Oxyfuel Cutting (17.5 Hours)
(Module ID 29102-15) Explains the safety requirements for oxyfuel cutting. Identifies oxyfuel cutting equipment and setup requirements. Explains how to light, adjust, and shut down oxyfuel equipment. Trainees will perform cutting techniques that include straight line, piercing, beveling, washing, and gouging.

Plasma Arc Cutting (7.5 Hours)
(Module ID 29103-15) Introduces plasma arc cutting equipment and safe work area preparation. Identifies correct amperage, gas pressures, and flow rates. Covers plasma-arc cutting methods for piercing, slotting, squaring, and beveling metals. Explains how to store equipment and clean the work area.

Air-Carbon Arc Cutting and Gouging (10 Hours)
(Module ID 29104-15) Introduces air-carbon arc cutting equipment and processes. Identifies the electrodes and safe operation of the equipment. Provides step-by-step instructions for performing air-carbon arc washing and gouging activities.

Base Metal Preparation (12.5 Hours)
(Module ID 29105-15) Describes how to clean and prepare all types of base metals for cutting or welding. Identifies and explains joint design and base metal preparation for all welding tasks.

Weld Quality (10 Hours)
(Module ID 29106-15) Identifies the codes that govern welding, including marine welds. Identifies and explains weld imperfections and causes. Describes non-destructive testing, visual inspection criteria, welder qualification tests, and the importance of quality workmanship.

SMAW – Equipment and Setup (5 Hours)
(Module ID 29107-15) Describes SMAW welding and welding safety. Explains how to connect welding current and set up arc welding equipment. Also explains how to use tools for cleaning welds.

SMAW Electrodes (2.5 Hours)
(Module ID 29108-15) Describes electrode characteristics and different types of filler metals. Reviews the role of the American Welding Society (AWS) and the American Society of Mechanical Engineers (ASME). Explains proper storage and control of filler metals and identifies the use of codes.

SMAW – Beads and Fillet Welds (100 Hours)
ISBN 978-0-13-418025-0
(Module ID 29109-15) Describes the preparation and setup of arc welding equipment and the process of striking an arc. Explains how to detect and correct arc blow. Describes how to make stringer, weave, overlapping beads, and fillet welds.

Joint Fit-Up and Alignment (5 Hours)
(Module ID 29110-15) Describes job code specifications. Explains how to use fit-up gauges and measuring devices to check fit-up and alignment and use plate and pipe fit-up and alignment tools to properly prepare joints. Explains how to check for joint misalignment and poor fit.

SMAW – Groove Welds with Backing (50 Hours)
(Module ID 29111-15) Introduces groove welds and explains how to set up welding equipment for making groove welds. Describes how to make groove welds with backing. Provides procedures for making flat, horizontal, vertical, and overhead groove welds.

SMAW – Open-Root Groove Welds – Plate (60 Hours)
(Module ID 29112-15) Introduces various types of groove welds and describes how to prepare for groove welding. Describes the techniques required to produce various open V-groove welds.
## Welding Level 2

**Curriculum Notes**
- 227.5 Hours
- Revised: 2015, Fifth Edition
- Sequenced in accordance with the American Welding Society’s (AWS) S.E.N.S.E school requirements. When combined with NCCER Welding Level 1, the content aligns with the key indicators specified in AWS E52.0.2008 Level 1-Entry Welder.
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

### Modules

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<tr>
<td>TRAINEE GUIDE: $99.99</td>
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### Modules Description

**Welding Symbols** (5 Hours)
- (Module ID 29201-15) Identifies and explains the different types of fillet weld, groove weld, and non-destructive examination symbols.

**Reading Welding Detail Drawings** (10 Hours)
- (Module ID 29202-15) Identifies and explains welding detail drawings. Describes lines, fills, object views, and dimensioning on drawings. Explains how to use notes on drawings and the bill of materials. Explains how to sketch and draw basic welding drawings.

**GMAW and FCAW – Equipment and Filler Metals** (10 Hours)
- (Module ID 29205-15) Describes general safety procedures for GMAW and FCAW. Identifies GMAW and FCAW equipment and explains the filler metals and shielding gases used to perform GMAW and FCAW. Explains how to set up and use GMAW and FCAW equipment and how to clean GMAW and FCAW welds.

**GMAW – Plate** (60 Hours)
- (Module ID 29209-15) Explains how to set up and use GMAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multi-pass fillet and V-groove welds on carbon steel plate in various positions.

**GMAW – Pipe** (60 Hours)
- (Module ID 29207-15) Explains GMAW safety. Identifies and explains the use of GMAW equipment, filler metals, and shielding gases. Covers the setup of GMAW equipment.

**GTAW – Equipment and Filler Metals** (10 Hours)
- (Module ID 29207-15) Explains GTAW safety. Identifies and explains how to set up and use GTAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multi-pass fillet and V-groove welds on carbon steel plate in various positions.

**GTAW – Carbon Steel Pipe** (80 Hours)
- (Module ID 29208-15) Describes how to build pads on carbon steel plate using GTAW and carbon steel filler metal. Also explains how to make multiple-pass GTAW fillet welds on carbon steel plate coupons in the 1F, 2F, 3F, and 4F positions, and how to make GTAW V-groove welds in the 1G, 2G, 3G, and 4G positions.

**GTAW – Low Alloy and Stainless Steel Pipe** (70 Hours)
- (Module ID 29205-16) Describes how to set up GTAW equipment for open-root V-groove welds on low-alloy and stainless steel pipe, and explains how to prepare for and make open-root V-groove welds on low-alloy and stainless steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on pipe in the 2G, 5G, and 6G positions.

## Welding Level 3

**Curriculum Notes**
- 470 Hours (370 Required; 100 Elective/Optional)
- Revised: 2016, Fifth Edition
- Downloadable instructor resources that include module tests, PowerPoints®, and performance profile sheets are available at www.nccer.org/irc.

### Modules

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### Modules Description

**GMAW – Carbon Steel Pipe** (80 Hours)
- (Module ID 29208-15) Describes how to set up GTAW equipment for open-root V-groove welds on low-alloy and stainless steel pipe, and explains how to prepare for and make open-root V-groove welds on low-alloy and stainless steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on pipe in the 2G, 5G, and 6G positions.

**GTAW – Low Alloy and Stainless Steel Pipe** (70 Hours)
- (Module ID 29205-16) Describes how to set up GTAW equipment for open-root V-groove welds on low-alloy and stainless steel pipe, and explains how to prepare for and make open-root V-groove welds on low-alloy and stainless steel pipe. Provides procedures for making open-root V-groove welds with GTAW equipment on pipe in the 2G, 5G, and 6G positions.

Continued on following page
Welding Level 3 (continued)

SMAW – Stainless Steel Plate and Pipe Groove Welds (100 Elective Hours)
(Module ID 29306-16) Explains stainless steel metallurgy; how to select SMAW electrodes for stainless steel welds; and how to weld different types of stainless steels. Covers safety issues associated with welding on stainless steels; how to prepare weld coupons; and how to set up SMAW equipment for welding stainless steel. Provides procedures for making open-root V-groove welds with SMAW equipment on stainless steel plate in the 1G, 2G, 3G, and 4G positions. Includes procedures for making open-root V-groove welds with SMAW equipment on stainless steel pipe in the 1G-ROTATED, 2G, 5G, and 6G positions.

GMAW – Aluminum Pipe (50 Hours)

GTAW – Aluminum Plate (30 Hours)
(Module ID 29402-16) Covers the setup of GTAW equipment for welding aluminum plate. Explains how to clean and prepare aluminum plate coupons for welding, and how to select the aluminum filler metals and shielding gases used in the GTAW process. Explains GTAW techniques used in aluminum welding. Provides GTAW procedures on how to build weld pads on aluminum plate; how to make fillet welds on aluminum plate in the 1F, 2F, 3F, and 4F positions; and how to make V-groove welds on aluminum plate with backing in the 1G, 2G, 3G, and 4G positions.

GMAW – Aluminum Pipe (50 Hours)

GTAW – Aluminum Pipe (50 Hours)
(Module ID 29404-16) Covers the setup of GTAW equipment for welding aluminum pipe. Addresses GTAW techniques used to make V-groove welds on aluminum pipe with and without backing. Provides GTAW procedures on how to make V-groove or modified U-groove welds on aluminum pipe in the 2G, 5G, and 6G positions.

Soldering and Brazing (12.5 Hours)
(Module ID 29405-16) Introduces the equipment, techniques, and materials used to safely join copper tubing through both brazing and soldering processes. Covers the required PPE, preparation, and work processes in detail. Also presents procedures for brazing copper to dissimilar materials such as steel.