Welding

**ALIGNS WITH AWS SENSE STANDARDS AND GUIDELINES**

NCCER is pleased to support the American Welding Society’s Schools Excelling through National Skills Education (SENSE) Entry Welder program with Levels 1 and 2 of its Welding curriculum. This curriculum supports the key learning indicators and performance accreditation tasks required to complete the current SENSE program.

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### L1 WELDING

**LEVEL 1**

#### Curriculum Notes

- 357.5 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: 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 2, the content aligns with the key indicators specified in AWS EG2.0:2008 Level 1-Entry Welder.
- New printed Instructor's Package includes lesson plans and instructor's copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.

#### Modules

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

1. **Welding Safety** (5 Hours)
   - Trainee $20
   - Instructor $20

2. **Oxyfuel Cutting** (7.5 Hours)
   - Trainee $20
   - Instructor $20

3. **Base Metal Preparation** (12.5 Hours)
   - Trainee $20
   - Instructor $20

4. **Plasma Arc Cutting** (7.5 Hours)
   - Trainee $20
   - Instructor $20

5. **Air-Carbon Arc Cutting and Gouging** (10 Hours)
   - Trainee $20
   - Instructor $20

6. **Base Metal Preparation** (12.5 Hours)
   - Trainee $20
   - Instructor $20

7. **Weld Quality** (10 Hours)
   - Trainee $20
   - Instructor $20

8. **SMAW – Equipment and Setup** (5 Hours)
   - Trainee $20
   - Instructor $20

9. **SMAW – Open-Root Groove Welds – Plate** (60 Hours)
   - Trainee $20
   - Instructor $20

10. **Joint Fit-Up and Alignment** (5 Hours)
   - Trainee $20
   - Instructor $20

11. **SMAW – Groove Welds with Backing** (50 Hours)
   - Trainee $20
   - Instructor $20

12. **SMAW – Beads and Fillet Welds** (100 Hours)
   - Trainee $20
   - Instructor $20

13. **SMAW – Groove Welds with Backing** (50 Hours)
   - Trainee $20
   - Instructor $20

14. **SMAW – Equipment and Setup** (5 Hours)
   - Trainee $20
   - Instructor $20

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### L2 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 EG2.0:2008 Level 1-Entry Welder.
- New printed Instructor’s Package includes lesson plans and instructor’s copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoint®, and performance profile sheets from www.nccerirc.com.

#### Modules

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

1. **Welding Symbols** (5 Hours)
   - Trainee $20
   - Instructor $20

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Stay Connected: www.nccer.org/bookstore
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.

Physical Characteristics and Mechanical Properties of Metals (7.5 Hours)
(Module ID 29203-15) Explains physical characteristics, mechanical properties, composition, and classification of common ferrous and nonferrous metals. Identifies the various standard metal forms and structural shapes. Shows how to extract metal information from Welding Procedure Specification (WPS) sheets and Procedure Qualification Records (PQRs). Covers visual inspection, magnetic testing, and X-ray fluorescent spectrometry methods used to identify metals.

Preheating and Postheating of Metals (5 Hours)
(Module ID 29204-15) Explains preheating, interpass temperature control, and postheating procedures that sometimes need to be done to preserve weldment strength, ductility, and weld quality. Covers the equipment used for heat treating metals.

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 multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

FCAW – Plate (60 Hours)
(Module ID 29210-15) Explains how to set up and use FCAW equipment and how to select and use different filler metals and shielding gases. Describes how to make multiple-pass fillet and V-groove welds on carbon steel plate in various positions.

GTAW – Equipment and Filler Metals (10 Hours)
(Module ID 29207-15) Explains GTAW safety. Identifies and explains the use of GTAW equipment, filler metals, and shielding gases. Covers the setup of GTAW equipment.

GTAW – Plate (60 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.

Curriculum Notes
- 470 Hours (370 Required; 100 Elective/Optional)
- Revised: 2016, Fifth Edition
- New printed Instructor’s Package includes lesson plans and instructor’s copy of Trainee Guide with an access code to download TestGen software, module exams, PowerPoints®, and performance profile sheets from www.nccerirc.com


GTAW – Carbon Steel Pipe (80 Hours)
(Module ID 29304-16) Explains how to set up GTAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon 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)
Instructor $20 ISBN 978-0-13-448569-0
(Module ID 29305-16) Explains 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 low-alloy and stainless steel pipe in the 2G, 5G, and 6G positions.

SMAW – Stainless Steel Plate and Pipe Groove Welds (100 Hours)
Instructor $20 ISBN 978-0-13-448572-0
(Module ID 29306-16) Explains stainless steel metallurgy; how to select SMAW electrodes for stainless steels; 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 pipe 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-ROTA TED, 2G, 5G, and 6G positions.

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.

SMAW – Open-Root Pipe Welds (100 Hours)
Instructor $20 ISBN 978-0-13-448561-4
(Module ID 29301-16) Explains how to set up SMAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with SMAW equipment on pipe in the 1G-ROTA TED, 2G, 5G, and 6G positions.

GMAW – Pipe (60 Hours)
(Module ID 29302-16) Describes general safety procedures for GMAW and FCAW. Identifies GMAW and FCAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with SMAW equipment on pipe in the 1G-ROTA TED, 2G, 5G, and 6G positions.

FCAW – Pipe (60 Hours)
(Module ID 29303-16) Explains how to set up FCAW equipment for open-root V-groove welds, and explains how to prepare for and make open-root V-groove welds on carbon steel pipe. Provides procedures for making open-root V-groove welds with FCAW equipment on pipe in the 1G-ROTA TED, 2G, 5G, and 6G positions.
Welding Level 4 (continued)

**GMAW – Aluminum Plate**  (30 Hours)
Trainee $20  
Instructor $20  
(Module ID 29401-16) Covers the setup of GMAW equipment for welding aluminum plate. Explains aluminum metallurgy and the characteristics of aluminum welding; how to clean and prepare aluminum plate coupons for welding; and problems often encountered in aluminum welds. Explains GMAW techniques used in aluminum welding. Provides GMAW 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.

**GTAW – Aluminum Plate**  (30 Hours)
Trainee $20  
Instructor $20  
(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.

**Soldering and Brazing**  (12.5 Hours)
Trainee $20  
Instructor $20  
(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.

**GTAW – Aluminum Pipe**  (50 Hours)
Trainee $20  
Instructor $20  
(Module ID 29403-16) Covers the setup of GTAW equipment for welding aluminum pipe. Explains how to clean and prepare aluminum pipe coupons for welding. Addresses GTAW techniques used to make V-groove and modified U-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.

**GMAW – Aluminum Pipe**  (50 Hours)
Trainee $20  
Instructor $20  
ISBN 978-0-13-467759-0  