MODULE OVERVIEW

This module describes the general construction industry concepts of craftsmanship, safety, and apprenticeship training. It details the history and current opportunities of the sheet metal trade, and describes sheet metal types, their various qualities and applications, and the use of a sheet metal measuring gauge.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum.*

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Describe what is meant by pride of craftsmanship in the sheet metal trade.
2. Name the general applications of sheet metal construction.
3. List the basic tools and equipment used in the sheet metal trade.
4. Summarize the history and development of the sheet metal trade.
5. Identify shop and field safety considerations specific to the sheet metal trade.
6. Identify types of metal.
7. Identify common fittings.
8. Describe what is involved in being part of a sheet metal training program.
9. Describe how to use a sheet metal gauge.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Identify types of metal from a collection of materials to instructor standards.
2. Identify common sheet metal fittings.
3. Use a standard sheet metal gauge to measure various metal thicknesses to given standards.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Whiteboard/chalkboard

Transparencies

Markers/chalk

Blank acetate sheets

Transparency pens

Pencils and scratch paper

Appropriate personal protective equipment

Examples of fiberglass and plastic

Sheet metal gauge and wire gauge

Examples of sheet metal pieces, including:
- Austenitic steel
- Ferritic steel
- Martensitic steel

Magnets and heat sources (torch, burner, heater, etc.)

Material Safety Data Sheets (MSDS)

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Building Air Quality, 2000. U.S. Environmental Protection Agency. Washington, D.C.: Government Printing Office.

Sheet Metal Handbook: How to Form and Shape Sheet Metal for Competition and Restoration Use, HP Books.

Sheet Metal Worker's Pocket Manual. Z/S Pocket Manuals, P.O. Box 872, Evergreen Park, IL 60642.

Ultimate Sheet Metal Fabrication, 1999. Tim Remus. Osceola, WI: Motorbooks International.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover *Introduction to the Sheet Metal Trade.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to the Sheet Metal Trade	
A. Pride of Craftsmanship	_____
B. The History of Sheet Metal	_____
C. The History of Apprenticeship	_____
D. Safety	_____
E. Steel and Other Metals	_____
F. Types of Sheet Metal	_____
G. Laboratory	_____
Trainees practice identifying types of metal from samples provided. This laboratory corresponds to Performance Task 1.	
H. Measuring Sheet Metal	_____
I. Laboratory	_____
Trainees practice measuring different gauges of sheet metal using a sheet metal gauge. This laboratory corresponds to Performance Task 3.	
Session II. Sheet Metal Trade Work; Review and Testing	
A. Work in the Sheet Metal Trade	_____
B. Laboratory	_____
Trainees practice identifying common sheet metal fittings. This laboratory corresponds to Performance Task 2.	
E. Review	_____
F. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from the NCCER.	
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.	
G. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.	

MODULE OVERVIEW

This module describes hand and power tools used in the sheet metal trade. Common fabricating machines are also discussed, as well as measuring, layout, and drafting tools. Trainees will learn which tool to select for a particular job, how to use it safely, and how to keep it in good condition.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Module 04101-08

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify and describe the proper use of tools commonly used in the sheet metal trade.
2. State general rules for safety when using tools.
3. Describe proper maintenance procedures for tools.
4. Demonstrate how to properly use sheet metal tools.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Identify a given hand tool, state its application, and describe its safe use and maintenance.
2. Demonstrate the use of a given hand tool, according to standards as given by your instructor.
3. Identify a given power tool, state its application, and describe its safe use and maintenance.
4. Demonstrate the use of a given power tool, according to standards as given by your instructor.
5. Identify a given shop machine, state its application, and describe its safe use and maintenance.
6. Demonstrate the use of a shop machine, according to standards as given by your instructor.
7. Select the most suitable tool or machine for a given application.
8. Demonstrate the use of the selected tool, according to standards as given by your instructor.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Two sections of duct

Samples of sheet metal

Duct stretcher

Duct tongs

Duct holder

A tool belt with various hand tools:
- Hand crimper
- Hand seamer
- Snips (insulated and non-insulated, aviation, and left- and right-handed)
- Sheet metal hammer
- Utility knife
- Tape measure
- Screwdriver
- Torpedo level
- Grip pliers
- Linesman pliers

Mallets

Cold chisels

Punches

Folding tool

(continued)

Various types of stakes, including:
- Blowhorn stake
- Beakhorn stake
- Candlemold stake
- Needlecase stake
- Hollow mandrel stake
- Double-seaming stake
- Hatchet stake

Measuring tools, including:
- Steel rule
- Circumference rule
- Steel square
- Combination square
- Protractor
- Feeler gauge
- Sheet metal gauge

Layout tools, including:
- Straightedge
- Scratch awl
- Scriber
- Trammel

Groover

Crimper

Snap lock punch

Various types of drills and drill bits

Drafting tools, including:
- Drawing board
- T-square
- Dividers
- Compass

Squaring shear

Notchers

Ring and circle shear

Nibbler

Uni-shear

Saws, including:
- Hacksaw
- Reciprocating saw
- Portable, horizontal, and vertical band saw
- Saber saw

Bar folder

Brakes

Slip-roll forming machine

Turning machines

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Build Your Own Metalworking Shop from Scrap, 1982. David J. Gingery. Bradley, IL: Lindsay Publications.

Sheet Metal, 1995. Leo A. Meyer. Homewood, IL: American Technical Publishers, Inc.

The Drill Press, 1982. David J. Gingery. Bradley, IL: Lindsay Publications.

Working Sheet Metal, 1993. David J. Gingery. Bradley, IL: Lindsay Publications.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover *Tools of the Trade.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic **Planned Time**

Session I. Tools of the Trade, Part One

A. Hammers and Mallets _____
B. Cold Chisels _____
C. Punches _____
D. Hand-Cutting Tools _____
E. Laboratory _____

Trainees practice using various hand tools. This laboratory corresponds to Performance Tasks 1 and 2.

F. Cutting Machines _____
G. Sawing Tools _____
H. Drills and Drill Presses _____
I. Laboratory _____

Trainees practice using various power tools. This laboratory corresponds to Performance Tasks 3 and 4.

J. Forming Machines _____

Session II. Tools of the Trade, Part Two; Review and Testing

A. Roll-Forming Machines _____
B. Laboratory _____

Trainees practice using shop machines. This laboratory corresponds to Performance Tasks 5 and 6.

C. Hand-Forming Tools and Hand Tools _____
D. Welding Tools _____
E. Production and Computer-Aided Machines _____
F. Laboratory _____

Trainees practice fabricating duct and fittings. This laboratory corresponds to Performance Tasks 7 and 8.

G. Measuring Tools _____
H. Layout Tools _____
I. Drafting Tools _____
J. Review _____
K. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from the NCCER.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

L. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

Introduction to Sheet Metal Layout and Processes Annotated Instructor's Guide

Module 04103-08

MODULE OVERVIEW

This module describes the processes of drawing, transferring patterns, cutting, forming, and assembling sheet metal parts. The terminology, rules, and three basic methods of layout development are discussed. The trainee will learn how to select and use the proper layout, hand, and machine tools for producing sheet metal fittings.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Modules 04101-08 and 04102-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to:

1. Define basic layout terminology.
2. Explain how to select and use layout and marking tools.
3. Identify and explain the three development methods for laying out sheet metal patterns.
4. Demonstrate how to select and use hand snips, hacksaws, and squaring shears for cutting out sheet metal parts and patterns.
5. Demonstrate how to select and use forming tools.
6. Demonstrate how to construct seams, edges, and duct connectors.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to:

1. Transfer a sheet metal pattern to a piece of sheet metal to given standards.
2. Use hand snips to make the following cuts to given standards on 24-gauge or lighter sheet metal: straight cuts, outside curved cuts, and internal cuts.
3. Perform a double cut on light pipe to given standards.
4. Use shears to square a piece of light-gauge sheet metal for ductwork to within $\frac{1}{16}$ inch.
5. Use stakes to form a cone for a weather cap to given standards.
6. Use stakes to form a 90-degree bend to given standards.
7. Use a slip-roll forming machine to make two sections of round pipe with grooved seams to given standards.
8. Use a box and pan brake to make right angle bends to given standards on light-gauge stock.
9. Use a bar folder to make a hem bend to given standards.
10. Use a hand brake to make a Pittsburgh seam to given standards.
11. Make a crimped edge on round pipe to given standards.
12. Join two sections of round pipe by crimping and beading to given standards.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Assorted samples of sheet metal, including 24-gauge or lighter

continued

Empty cereal box

Layout materials, including:
- Steel rule
- Scratch awl
- Sheet metal scriber
- Punches
- Combination square
- Trammels
- Dividers

Sections of light pipe

Stakes

Mallets

Notchers (dovetail and hand)

Crimper

Sections of round pipe (snap-lock)

Screwdriver, screws

Hand snips
- Double-cutting
- Combination
- Straight blade
- Aviation (left-hand, right-hand)

Slip-roll forming machine

Squaring shears

Box and pan brake

Bar folder

Hand brake

Lever punch

Hand-cranked beading machine

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference work is suggested for both instructors and motivated trainees interested in further study. This is optional material for continued education rather than for task training.

Cliff's Quick Review Geometry, 1998. Edward Kohn. Lincoln, NE: Cliff's Notes Publishing Company.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Introduction to Sheet Metal Layout and Processes.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Sheet Metal Pattern Layout	
A. Layout Terminology	_____
B. Visualizing Layouts	_____
C. Layout Rules	_____
D. Layout Tools	_____
E. Laboratory Trainees practice transferring sheet metal patterns to sheet metal. This laboratory corresponds to Performance Task 1.	_____
F. Layout Methods	_____

Session II. Cutting and Punching Holes in Sheet Metal Patterns; Forming

A. Cutting with Hand Snips _____

B. Laboratory _____

Trainees practice making cuts with snips. This laboratory corresponds to Performance Task 2.

C. Cutting with Squaring Shears _____

D. Laboratory _____

Trainees practice cutting with a squaring shear This laboratory corresponds to Performance Task 4.

E. Punching Holes _____

F. Forming _____

G. Laboratory _____

Trainees practice using stakes to form sheet metal. This laboratory corresponds to Performance Tasks 5 and 6.

H. Laboratory _____

Trainees practice using a slip-roll forming machine. This laboratory corresponds to Performance Task 7.

Session III. Edges, Seams, and Connectors; Review and Testing

A. Edges _____

B. Seams _____

C. Laboratory _____

Trainees practice using a hand brake. This laboratory corresponds to Performance Task 10.

D. Connectors _____

E. Review _____

F. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from the NCCER.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

G. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module explains how to use various units of measure to satisfy job requirements. The trainee will learn about measurement conversion for both the English and metric systems. The module also covers basic geometric concepts and terminology.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Modules 04101-08 through 04103-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Convert denominate numbers and solve problems using them.
2. Calculate using rules.
3. Calculate using linear, square, volume, and weight measures.
4. Calculate the stretchouts for selected fittings.
5. Construct simple geometric figures.
6. Calculate the offset using field mitering and the OWL methods.

PERFORMANCE TASK

Under the supervision of the instructor, the trainee should be able to do the following:

1. Use the OWL method to calculate a specified offset.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Appropriate personal protective equipment
Assorted examples of paper stretchouts
Sample sheet metal pieces
Sheet metal scriber
Metal straightedge
Empty milk jugs, pitchers, other liquid containers
Straight pins
Assorted lengths of string
Calculators
Protractors, compasses, and dividers to perform the geometry exercises
Various types of flexible, bench, and tape rules, marked with English and metric measures
Assorted measuring cups marked with English and metric measures
Weights and scale
Assorted rules marked with English and metric measures
Module Examinations*
Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Geometry Plane and Practical, 1991. Bruce Stephan. New York, NY: Harcourt Brace Jovanovich.

Geometry the Easy Way, 1991. Lawrence Leff. Hauppauge, NY: Barrons Educational Series.

Workshop Math, 1989. Robert Scharff. New York, NY: Sterling Publications.

www.math.com/tables/geometry

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 20 hours are suggested to cover *Trade Math One*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Denominate Numbers	
A. Adding Denominate Numbers	_____
B. Subtracting Denominate Numbers	_____
C. Multiplying Denominate Numbers	_____
D. Dividing Denominate Numbers	_____
Session II. Rules; Metric System	
A. Rules	_____
B. The Metric System	_____
Session III. Measurement Systems, Part One	
A. Linear Measure	_____
B. Square Measure	_____
C. Area of a Circle	_____
Session IV. Measurement Systems, Part Two	
A. Area Measure	_____
B. Volume Measure	_____
C. Weight Measure	_____
Session V. Calculating Stretchouts; Geometry, Part One	
A. Rectangular Fittings	_____
B. Box Fittings	_____
C. Circular Fittings	_____
D. The Point	_____
E. The Line	_____
F. The Circle	_____
Session VI. Geometry, Part Two	
A. Angles	_____
B. Polygons	_____
C. Ellipses	_____
D. Geometry Exercises One through Three	_____

Session VII. Geometry, Part Three; Mitering Duct

A. Geometry Exercises Four through Ten _____

B. Field Mitering _____

C. OWL Method _____

D. Laboratory _____

Trainees practice calculating an offset using the OWL method. This laboratory corresponds to Performance Task 1.

Session VIII. Review and Testing

A. Review _____

B. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from the NCCER.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

C. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

Fabrication One – Parallel Line Development
Annotated Instructor's Guide

Module 04105-08

MODULE OVERVIEW

This module describes layout and fabrication of ductrun assemblies. Through a series of practice exercises, trainees use the parallel line development method to prepare a pattern on metal to the correct measurements, use the proper tools to cut the fitting, and fabricate it.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Modules 04101-08 through 04104-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Explain procedures for parallel line development.
2. Lay out and fabricate selected ductrun fittings.

PERFORMANCE TASKS

Under the supervision of the instructor,the trainee should be able to do the following:

1. Lay out and fabricate seven fittings from among the following:
   - Grooved lock seam
   - Flexible connection
   - Pittsburgh seam
   - Mitered fitting
   - Square elbow
   - 90-degree elbow
   - 90-degree change elbow
   - 45-degree change elbow
   - Rectangular Y-branch
   - 90-degree double Y-branch
   - 90-degree clinch tee
   - Three-piece round offset
   - Transition with three straight sides
   - Transition with two straight sides
   - Double offset
   - Ogee offset
   - Rectangular roof flange
   - Smokestack
   - Gored elbow
   - Ogee gutter
   - Belt guard
   - 90-degree tee (Layout only)
   - 45-degree tee (Layout only)
   - Type-A ventilator

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Transparencies

Whiteboard/chalkboard

Markers/chalk

Blank acetate sheets

Transparency pens

Pencils and scratch paper

Drafting pencils

Ledger (11" × 17") paper

Appropriate personal protective equipment

26-gauge, galvanized iron sheet metal pieces for patterns, according to specifications for each fitting

Materials for fittings, including:
- Prefabricated flexible connection material (*NFPA Standard 90A*)
- Fabric-to-fabric connection sealant (NFPA approved)

A completed Type-A ventilator

(continued)

Hand tools for cutting, forming, and finishing fittings, including:
- Groover
- Notcher
- Seamer
- Sheet metal hammer
- Snips
- Heavy-duty staple gun and staples
- Soldering equipment
- Welding equipment

Machines for forming and finishing fittings, including:
- Bar folder
- Brake
- Squaring shear
- Slip-roll
- Pittsburgh roll-forming
- Easy edger

Layout tools, including:
- Straightedge
- Flexible steel rule
- Combination square
- Scratch awl
- Scriber
- Prick punch
- Framing square
- Mallet
- Felt-tipped marker
- Wing dividers
- 45-degree triangle

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand and power tools. Ensure that they are briefed on shop safety procedures.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Metal Fabricator's Handbook, 1990. Ron Fournier. New York, NY: H.P. Books.

Ultimate Sheet Metal Fabrication, 1999. Tim Remus. Stillwater, MN: Wolfgang Publications, Inc.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 22½ hours are suggested to cover *Fabrication One – Parallel Line Development*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to performance tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Parallel Line Development, Part One	
A. Introduction	_____
B. Pattern Development	_____
C. Grooved Lock Seam	_____
D. Laboratory Trainees practice laying out and fabricating a grooved lock seam. This laboratory corresponds to Performance Task 1.	_____
E. Flexible Connection	_____
F. Laboratory Trainees practice laying out and fabricating a flexible connection. This laboratory corresponds to Performance Task 1.	_____

Session II. Parallel Line Development, Part Two

A. Rectangular Pittsburgh Seam _____

B. Laboratory _____

Trainees practice laying out and fabricating a rectangular Pittsburgh lock duct. This laboratory corresponds to Performance Task 1.

C. Mitered Fitting _____

D. Laboratory _____

Trainees practice laying out and fabricating a mitered fitting. This laboratory corresponds to Performance Task 1.

E. Square Elbow _____

F. Laboratory _____

Trainees practice laying out and fabricating a square elbow. This laboratory corresponds to Performance Task 1.

Session III. Parallel Line Development, Part Three

A. 90-Degree Elbow _____

B. Laboratory _____

Trainees practice laying out and fabricating a 90-degree elbow. This laboratory corresponds to Performance Task 1.

C. 90-Degree Change Elbow _____

D. Laboratory _____

Trainees practice laying out and fabricating a 90-degree change elbow. This laboratory corresponds to Performance Task 1.

E. 45-Degree Change Elbow _____

F. Laboratory _____

Trainees practice laying out and fabricating a 45-degree change elbow. This laboratory corresponds to Performance Task 1.

Session IV. Parallel Line Development, Part Four

A. Rectangular Y-Branch _____

B. Laboratory _____

Trainees practice laying out and fabricating a rectangular Y-branch. This laboratory corresponds to Performance Task 1.

C. 90-Degree Double-Y Branch _____

D. Laboratory _____

Trainees practice laying out and fabricating a 90-degree double-Y branch. This laboratory corresponds to Performance Task 1.

E. 90-Degree Clinch Tee _____

F. Laboratory _____

Trainees practice laying out and fabricating a 90-degree clinch tee. This laboratory corresponds to Performance Task 1.

Session V. Parallel Line Development, Part Five

A. Three-Piece Round Offset _____

B. Laboratory _____

Trainees practice laying out and fabricating a three-piece round offset. This laboratory corresponds to Performance Task 1.

C. Transition with Three Straight Sides _____

D. Laboratory _____

Trainees practice laying out and fabricating a transition with three straight sides. This laboratory corresponds to Performance Task 1.

E. Transition with Two Straight Sides _____

F. Laboratory _____

Trainees practice laying out and fabricating a transition with two straight sides. This laboratory corresponds to Performance Task 1.

Session VI. Parallel Line Development, Part Six

A. Double Offset _____

B. Laboratory _____

Trainees practice laying out and fabricating a double offset. This laboratory corresponds to Performance Task 1.

C. Ogee Offset _____

D. Laboratory _____

Trainees practice laying out and fabricating an ogee offset. This laboratory corresponds to Performance Task 1.

E. Rectangular Roof Flange _____

F. Laboratory _____

Trainees practice laying out and fabricating a rectangular roof flange. This laboratory corresponds to Performance Task 1.

Session VII. Parallel Line Development, Part Seven

A. Smokestack _____

B. Laboratory _____

Trainees practice laying out and fabricating a smokestack. This laboratory corresponds to Performance Task 1.

C. Gored Elbow _____

D. Laboratory _____

Trainees practice laying out and fabricating a gored elbow. This laboratory corresponds to Performance Task 1.

E. Ogee Gutter _____

F. Laboratory _____

Trainees practice laying out and fabricating an ogee gutter. This laboratory corresponds to Performance Task 1.

Session VIII. Parallel Line Development, Part Eight

A. Belt Guard _____

B. Laboratory _____

Trainees practice laying out and fabricating a belt guard. This laboratory corresponds to Performance Task 1.

C. 90-Degree Tee _____

D. Laboratory _____

Trainees practice laying out a 90-degree tee. This laboratory corresponds to Performance Task 1.

E. 45-Degree Tee _____

F. Laboratory _____

Trainees practice laying out a 45-degree tee. This laboratory corresponds to Performance Task 1.

Session IX. Parallel Line Development, Part Nine; Review and Testing

A. Type-A Ventilator _____

B. Laboratory _____

Trainees practice laying out and fabricating a type-A ventilator. This laboratory corresponds to Performance Task 1.

C. Review _____

D. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from the NCCER.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

E. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

Installation of Ductwork
Annotated Instructor's Guide

Module 04106-08

MODULE OVERVIEW

This module describes how to identify and select fasteners that can withstand loads and stresses within air distribution systems. It explains the proper spacing, load ratings, and installation of the hangers and supports used to hold ductwork, fans, compressors, and diffusers in place. It also covers the elimination or reduction of noise connected with the delivery of heated or cooled air.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Modules 04101-08 through 04105-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify and describe fasteners used in the sheet metal trade.
2. Select and use the right fastener for the task.
3. Describe some of the more common methods of supporting air system components.
4. Install duct fasteners, hangers, and supports.
5. Describe how to connect rectangular, round, and spiral ductwork.
6. Explain how to properly seal ductwork.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Identify a given fastener and state its application.
2. Determine the various specifications of given fasteners.
3. Classify hangers by types and applications.
4. Demonstrate the proper method of installing selected duct hangers, supports and reinforcements.
5. Connect and seal rectangular and round duct.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Examples of fastening tools, including:
- Screwdrivers
- Allen wrenches

Examples of connecting tools, including:
- Socket wrenches
- Drift pin
- TDC corner piece crimping tool
- Hand crimper
- Snips for cutting a dovetail connection

Steel rule for measuring sizes of bolts and screws
Hand-operated blind riveter, blind rivets (domed), and practice workpiece
Expansion shield
Thread pitch gauge
Ruler
Duct sealant
Sample duct sections, including:
- TDC, Ductmate®, or S and drive connected fittings
- Spiralmate®, Ovalmate®, crimped, collared, or dovetail connected fittings

Examples of bolts, including:
- Carriage
- Machine
- Stove
- Stud

(continued)

Examples of screws, including:
- Cap
- Lag
- Self-tapping
- Setscrew
- Wood

Copies of your local code

Examples of nuts and washers, including:
- Interference nut
- Jam nut
- Pal nut
- Castellated nut
- Self-locking nut
- Split-ring washer
- Spring-type washer
- Tooth-type washer
- Prem assembly

Practice assembly boards/sheet metal with predrilled holes suitable for fastening selected screws and bolts in place

Examples of special-purpose fasteners, including:
- Toggle bolts
- Molly bolts
- Threaded anchors

A section of flexible duct

Examples of fasteners for hangers, including:
- #10 plated sheet metal screw
- 2½-inch square washer
- ¼-inch bolt

Examples of duct supports (riser supports should have holes for #10 screw), including:
- Channel
- Wall support angle
- Floor support angle iron
- Trapeze assembly with rod and wire alternatives
- Single strap
- Strap for flexible duct

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

HVAC Duct Construction Standards—Metal and Flexible, 3rd edition, 2005. Chantilly, VA. Sheet Metal and Air Conditioning Contractor's National Association.

Indoor Air Quality and HVAC Systems, 1993. David W. Bearg. Boca Raton, FL: Lewis Publishers.

One Good Turn: A Natural History of the Screwdriver and the Screw, 2000. Witold Rybcaynski. New York: Charles Scribner's Sons.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Installation of Ductwork*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Assembling Ductwork	
A. Sealing and Connecting Ductwork	_____
B. Lifting Ductwork	_____
C. Connecting Ductwork	_____
D. Laboratory	_____
Trainees practice connecting and sealing ductwork. This laboratory corresponds to Performance Task 5.	
Session II. Bolts, Screws, and Nuts	
A. Bolts and Screws	_____
B. Laboratory	_____
Trainees practice fastening bolts and screws to predrilled sheet metal using the appropriate tools.	
C. Nuts	_____
D. Laboratory	_____
Trainees practice fastening nuts and bolts.	
Session III. Washers; Structural Fasteners; Rivets	
A. Lock Washers	_____
B. Structural Fasteners	_____
C. Rivets	_____
D. Laboratory	_____
Trainees practice using a blind riveter.	
Session IV. Fasteners; Hangers and Supports	
A. Special Purpose Fasteners	_____
B. Hangers and Supports	_____
Session V. Equipment Noise	
A. Air Handling Equipment Noise	_____
Session VI. Review and Testing	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70% or higher to receive recognition from the NCCER.	
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.	
C. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.	
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.	

Installation of Air Distribution Accessories
Annotated Instructor's Guide

Module 04107-08

MODULE OVERVIEW

This module reviews air distribution accessories and how they work within a system. It discusses the manufacturer's installation instructions and local code requirements. The trainee will learn to test the installation of various accessories for correct operation.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Modules 04101-08 through 04106-08.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Identify and explain the purpose of selected air distribution accessories.
2. Correctly install selected air distribution accessories.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Explain the purpose of selected air distribution components.
2. Simulate and/or demonstrate the installation of selected air distribution accessories.
3. Install an opposed-blade balancing damper in a section of lined duct.
4. Install a takeoff in the same section of duct.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Transparencies

Blank acetate sheets

Transparency pens

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Copies of your local code

Appropriate personal protective equipment

Assorted air handling and zoning accessories, including those designed for flexible duct attachment

Flexible duct hangers

Assorted sections of flexible duct, including duct with vapor barriers and insulation

A cardboard box and two stiff pieces of cardboard

Various types of louvers, including one that is in its original packaging

Manual volume damper (opposed-blade and parallel-blade)

Fire or fire/smoke damper

Tools required for flexible duct installation

Various registers, grilles, and diffusers

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment. Emphasize the importance of following all safety precautions and procedures when working with power tools.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Air Distribution Basics for Residential and Small Commercial Buildings, 2000. Hank Rutkowski. Arlington, VA: Air Conditioning Contractors of America.

Air Distribution in Rooms: Ventilation for Health and Sustainable Environment, 2000. Hazim B. Awbi, editor. New York, NY: Elsevier Science.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover *Installation of Air Distribution Accessories.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic **Planned Time**

Session I. Air Distribution Accessories, Part One

A. Introduction to Air Distribution Accessories _____

B. Louvers _____

C. Dampers and Access Doors _____

D. Laboratory _____

Trainees practice installing an opposed-blade damper. This laboratory corresponds to Performance Task 3.

E. Laboratory _____

Trainees practice testing dampers.

F. Zoning Accessories and Coils _____

Session II. Air Distribution Accessories, Part Two; Review and Testing

A. Takeoffs _____

B. Laboratory _____

Trainees practice installing a takeoff. This laboratory corresponds to Performance Task 4.

C. Flexible Duct _____

D. Registers, Grilles, and Diffusers _____

E. Review _____

F. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from the NCCER.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

G. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module describes different types of thermal and acoustic insulation. It also discusses how to install different types of insulation using sealers, adhesives, and fasteners.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Modules 04101-08 through 04107-08.

Please note that this is an elective module. It is not necessary to complete this module in order to advance to *Sheet Metal Level Two*.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Explain the principles of thermal insulation.
2. Explain the principles of acoustic insulation.
3. Install liner materials on selected duct sections.
4. Install duct wrap on selected duct sections.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Measure and cut a specified size of fibrous duct liner from a larger piece, including at least one facing tab, using the appropriate tools.
2. Properly install appropriate insulation around a provided pipe.
3. Properly install a vapor barrier around a provided pipe.
4. Properly seal the seams, joints, or facing tabs on the insulation with tape or adhesive, as the instructor chooses.
5. Install metal nosing.

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen

Transparencies

Transparency pens

Blank acetate sheets

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Tape measures

Straightedges

Assorted pieces of cardboard (18" × 18")

Installation tools

Insulation tape and adhesives

Staple gun and staples

Scissors

Assorted duct sections, including:

- Rectangular duct
- Round duct
- Oval duct

Assorted flexible and rigid fibrous glass duct liners

Assorted samples of different types of fiberglass duct and blanket insulation

Assorted samples of metal nosing

Brushed-on adhesive strips for blanket insulation

Vapor barrier mastic

Assorted mechanical fasteners

Assorted samples of insulation with factory-applied adhesive

(continued)

Assorted samples of fiberglass pipe insulation, including insulation with the All-Service Jacket (ASJ)

Appropriate personal protective equipment, to include:

- Gloves
- Safety glasses

Heavy cardboard or plywood sheet

Assorted samples of tube insulation

Copies of various property requirements

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand and power tools. Ensure that they are briefed on shop safety procedures.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

Fibrous Glass Duct Liner Standard: Design, Fabrication, and Installation Guidelines, 1998. NAIMA. Alexandria, VA: North American Insulation Manufacturers Association.

Thermal Insulation Building Guide, 1990. Edin F. Strother and William C. Turner. Melbourne, FL: Krieger Publishing.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Insulation.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Introduction to Insulation	
A. Insulation Properties	_____
B. Principles of Thermal Insulation	_____
C. Principles of Acoustic Insulation	_____
D. Fibrous Glass Duct Liner	_____
E. Laboratory Trainees practice cutting fibrous glass duct liner. This laboratory corresponds to Performance Task 1.	_____
F. Laboratory Trainees practice installing metal nosing. This laboratory corresponds to Performance Task 5.	_____

Session II. Fiberglass Blanket and Fiberglass Pipe Insulation

A. Measuring and Cutting _____
B. Installing Fiberglass Blanket Insulation _____
C. Sealing _____
D. Laboratory _____

Trainees practice sealing seams on blanket insulation using insulation tape and adhesive. This laboratory corresponds to Performance Task 4.

E. Mechanical Fasteners _____
F. Factory-Applied Adhesives _____
G. Field-Applied Adhesives _____
H. Fiberglass Pipe Insulation _____
I. Laboratory _____

Trainees practice measuring and cutting fiberglass pipe insulation.

Session III. Flexible Foam Insulation; Review and Testing

A. Flexible Foam Insulation _____
B. Review _____
C. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from the NCCER.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

D. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

MODULE OVERVIEW

This module reviews architectural sheet metal tasks for roofing, gutters, downspouts, and chimneys. Trainees will learn how to lay out and fabricate selected drainage and flashing components.

PREREQUISITES

Please refer to the Course Map in the Trainee Module. Prior to training with this module, it is recommended that the trainee shall have successfully completed the following: *Core Curriculum*; *Sheet Metal Level One*, Modules 04101-08 through 04108-08.

Please note that this is an elective module. It is not necessary to complete this module in order to advance to *Sheet Metal Level Two*.

OBJECTIVES

Upon completion of this module, the trainee will be able to do the following:

1. Describe the parts of a roof drainage system.
2. Describe how flashing is used.
3. Describe how gutters and downspouts are used.
4. Lay out and fabricate selected drainage components.
5. Fabricate selected flashing components.

PERFORMANCE TASKS

Under the supervision of the instructor, the trainee should be able to do the following:

1. Lay out and develop the pattern for a 60-degree two-piece conductor elbow.
2. Fabricate the fitting listed above.
3. Form and solder a lap seam and a butt seam.
4. Lay out and fabricate the following:
   - Rectangular outlet tube
   - Rectangular gutter (two styles)
5. Fabricate flashing for a shingle roof.
6. Lay out and fabricate:
   - Chimney flashing
   - Typical metal coping profile

MATERIALS AND EQUIPMENT LIST

Overhead projector and screen
Transparencies
Blank acetate sheets
Transparency pens
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copies of your local code
Samples of shingles, wood shakes, and slate and tile roofing
Roll roofing (standard, granule, and selvage)
Slate roofing (grades A through C)
Large sheets of heavy, white paper
Scissors
Rulers
26-gauge galvanized sheet metal (12-inch and 10-inch)
Soldering equipment and supplies
Layout and development tools
Aviation snips
Combination square
Flexible steel rule
Circumference rule

(continued)

Steel square

Hand seamer

Box or pan brake

Squaring shear

Slip-roll forming machine

Number three hand groover

Bar folder

Layout and development tools

Tools and materials to lay out and fabricate two rectangular gutters

Tools and materials to lay out and fabricate shingle roof flashing, including:
- Drawing of a shingle roof flashing *(Figure 37)*

Tools and materials to lay out and fabricate chimney flashing, including:
- Sealant
- Hammer and galvanized roofing nails
- Lead wedges
- Drawing of chimney flashing *(Figure 38)*

Tools and materials to lay out and fabricate wall flashing (top surface), including:
- Drawing of coping profile *(Figure 40)*

Real or mockup small residential chimney fabrication

Model wall, model chimney, and model roofing

Module Examinations*

Performance Profile Sheets*

*Located in the Test Booklet.

SAFETY CONSIDERATIONS

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand and power tools. Ensure that they are briefed on shop safety procedures.

ADDITIONAL RESOURCES

This module is intended to present thorough resources for task training. The following reference works are suggested for both instructors and motivated trainees interested in further study. These are optional materials for continued education rather than for task training.

NRCA Roofing and Waterproofing Manual, 2001. Rosemont, IL: National Roofing Contractors Association.

Roofing Design and Practice, 2001. Stephen Patterson and Madan Mehta. Upper Saddle River, NJ: Prentice Hall.

SMACNA Architectural Sheet Metal Manual, Latest Edition. Chantilly, VA: Sheet Metal and Air Conditioning Contractors' National Association.

TEACHING TIME FOR THIS MODULE

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Architectural Sheet Metal.* You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	**Planned Time**
Session I. Roofing Materials; Roof Pitch	
A. Introduction	_____
B. Roofing Materials	_____
C. Roof Pitch	_____
Session II. Flashing and Gutters	
A. Roof Flashing	_____
B. Gutters and Downspouts	_____

Session III. Chimneys; Practice Tasks, Part One

A. Chimney _____

B. Conductor Elbow _____

C. Laboratory _____

Trainees practice fabricating a conductor elbow. This laboratory corresponds to Performance Tasks 1 and 2.

D. Rectangular Outlet Tube _____

E. Laboratory _____

Trainees practice fabricating a rectangular outlet tube. This laboratory corresponds to Performance Task 4.

Session IV. Practice Tasks, Part Two

A. Two Rectangular Gutters _____

B. Laboratory _____

Trainees practice fabricating rectangular gutters. This laboratory corresponds to Performance Task 4.

C. Shingle Roof Flashing _____

D. Laboratory _____

Trainees practice fabricating shingle roof flashing. This laboratory corresponds to Performance Task 5.

Session V. Practice Tasks, Part Three

A. Chimney Flashing _____

B. Laboratory _____

Trainees practice fabricating chimney flashing. This laboratory corresponds to Performance Task 6.

C. Wall Flashing _____

D. Laboratory _____

Trainees practice fabricating wall flashing. This laboratory corresponds to Performance Task 6.

Session VI. Review and Testing

A. Review _____

B. Module Examination _____

1. Trainees must score 70% or higher to receive recognition from the NCCER.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.

C. Performance Testing _____

1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from the NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the performance testing requirements.
2. Record the testing results on Craft Training Report Form 200 and submit the results to the Training Program Sponsor.Module Exam