

Module Overview

This module covers the selection and installation of various types of insulating materials in walls, floors, and attics. It also covers the uses and installation practices for vapor barriers, waterproofing materials, and building wraps.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Fundamentals of Weatherization*, and *Weatherization Technician Level One*, Module 33102-10.

Objectives

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

1. Describe the requirements for insulation.
2. Describe the characteristics of various types of insulation material.
3. Calculate the required amounts of insulation for a structure.
4. Install selected insulation materials.
5. Describe the requirements for moisture control and ventilation.
6. Install selected vapor barriers.
7. Describe various methods of waterproofing.
8. Describe air infiltration control requirements.
9. Install selected building wraps.

Performance Tasks

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

1. Install blanket insulation in a wall.
2. Install a vapor barrier on a wall.
3. Install selected building wraps.

Materials and Equipment

Markers/chalk	Calculator
Pencils and scratch paper	Samples of various vapor barrier materials
Whiteboard/chalkboard	Samples of various waterproofing materials
<i>Weatherization Technician Level 1</i>	Soffit baffles
PowerPoint® Presentation Slides (ISBN 978-0-13-256981-1)	Wire mesh (if needed)
Multimedia projector and screen	Tape measure
Appropriate personal protective equipment	Utility knife or shears
Flexible insulation	Pencil
Loose-fill insulation	Prepared wall for insulation, vapor barriers, and building wraps
Rigid or semi-rigid insulation boards	Copies of the Quick Quiz*
Reflective insulation	Module Examinations**
Hand or power stapler and staples	Performance Profile Sheets**

* Located at the back of this module

** Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module may require trainees to visit construction sites. Ensure that they are briefed on site safety procedures. This module requires trainees to install insulation materials. Ensure that they are properly briefed on the use of all tools and personal protection necessary to handle insulation materials.

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.

International Energy Conservation Code[®]. International Code Council, 2006.

U.S. Department of Energy Website, www.eere.energy.gov

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 *Thermal and Moisture Protection*. 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; Thermal Insulation	
A. Introduction	_____
B. Thermal Insulation	_____
C. Insulation Installation Guidelines	_____
D. Laboratory	_____
Have trainees practice installing blanket insulation in a wall. This laboratory corresponds to Performance Task 1.	
Session II. Moisture Control; Air Infiltration Control	
A. Moisture Control	_____
B. Laboratory	_____
Have trainees practice installing a vapor barrier on a wall. This laboratory corresponds to Performance Task 2.	
C. Waterproofing	_____
D. Air Infiltration Control	_____
E. Laboratory	_____
Have trainees practice installing selected building wraps. This laboratory corresponds to Performance Task 3.	

Session III. Review and Testing

A. Module Review

B. Module Examination

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on 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 NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

Module Overview

This module provides an overview of the materials and techniques commonly used for constructing and finishing wood or masonry structures. Included are descriptions of the tools and procedures used to install fasteners and anchors in wood, masonry, and drywall. Power tools commonly used for running cable are also described.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Fundamentals of Weatherization*.

Objectives

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

1. Describe the composition and uses of the common types of residential building materials.
2. Identify the major structural components of a residential building.
3. State the major steps in the construction of a frame residence.
4. Explain common terms used in residential construction.
5. Describe how cable is run within a building.
6. Select the appropriate drill bits and bore openings in lumber and masonry.
7. Cut plywood with a jig saw or reciprocating saw.
8. Select and install appropriate fasteners and anchors in the following:
 - Wood
 - Masonry
 - Drywall

Performance Tasks

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

1. Select the appropriate drill bits and bore openings in lumber and masonry.
2. Cut plywood with a jig saw or reciprocating saw.
3. Select and install appropriate fasteners and anchors in the following:
 - Wood
 - Masonry
 - Drywall

Materials and Equipment

Pencils and scratch paper
Whiteboard/chalkboard
Markers/chalk
Weatherization Technician Level 1
PowerPoint® Presentation Slides
(ISBN 978-0-13-256981-1)
Multimedia projector and screen
Desktop or laptop computer
Appropriate personal protective equipment
Rulers or measuring tape

Samples of typical construction materials:
Dimension lumber
Plywood and building boards
Engineered wood products
Concrete blocks
Building brick
Components of a wood framing system or an
illustration of a framing system
Operator's manuals for selected power tools
Power screwdriver
Drill
Selection of drill bits and hole saws

(continued)

- | | |
|--|-----------------------------|
| Jig saw and blades | Screws |
| Reciprocating saw and blades | Hollow-wall anchors |
| Power cutout tool | Tie wraps |
| Circle cutter | Cable clips |
| Scrap pieces of lumber, gypsum wallboard, and plywood for drilling and cutting | Rivet gun and rivets |
| Hammers | Nail bar |
| Selection of fasteners: | Stud finder |
| Nails | Module Examinations* |
| | Performance Profile Sheets* |

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires the trainees to use power tools for cutting and drilling. Brief trainees on shop safety procedures and point out fire extinguishers, first aid stations, and other emergency equipment. Review basic electrical safety and power tool safety. Emphasize the use of personal protective equipment. This module may require that the trainees visit job sites. Ensure that trainees are briefed on job-site safety policies prior to any site visits.

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.

Informational Transport Systems Installation Methods Manual (ITSIMM), 5th ed. Tampa, FL: BICSI.

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 12½ hours are suggested to cover *Wood and Masonry Construction Methods*. 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; Building Materials	
A. Introduction	_____
B. Building Materials	_____
1. Gypsum Board	_____
2. Masonry Materials	_____
Session II. Wood Frame Construction	
A. Sills	_____
B. Floor Construction	_____
C. Wall Construction	_____
D. Ceiling Construction	_____
E. Roof Construction	_____
F. Plank-and-Beam Framing	_____
G. Wall Framing in Masonry	_____
H. Walls Separating Occupancies	_____

Session III. Fasteners and Anchors

- A. Screws
- B. Nonthreaded Fasteners
- C. Screw Anchors
- D. Hollow-Wall Anchors

Session IV. Tools

- A. Guidelines for Using All Power Tools
- B. Drilling Tools
- C. Cutting Tools
- D. Stud Finders

Session V. Laboratories; Review and Testing

- A. Laboratory
Have trainees practice selecting the correct drill bits and boring openings in lumber and masonry. This laboratory corresponds to Performance Task 1.
- B. Laboratory
Have trainees practice cutting plywood with a jig saw or reciprocating saw. This laboratory corresponds to Performance Task 2.
- C. Laboratory
Have trainees practice installing fasteners and anchors in wood, masonry, and drywall. This laboratory corresponds to Performance Task 3.
- D. Module Review
- E. Module Examination
 - 1. Trainees must score 70 percent or higher to receive recognition from NCCER.
 - 2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
- F. 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 Training Report Form 200, and submit the results to the Training Program Sponsor.

Module Overview

This module explains how to seal the envelope of a home to prevent air from entering and leaving the home, and how to add insulation to reduce heat loss and heat gain. Sealing the building envelope and adding insulation results in a more comfortable home that uses less energy for heating and cooling.

Prerequisites

Before you begin this module, it is recommended that you successfully complete *Fundamentals of Weatherization* and *Weatherization Technician Level One*, Modules 33102-10 and 27203-07.

Objectives

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

1. Identify and select the caulking and insulating materials needed for specific applications.
2. Describe and demonstrate how to reduce air infiltration by application of caulks and other materials.
3. Describe and demonstrate how to correct heat losses and heat gains by applying insulation materials to uninsulated areas of the building envelope such as finished exterior walls.
4. Describe the tools and materials used to patch drywall.
5. Describe and demonstrate how to install weatherstripping around exterior doors.

Performance Tasks

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

1. Select and apply caulks and other sealants to correct air infiltration.
2. Select and apply insulation to correct heat loss and/or heat gain in the building envelope.
3. Install weatherstripping around exterior doors.
4. Install drywall patches.

Materials and Equipment

Markers/chalk	Utility knife
Pencils and scratch paper	Putty knife
Whiteboard/chalkboard	Replacement glass
<i>Weatherization Technician Level 1</i>	Glazier's points
PowerPoint® Presentation Slides (ISBN 978-0-13-256981-1)	Glazier's putty
Multimedia projector and screen	Voltage detector
Desktop or laptop computer	Assorted screwdrivers
Appropriate personal protective equipment	Foam gaskets for electrical outlets
Rigid foam board insulation	Drywall
Flexible insulation	Drywall tape
Spray foam insulation	Drywall joint knife
Loose-fill insulation	Drywall compound
Loose-fill insulation machine	Drywall screws
Assorted caulks, sealants, and weatherstripping	Furring strips
Caulking gun	Module Exam*
Tape measure	Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees may be exposed to hazardous materials and may be required to work with certain materials such as insulation and/or sealants that require special protective equipment. Make sure that all trainees are briefed on appropriate 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.

Insulate and Weatherize, Latest Edition. Newtown, CT: Taunton Press.

Thermal Insulation Building Guide, Latest Edition. Malabar, FL: Krieger Publishing Co.

Weatherization Standards and Field Guide for Pennsylvania, Latest Edition. Helena, MT: Saturn Resource Management.

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 25 hours are suggested to cover *Sealing the Building Envelope*. 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; Safety; Finding Air Leaks and Inadequate Insulation	
A. Introduction	_____
B. Safety	_____
C. Finding Air Leaks and Inadequate Insulation	_____
Session II. Materials Used to Seal the Building Envelope	
A. Types of Insulation	_____
1. Flexible Insulation	_____
2. Rigid Foam Board	_____
3. Loose-Fill Insulation	_____
4. Spray-in-Place Insulation	_____
5. Spray Foam Insulation	_____
B. Caulks and Sealants	_____
C. Weatherstripping	_____
D. Vapor Barriers	_____
Sessions III-IV. Sealing the Building Envelope, Part One	
A. Sealing the Basement or Crawlspace	_____
1. Sealing Register Boots	_____
B. Sealing Exterior Walls, Doors, and Windows	_____
1. Sealing Cracks Around Door and Window Frames	_____
2. Sealing Loose-Fitting Windows and Doors	_____
3. Repairing Broken Windows	_____
4. Sealing Electrical Outlets and Light Switches	_____
5. Insulating Exterior Walls	_____

Module Overview

This module explains how to insulate water pipes, forced-air ducts, and water heaters as part of a home weatherization. The emphasis is on how adding insulation to these components reduces heat loss and heat gain and results in a home that uses less energy.

Prerequisites

Before you begin this module, it is recommended that you successfully complete *Fundamentals of Weatherization* and *Weatherization Technician Level One*, Modules 33102-10, 27203-07, and 59102-10.

Objectives

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

1. Describe the various ways that energy can be lost in a home.
2. Describe how to insulate water pipes to reduce heat loss.
3. Describe how to insulate a water heater to reduce heat loss.
4. Describe how to make simple duct repairs.
5. Describe how to seal air leaks in a duct system.
6. Describe how to insulate sheet metal ducts to reduce heat loss.

Performance Tasks

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

1. Insulate hot and cold water pipes.
2. Install an insulating blanket around a gas and/or electric water heater.
3. Repair simple damage to an air duct system.
4. Seal air leaks in an air duct system.

Materials and Equipment

Markers/chalk	Rigid fiberglass pipe insulation
Pencils and scratch paper	Water heater insulation kit
Whiteboard/chalkboard	Round sheet metal duct section
<i>Weatherization Technician Level 1</i>	Fiberglass ductboard section
PowerPoint® Presentation Slides (ISBN 978-0-13-256981-1)	Flexible, insulated duct section
Multimedia projector and screen	Sheet metal screws
Desktop or laptop computer	Assorted screwdrivers
Appropriate personal protective equipment	Metal straps
Tape measure	Mastic duct sealant
Utility knife	Paint brushes
Straightedge	Fiberglass mesh tape
Rolled fiberglass pipe wrap	Fiberglass duct wrap
Vapor barrier wrap	Staple gun and staples
Scissors	UL181 tape
Cord or string	12-gauge solid wire
Foam pipe wraps	Module Exam*
	Performance Profile Sheets*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees may be exposed to hazardous materials and may be required to work with certain materials such as insulation and/or sealants that require special protective equipment. Make sure that all trainees are briefed on appropriate 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.

Residential Energy: Cost Savings and Comfort for Existing Buildings, 5th Edition. Upper River, NJ: Prentice Hall.

Saturn Energy Auditor Field Guide, Latest Edition. Upper Saddle River, NJ: Prentice Hall.

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 10 hours are suggested to cover *Insulating Pipes, Ducts, and Water Heaters*. 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; Safety; Insulating Water Pipes	
A. Introduction	_____
B. Safety	_____
C. Insulating Water Pipes	_____
1. Fiberglass Wraps	_____
2. Foam Wraps	_____
3. Pipe Insulating Materials for Hydronic Heating Systems	_____
4. Installing Rigid Fiberglass Pipe Insulation	_____
5. Freeze Protection	_____
D. Laboratory	_____
Have trainees insulate water pipes. This laboratory corresponds to Performance Task 1.	
Session II. Insulating Water Heaters	
A. Insulating Water Heaters	_____
1. Water Heater Insulating Materials	_____
2. Insulating Electric Water Heaters	_____
3. Insulating Gas Water Heaters	_____
B. Laboratory	_____
Have trainees install an insulating blanket around a water heater. This laboratory corresponds to Performance Task 2.	

