel open-root V-groove welds.
- Perform shielded metal arc welding (SMAW) on stainless steel open-root V-groove joints in the following positions:
  - Flat (1G) position
  - Horizontal (2G) position

- Vertical (3G) position
- Overhead (4G) position

- Explain stainless steel open-root V-groove pipe welds.
- Perform shielded metal arc welding (SMAW) on stainless steel open-root V-groove pipe welds in the following positions:
  - Flat (1G-ROTATED) position
  - Horizontal (2G) position
  - Multiple (5G) position
  - Inclined multiple (6G) position

AIR CARBON ARC CUTTING AND GOUGING (MODULE 29204-03)

- Identify and explain the air carbon arc cutting (CAC-A) process and equipment.
- Select and install CAC-A electrodes.
- Prepare the work area and CAC-A equipment for safe operation.
- Use CAC-A equipment for washing and gouging activities.
- Perform storage and housekeeping activities for CAC-A equipment.
- Make minor repairs to CAC-A equipment.

PLASMA ARC CUTTING (MODULE 29205-03)

- Identify and understand plasma arc cutting processes.
- Identify plasma arc cutting equipment.
- Prepare and set up plasma arc cutting equipment.
- Use plasma arc cutting equipment to make various types of cuts.
- Properly store equipment and clean the work area after use.

GMAW & FCAW – EQUIPMENT AND FILLER METALS (MODULE 29206-03)

- Explain gas metal arc welding (GMAW) and flux cored arc welding (FCAW) safety.
- Explain the characteristics of welding current and power sources.
- Identify and explain the use of GMAW and FCAW equipment:
  - Spray transfer
  - Globular
  - Short circuiting
  - Pulse
- Identify and explain the use of GMAW and FCAW shielding gases and filler metals.
- Set up GMAW and FCAW equipment and identify tools for weld cleaning.

GMAW AND FCAW – PLATE (MODULE 29207-03)

- Perform GMAW multipass fillet welds on plate, using solid or composite wire and shielding gas in multiple positions.
- Perform GMAW multipass groove welds on plate, using solid or composite wire and shielding gas in multiple positions.
- Perform GMAW spray fillet and groove welds on plate, using solid or composite wire and shielding gas in flat and horizontal positions.
- Perform FCAW multipass fillet welds on plate in multiple positions using flux cored wire and, if required, shielding gas.
- Perform FCAW multipass groove welds on plate in multiple positions using flux cored wire and, if required, shielding gas.

GTAW – EQUIPMENT AND FILLER METALS (MODULE 29208-03)

- Explain gas tungsten arc welding (GTAW) safety.
- Identify and explain the use of GTAW equipment.
- Identify and explain the use of GTAW filler metals.
- Identify and explain the use of GTAW shielding gases.
- Set up GTAW equipment.

GTAW – PLATE (MODULE 29209-03)

- Build a pad in the flat position with stringer beads using GTAW and carbon steel filler metal.
- Make multipass open V-groove welds on carbon steel plate in the 1G (flat) position using GTAW and carbon steel filler metal.
- Make multipass open V-groove welds on carbon steel plate in the 2G (horizontal) position using GTAW and carbon steel filler metal.
- Make multipass open V-groove welds on carbon steel plate in the 3G (vertical) position using GTAW and carbon steel filler metal.
- Make multipass open V-groove welds on carbon steel plate in the 4G (overhead) position using GTAW and carbon steel filler metal.

GTAW – ALUMINUM PLATE
(MODULE 29210-03)

- Identify and explain aluminum metallurgy.
- Explain and identify characteristics of aluminum.
- Explain GTAW and set up equipment to weld aluminum plate.
- Explain and practice GTAW techniques for plate and pipe, including padding in the flat position with stringer beads, using aluminum filler metal.
- Make fillet welds on aluminum plate in the following positions:
  - 1G (flat)
  - 2G (horizontal)
  - 3G (vertical)
  - 4G (overhead)
- Make multipass open V-groove welds with backing on aluminum plate in the following positions:
  - 1G (flat)
  - 2G (horizontal)
  - 3G (vertical)
  - 4G (overhead