This course map shows all of the modules in Weatherization Crew Chief Level Two. The suggested training order begins at the bottom and proceeds up. Skill levels increase as you advance on the course map. The local Training Program Sponsor may adjust the training order.
Module Overview

This module presents information on the materials and techniques used to construct commercial buildings. It covers fasteners, anchors, and tools used to run cable in concrete and steel structures. Fire- and sound-rated walls and suspended ceilings are also discussed.

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.

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 commercial building materials.
2. Describe the common methods of commercial construction.
3. Explain common terms used in commercial construction.
4. Identify various types of suspended ceilings.
5. Identify the tools used to make openings in concrete and steel.
6. Select the appropriate drill bits and bore openings in concrete and steel.
7. Select and install appropriate fasteners and anchors in the following:
   - Concrete
   - Steel

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 concrete and steel.
2. Select and install appropriate fasteners and anchors in the following:
   - Concrete
   - Steel

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Samples of the following construction materials:
  - Metal studs
  - Mechanical firestop devices
  - Firestopping materials
  - Operator’s manuals for selected power tools
  - Torque wrench
  - Drill
  - Rotary hammer
  - Selection of concrete drill bits
  - Selection of concrete fasteners
  - Selection of screws, nuts, and washers
  - 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 that trainees use power tools for cutting and drilling. Brief all trainees on shop safety procedures and point out the location of 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 site safety policies prior to any site visits.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


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 Concrete and Steel 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.

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<th>Topic</th>
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<td>1. Concrete</td>
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<td>2. Metal</td>
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<td>Session II. Commercial Construction Methods; Fire-Rated and Sound-Rated Walls</td>
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<td>A. Commercial Construction Methods</td>
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<td>1. Floors</td>
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<td>2. Exterior Walls</td>
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<td>3. Interior Walls and Partitions</td>
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<td>4. Roof Structure</td>
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<td>5. Ceilings</td>
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<td>B. Fire-Rated and Sound-Rated Walls</td>
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<tr>
<td>1. Fire-Rated Construction</td>
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<td>2. Sound-Isolation Construction</td>
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</tbody>
</table>
Session III. Fasteners and Anchors; Special Tools
   A. Fasteners and Anchors
      1. Threaded Fasteners
      2. Bolts and Screws
      3. Nuts and Washers
      4. Installing Fasteners
      5. Eye Bolts
      6. Hammer-Driven Pins and Studs
      7. Mechanical and Self-Drilling Anchors
      8. Guidelines for Drilling Anchor Holes in Hardened Concrete and Masonry
      9. Epoxy Anchoring Systems
   B. Special Tools
      1. Hammer Drills and Rotary Hammers
      2. Core Drills
      3. Metal Stud Punches
      4. Powder-Actuated Tools and Fasteners

Session IV. Laboratories
   A. Laboratory
      Have trainees practice selecting the appropriate drill bits and boring openings
      in concrete and steel. This laboratory corresponds to Performance Task 1.
   B. Laboratory
      Have trainees practice selecting and installing appropriate fasteners and anchors
      in concrete and steel. This laboratory corresponds to Performance Task 2.

Session V. Project Schedules; Review and Testing
   A. Project Schedules
   B. Module Review
   C. 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.
   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 Training Report Form 200, and submit the results
         to the Training Program Sponsor.
Module Overview

This module describes the types and uses of drawings prepared for commercial structures. It provides information about the format and content of commercial drawings and their use in conveying specific construction requirements. It describes the standard format for specifications.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Module 33103-10.

Objectives

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

1. Recognize the difference between commercial and residential construction drawings.
2. Identify the basic keys, abbreviations, and other references contained in a set of commercial drawings.
3. Accurately read a set of commercial drawings.
4. Identify and document specific items from a door and window schedule.
5. Explain basic construction details and concepts employed in commercial construction.
6. Calculate the floor area of each room in a floor plan.

Performance Tasks

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

1. Locate 10 items contained in a set of commercial drawings. (The instructor will select the 10 items.)
2. Using a door and window schedule, identify the hardware, ratings, and finishing for each door and window.
3. Calculate the floor area in a floor plan.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Set of commercial drawings
- Set of residential drawings
- Quick Quizzes*
- Module Examination**
- Performance Profile Sheet**

* 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. Emphasize basic site safety. This module may require trainees to visit job sites. Make sure that all trainees are briefed on site safety procedures.
Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


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 *Commercial Drawings*. 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.

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<tr>
<th>Topic</th>
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<td>A. Introduction</td>
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<td>B. Requirements for Commercial Plans</td>
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<td><strong>Sessions II-IV. Reading and Understanding Drawings I</strong></td>
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<td>A. Architectural Drawings</td>
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<td>B. Laboratory</td>
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<tr>
<td>Have trainees practice calculating the area of each room in a floor plan in a set of commercial drawings. This laboratory corresponds to Performance Task 3.</td>
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<tr>
<td>C. Schedules</td>
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<td>D. Laboratory</td>
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<tr>
<td>Have trainees practice using a door and window schedule. This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td><strong>Sessions V and VI. Reading and Understanding Drawings II</strong></td>
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<td>A. Structural Drawings</td>
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<td><strong>Sessions VII and VIII. Reading and Understanding Drawings III</strong></td>
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<td>A. Mechanical Drawings</td>
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<tr>
<td>B. Electrical Drawings</td>
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<tr>
<td>C. Laboratory</td>
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<tr>
<td>Have trainees practice identifying and documenting the design and location of ten items contained in a set of commercial drawings. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td><strong>Session IX. Understanding Written Specifications</strong></td>
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<tr>
<td>A. Written Specifications</td>
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</table>
Session X. 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 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 many of the skills needed to become a supervisor. Issues covered include those related to leadership, gender and culture, problem solving/decision making, and safety.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Modules 33103-10 and 27201-07.

Objectives

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

1. Describe the skills necessary to be a supervisor.
2. List the characteristics and behavior of effective leaders, as well as the different leadership styles.
3. Explain the difference between problem solving and decision making.
4. Describe ways to deal with common leadership problems, such as absenteeism and turnover.
5. Identify a supervisor’s safety responsibilities.
6. Describe the signals of substance abuse.
7. List the essential parts of an accident investigation.

Performance Tasks

This is a knowledge-based module; there are no performance tasks.

Materials and Equipment

Multimedia projector and screen
Computer

Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Module Examinations*

* 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.
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 *Introduction to Supervisory Skills*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

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<th>Topic</th>
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<td>A. Introduction to Supervision</td>
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<td>B. Becoming a Leader</td>
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<tr>
<td>1. Characteristics of Effective Leaders</td>
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<td>2. Leadership Behavior</td>
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<td>3. Functions of a Leader</td>
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<td>4. Leadership Styles</td>
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<td>5. Ethics in Leadership</td>
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<td><strong>Session II. Gender and Cultural Issues</strong></td>
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<td>A. Communication Styles of Men and Women</td>
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<td>B. Language Barriers</td>
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<td>C. Cultural Differences</td>
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<td>D. Sexual Harassment</td>
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<td>E. Gender and Minority Discrimination</td>
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<td><strong>Session III. Problem Solving and Decision Making</strong></td>
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<td>A. Types of Decisions</td>
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<td>B. Formal Problem-Solving Techniques</td>
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<td>C. Dealing with Leadership Problems</td>
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<td><strong>Session IV. Supervisors and Safety; Supervisor Involvement in Safety</strong></td>
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<tr>
<td>A. Supervisors and Safety</td>
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<td>1. Safety Responsibilities, Programs, and Policies/Procedures</td>
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<tr>
<td>2. Hazard Identification and Safety Training</td>
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<tr>
<td>B. Supervisor Involvement in Safety</td>
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<tr>
<td>1. Safety Meetings and Inspections</td>
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<td>2. Substance Abuse</td>
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<td>3. Accident Investigation</td>
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<tr>
<td><strong>Session V. Review and Testing</strong></td>
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<tr>
<td>A. Review</td>
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<td>B. Module Examination</td>
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<tr>
<td>1. Trainees must score 70 percent or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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Module Overview

This module covers the basic principles of heat transfer, refrigeration, and pressure-temperature relationships and describes the components and accessories used in air conditioned systems.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Module 33103-10, 27201-07, and 03410-09.

Objectives

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

1. Explain how heat transfer occurs in a cooling system, demonstrating an understanding of the terms and concepts used in the refrigeration cycle.
2. Calculate the temperature and pressure relationships at key points in the refrigeration cycle.
3. Under supervision, use temperature- and pressure-measuring instruments to make readings at key points in the refrigeration cycle.
4. Identify commonly used refrigerants and demonstrate the proper procedures for handling these refrigerants.
5. Identify the major components of a cooling system and explain how each type works.
6. Identify the major accessories available for cooling systems and explain how each works.
7. Identify the control devices used in cooling systems and explain how each works.
8. State the correct methods to be used when piping a refrigeration system.

Performance Tasks

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

1. Measure temperatures in an operating air conditioning system.
2. Use cylinder color codes to identify refrigerants.
3. Identify compressors, condensers, evaporators, metering devices, controls, and accessories.
4. Use service valves to gain access to an air conditioning system in order to measure pressures using a gauge manifold set.

Materials and Equipment

Multimedia projector and screen
Weatherization Crew Chief Level Two PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Barometers
Temperature-pressure charts
Various types of thermometers, including infrared

Material Safety Data Sheets for refrigerants
One or more operating refrigeration and/or air conditioning systems
Compressors
Condensers
Evaporators
Gauge manifold sets
Metering devices
Service valves
Refrigerant cylinders
Accessories
Primary controls

continued
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 on equipment that is operating and to operate testing equipment. Ensure that they are briefed on shop safety procedures and emphasize electrical safety precautions.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


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 2 1/2 hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 30 hours are suggested to cover Introduction to Cooling. 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.

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<td>C. Heat Transfer</td>
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<td>D. Pressure</td>
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<td>E. Instruments Used to Measure Temperature and Pressure</td>
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<td>F. Laboratory</td>
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<tr>
<td>Have trainees practice measuring temperatures in an operating air conditioning system. This laboratory corresponds to Performance Task 1.</td>
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<td>Session III. Mechanical Refrigeration System</td>
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<td>B. Refrigeration Cycle</td>
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Session IV. Refrigerants
   A. Trade Names
   B. Ammonia
   C. Fluorocarbon Refrigerants
   D. Refrigerant Containers
   E. Identifying Refrigerants
   F. Laboratory
      Have trainees practice identifying refrigerants. This laboratory corresponds to Performance Task 2.
   G. Refrigerant Safety Precautions

Session V. Compressors
   A. Reciprocating Compressors
   B. Rotary Compressors
   C. Scroll Compressors
   D. Screw Compressors
   E. Centrifugal Compressors

Session VI. Condensers
   A. Air-Cooled Condensers
   B. Water-Cooled Condensers
   C. Evaporative Condensers

Session VII. Evaporators
   A. Direct Expansion (DX) Evaporators
   B. Flooded Evaporators
   C. Evaporator Construction

Session VIII. Expansion (Metering) Devices
   A. Fixed Metering Devices
   B. Adjustable Metering Devices

Session IX. Other Components
   A. Filter-Drier
   B. Sight-Glass Moisture Liquid Indicator
   C. Suction Line Accumulator
   D. Crankcase Heater
   E. Oil Separator
   F. Heat Exchanger
   G. Receiver
   H. Service Valves
   I. Laboratory
      Trainees practice using service valves to gain access to air conditioning systems to measure pressure. This laboratory corresponds to Performance Task 4.
   J. Compressor Muffler

Session X. Controls
   A. Primary Controls
   B. Secondary Controls
Session XI. Piping

A. Basic Principles
B. Suction Line
C. Hot Gas Line
D. Liquid Line Layout
E. Pipe Supports
F. Insulation
G. Laboratory

Have trainees practice identifying air conditioning components.
This laboratory corresponds to Performance Task 3.

Session XII. Review and Testing

A. Module Review
B. Module Examination

1. Trainees must score 70% 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. Classroom
Module Overview

This module covers heating fundamentals, types and designs of furnaces and their components, and basic procedures for installing and servicing furnaces.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Modules 33103-10, 27201-07, 03410-09, and 03107-07.

Objectives

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

1. Explain the three methods by which heat is transferred and give an example of each.
2. Describe how combustion occurs and identify the byproducts of combustion.
3. Identify various types of fuels used in heating.
4. Identify the major components and accessories of an induced draft and condensing gas furnace and explain the function of each component.
5. State the factors that must be considered when installing a furnace.
6. Identify the major components of a gas furnace and describe how each works.
7. With supervision, use a manometer to measure and adjust manifold pressure on a gas furnace.
8. Identify the major components of an oil furnace and describe how each works.
9. Describe how an electric furnace works.
10. With supervision, perform basic furnace preventive maintenance procedures such as cleaning and filter replacement.

Performance Tasks

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

1. Identify the components of an induced draft and condensing gas furnace and state their purpose.
2. With supervision, turn on and check a gas furnace.
3. Identify symptoms of combustion problems in a gas furnace and adjust the manifold pressure.
4. With supervision, perform preventive maintenance procedures on a gas furnace, including filter replacement, cleaning of components, and temperature measurements.
5. Identify the components of an oil furnace and state their purpose.
6. With supervision, turn on and check an oil furnace.
7. With supervision, perform preventive maintenance procedures on an oil furnace, including filter replacement, cleaning of components, and temperature measurements.

Materials and Equipment

| Multimedia projector and screen |
| Weatherization Crew Chief Level Two PowerPoint® Presentation Slides |
| Computer |
| Whiteboard/chalkboard |
| Markers/chalk |
| Pencils and scratch paper |
| Appropriate personal protective equipment |
| GAMA venting tables |
| Copper pipe and light plastic bags for heat transfer experiments |
| Hair dryer for heat transfer experiments |
| Thermometers or temperature probes |
| Operating gas-fired furnace |
| Operating oil-fired furnace |
| Pressure-type oil burner |
| Gas manifold |
| Drill and brush |
| Manometer |
| Various grades of oil |
| Manufacturer’s literature on various types of forced-air furnaces |
| Manufacturer’s literature on multi-poise furnaces |

(continued)
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 on equipment that is operating and to operate testing equipment. Ensure that they are briefed on shop safety procedures and emphasize electrical safety precautions.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


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 2 1/2 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 *Introduction to Heating*. 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.

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<td>A. Introduction</td>
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<td>B. Heat Transfer</td>
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<td>C. Temperature and Heat Measurement</td>
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<td>D. Combustion</td>
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<td><strong>Session II. Forced-Air Furnaces</strong></td>
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<td>A. Types</td>
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<td>B. Heat Exchangers</td>
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<td>C. Condensing Furnaces</td>
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<td>D. Fans, Motors, Air Filters, and Blowers</td>
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<tr>
<td>E. Humidifiers</td>
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<tr>
<td>F. Installation</td>
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<tr>
<td>G. Laboratory</td>
<td>Have trainees practice identifying the components of an induced draft and condensing gas furnace and state their purpose. This laboratory corresponds to Performance Task 1.</td>
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</tbody>
</table>
Session III. Gas Furnaces
A. Flame Ignition
B. Laboratory
   Have trainees practice turning on and checking a gas furnace. This laboratory corresponds to Performance Task 2.
C. Gas Valve Assembly
D. Components
E. Safety Switches
F. Maintenance
G. Laboratory
   Have trainees practice performing preventive maintenance procedures on a gas furnace. This laboratory corresponds to Performance Task 4.
H. Manifold Pressure
I. Laboratory
   Have trainees practice identifying symptoms of combustion problems in a gas furnace and adjusting the manifold pressure. This laboratory corresponds to Performance Task 3.

Session IV. Oil Furnaces
A. Oil Burner Operation
B. Laboratory
   Have trainees practice turning on and checking an oil furnace. This laboratory corresponds to Performance Task 6.
C. Combustion Chamber
D. Regulators and Safety Controls
E. Oil Storage
F. Laboratory
   Have trainees practice identifying the components of an oil furnace. This laboratory corresponds to Performance Task 5.
G. Maintenance
H. Laboratory
   Have trainees practice performing preventive maintenance procedures on an oil furnace. This laboratory corresponds to Performance Task 7.

Session V. Electric Heating
A. Heating Elements
B. Components
C. Power Supply
D. Hydronic Heating Systems
E. Summary

Session VI. 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 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 covers proper venting of fossil-fuel furnaces and the procedures for selecting and installing vents in all types of gas furnaces.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Modules 33103-10, 27201-07, 03410-09, 03107-07, and 03108-07.

Objectives

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

1. Describe the principles of combustion and explain complete and incomplete combustion.
2. Describe the content of flue gas and explain how it is vented.
3. Identify the components of a furnace vent system.
4. Describe how to select and install a vent system.
5. Perform the adjustments necessary to achieve proper combustion in a gas furnace.
6. Describe the techniques for venting different types of furnaces.
7. Explain the various draft control devices used with natural-draft furnaces.
8. Calculate the size of a vent required for a given application.

Performance Tasks

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

1. Measure supply and return temperature and determine the temperature rise of a furnace.
2. Adjust a thermostat heat anticipator.
3. Calculate the correct size and type of PVC pipe using manufacturer’s instructions or National Fuel Gas Code or American Gas Association specifications.
4. Calculate the correct size and type of furnace vent connector and metal vent using manufacturer’s instructions or National Fuel Gas Code or American Gas Association specifications.

Materials and Equipment

Multimedia projector and screen
Weatherization Crew Chief Level Two PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Copy of latest edition of the National Fuel Gas Code or American Gas Association specifications
Various vent manufacturers’ product data and catalogs
Videotape (optional) Principles of Gas Combustion
Videotape (optional) Ventinox Chimney Solution
TV/VCR/DVD player
Thermometer
Selection of vent piping:
Double wall (Types B, L, and B-W)
Single wall
Schedule 40 PVC
High-temperature plastic
PVC and metal tubes
Smoke source
Flame source
Concentric vent termination
Temperature probes
Operating gas-fired furnace
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located in 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. The module requires that trainees work with operating gas-fired furnaces. Ensure that all trainees are briefed on fire safety procedures.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


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 2 1/2 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 Chimneys, Vents, and Flues. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction to Chimneys and Venting Requirements</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Combustion</td>
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<tr>
<td>C. Flue Gases</td>
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<tr>
<td>D. Furnace Venting</td>
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<tr>
<td>E. Vent System Components</td>
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<tr>
<td>F. Natural-Draft Furnaces</td>
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<tr>
<td>G. Induced-Draft Furnaces</td>
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<tr>
<td>H. Laboratory</td>
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</tr>
<tr>
<td>Have trainees practice measuring the temperature and determining the temperature rise. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>I. Laboratory</td>
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<tr>
<td>Have trainees practice adjusting the thermostat anticipator. This laboratory corresponds to Performance Task 2.</td>
<td></td>
</tr>
</tbody>
</table>
Session II. Vent Calculations; Review and Testing

A. Venting Considerations

B. Laboratory
   Have trainees practice calculating the correct size and type of vent connector and metal vent. This laboratory corresponds to Performance Task 4.

C. Condensing Gas Furnaces

D. Laboratory
   Have trainees practice calculating the correct size and type of PVC pipe. This laboratory corresponds to Performance Task 3.

E. Draft Controls

F. Review

G. 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.

H. 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 describes air distribution systems and their components, air flow measurement, duct work installation principles, and the use of instruments for measuring temperature, humidity, pressure, and velocity.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed *Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two*, Modules 33103-10, 27201-07, 03410-09, 03107-07, 03108-07, and 03202-07.

Objectives

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

1. Describe the airflow and pressures in a basic forced-air distribution system.
2. Explain the differences between propeller and centrifugal fans and blowers.
3. Identify the various types of duct systems and explain why and where each type is used.
4. Demonstrate or explain the installation of metal, fiberboard, and flexible duct.
5. Demonstrate or explain the installation of fittings and transitions used in duct systems.
6. Demonstrate or explain the use and installation of diffusers, registers, and grilles used in duct systems.
7. Demonstrate or explain the use and installation of dampers used in duct systems.
8. Demonstrate or explain the use and installation of insulation and vapor barriers used in duct systems.
9. Identify instruments used to make measurements in air systems and explain the use of each instrument.
10. Make basic temperature, air pressure, and velocity measurements in an air distribution system.

Performance Tasks

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

1. Use a tachometer to measure blower motor rpm.
2. Read and interpret equivalent length charts and required air volume/duct size charts.
3. Assemble duct and fittings.
4. Assemble flexible duct.
5. Install insulation and vapor barriers on metal ducts.
6. Use a manometer to measure static pressure in a duct system.
7. Use a velometer to measure the velocity of airflow at the output of air system supply diffusers and registers.

Materials and Equipment

<table>
<thead>
<tr>
<th>Multimedia projector and screen</th>
<th>Various examples of blowers and fans</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Weatherization Crew Chief Level Two</em> PowerPoint® Presentation Slides</td>
<td>Manufacturer’s literature on various types of blowers and fans</td>
</tr>
<tr>
<td>Computer</td>
<td>Various examples of diffusers, registers, and grilles</td>
</tr>
<tr>
<td>Whiteboard/chalkboard</td>
<td>Manufacturer’s literature on various types of diffusers, registers, and grilles</td>
</tr>
<tr>
<td>Markers/chalk</td>
<td>Metal duct sections of various sizes and types</td>
</tr>
<tr>
<td>Pencils and scratch paper</td>
<td>Metal duct installation fasteners and attaching hardware</td>
</tr>
<tr>
<td>Appropriate personal protective equipment</td>
<td></td>
</tr>
<tr>
<td>Operating air distribution duct system</td>
<td></td>
</tr>
</tbody>
</table>
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 on equipment that is operating and to operate testing equipment. Ensure that they are briefed on shop safety procedures and emphasize electrical safety precautions.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


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 *Air Distribution Systems*. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction to Air Distribution Systems</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Air Distribution Systems</td>
<td></td>
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<tr>
<td>C. Fans and Blowers</td>
<td></td>
</tr>
<tr>
<td>D. Laboratory</td>
<td></td>
</tr>
<tr>
<td>Have trainees practice using a tachometer to measure blower rpm.</td>
<td></td>
</tr>
<tr>
<td>This laboratory corresponds to Performance Task 1.</td>
<td></td>
</tr>
</tbody>
</table>

* 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.
Session II. Duct Systems
A. Duct Systems Used in Cold Climates
B. Duct Systems Used in Warm Climates
C. Duct System Components
D. Duct Hangers and Supports
E. Laboratory
   Have trainees practice reading and interpreting equivalent length charts.
   This laboratory corresponds to Performance Task 2.
F. Laboratory
   Have trainees practice installing various types of ductwork, including
   installation of insulation and vapor barriers. This laboratory corresponds to
   Performance Tasks 3 through 5.

Session III. Instruments and Measurements
A. Temperature and Humidity Measurements
B. Air Distribution System Measurements
C. Laboratory
   Have trainees practice using a manometer. This laboratory corresponds to
   Performance Task 6.
D. Air Velocity Measurements
E. Laboratory
   Have trainees practice using a velometer. This laboratory corresponds to
   Performance Task 7.
F. Summary

Session IV. 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 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 covers common accessories used to control air quality, including dehumidifiers, humidifiers, and filters. It also covers energy conservation equipment.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Modules 33103-10, 27201-07, 03410-09, 03107-07, 03108-07, 03202-07, and 03109-07.

Objectives

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

1. Explain why it is important to control humidity in a building.
2. Recognize the various kinds of humidifiers used with HVAC systems and explain why each is used.
3. Demonstrate how to install and service the humidifiers used in HVAC systems.
4. Recognize the kinds of air filters used with HVAC systems and explain why each is used.
5. Demonstrate how to install and service the filters used in HVAC systems.
6. Use a manometer or differential pressure gauge to measure the friction loss of an air filter.
7. Identify accessories commonly used with air conditioning systems to improve indoor air quality and reduce energy cost, and explain the function of each, including:
   • Humidity control devices
   • Air filtration devices
   • Energy conservation devices
8. Demonstrate or describe how to clean an electronic air cleaner.

Performance Tasks

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

1. Demonstrate how to inspect, clean, and replace humidifiers.
2. Inspect disposable/permanent air filters for mechanical damage and cleanliness.
3. Clean permanent-type air filters.
4. Measure the differential pressure drop across an air filter with a manometer.

Materials and Equipment

Multimedia projector and screen
Weatherization Crew Chief Level Two
   PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Humidifiers
Disposable air filters
Electronic air cleaner

Various types of air filters
Tools for removing and cleaning air filters
Manometer
Operating air filtration system
Manufacturers’ literature on energy and heat recovery ventilators
Ultraviolet light purification system
Carbon monoxide and carbon dioxide monitors
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

* Located in 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. The module requires that trainees work with air filters and testing equipment. Ensure that all trainees are briefed on appropriate safety procedures.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


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 Air Quality Equipment. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction; Humidity Control; Indoor Air Quality</strong></td>
<td></td>
</tr>
<tr>
<td>A. Introduction</td>
<td></td>
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<tr>
<td>B. Process and Comfort Air Conditioning</td>
<td></td>
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<tr>
<td>C. Humidity Control</td>
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<tr>
<td>D. Laboratory</td>
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</tr>
<tr>
<td>Have trainees practice inspecting, cleaning, and replacing humidifiers. This laboratory corresponds to Performance Task 1.</td>
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<tr>
<td>E. Mechanical Air Filters</td>
<td></td>
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<tr>
<td>F. Laboratory</td>
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<tr>
<td>Have trainees practice inspecting disposable/permanent air filters. This laboratory corresponds to Performance Task 2.</td>
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<tr>
<td>G. Laboratory</td>
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<tr>
<td>Have trainees practice cleaning permanent air filters. This laboratory corresponds to Performance Task 3.</td>
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</tr>
</tbody>
</table>
Session II. Indoor Air Quality Part Two; Review and Testing

A. Laboratory
   Have trainees practice measuring the differential pressure drop across an air filter with a manometer. This laboratory corresponds to Performance Task 4.

B. Air Conditioning Energy Conservation Equipment

C. Ultraviolet Light Air Purification Systems

D. Carbon Monoxide and Carbon Dioxide Monitors

E. Review

F. Module Examination
   1. Trainees must score 70% 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.

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 Training Report Form 200, and submit the results to the Training Program Sponsor.
Indoor Air Quality
Annotated Instructor’s Guide

Module Overview

This module covers indoor air quality and its effect on the health and comfort of building occupants. It provides guidelines for performing a building IAQ survey and identifies the equipment and methods used to test and control indoor air quality.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Modules 33103-10, 27201-07, 03410-09, 03107-07, 03108-07, 03202-07, 03109-07, and 03204-07.

Objectives

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

1. Explain the need for good indoor air quality.
2. List the symptoms of poor indoor air quality.
3. Perform an inspection/evaluation of a building’s structure and equipment for potential causes of poor indoor air quality.
4. Identify the causes and corrective actions used to remedy common indoor air problems.
5. Identify the HVAC equipment and accessories that are used to sense, control, and/or enhance indoor air quality.
6. Use selected test instruments to measure or monitor the quality of indoor air.
7. Clean HVAC air system ductwork and components.

Performance Tasks

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

1. Use selected radon monitors and/or test kits.
2. Perform a building indoor air quality (IAQ) inspection/evaluation.
3. Make air measurements using each of the following:
   • Carbon dioxide (CO₂) detector/sensor
   • Carbon monoxide (CO) detector/sensor
   • Volatile organic compound (VOC) detector/sensor
   • Combustion analyzer
4. Use a manufacturer’s humidifier capacity chart to find the humidifier capacity needed for various building types and sizes.
5. Use a manufacturer’s portable dehumidifier capacity chart to find the dehumidifier capacity needed for various building types and sizes.
6. Clean and inspect ductwork using one or more approved methods:
   • Contact vacuum
   • Air washing
   • Power brushing

Materials and Equipment

Multimedia projector and screen
Weatherization Crew Chief Level Two PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Copy of ASHRAE Standard 62.1-2007, Ventilation for Acceptable Indoor Air Quality

continued
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Trainees will be required to use radon monitors and/or test kits, perform building IAQ inspection/evaluation, use gas detectors and combustion analyzers to make air measurements, and clean and inspect ductwork.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.

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 Indoor Air Quality. 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.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
<tr>
<td><strong>Session I. Introduction to Indoor Air Quality (IAQ)</strong></td>
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<tr>
<td>A. Introduction</td>
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<tr>
<td>B. Long-Term and Short-Term Effects of Poor IAQ</td>
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<tr>
<td>C. Good Indoor Air Quality</td>
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<tr>
<td>D. Sources of Building Contaminants</td>
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<tr>
<td>1. Building Construction</td>
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<td>2. Human Occupancy</td>
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<td>3. Building Materials and Furnishings</td>
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<tr>
<td>4. HVAC and Other Building Equipment</td>
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<tr>
<td>5. Cleaning Compounds and Pesticides</td>
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<tr>
<td>6. Contaminant Sources Located Outside the Building</td>
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<tr>
<td>E. Laboratory</td>
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<tr>
<td>Have trainees use selected radon monitors and/or test kits. This laboratory corresponds to Performance Task 1.</td>
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</tbody>
</table>

| Session II. Elements of a Building IAQ Inspection Survey | |
|---------------------------------------------------------|
| A. Elements of a Building IAQ Inspection Survey | |
| 1. Problem Description | |
| 2. Site Visit and Building Walk-Through | |
| 3. Building HVAC Equipment and Ventilation System Inspection | |
| 4. Air Sampling and Testing for Specific Contaminants | |
| 5. Interpreting Test Results and Corrective Actions | |
| B. Laboratory | |
| Have trainees perform a building indoor air quality (IAQ) inspection/evaluation. This laboratory corresponds to Performance Task 2. | |

| Session III. Achieving Acceptable Indoor Air Quality; IAQ and Energy-Efficient Systems and Equipment | |
|--------------------------------------------------------------------------------------------------|
| A. Achieving Acceptable Indoor Air Quality | |
| 1. Initial Building Design | |
| 2. Ventilation Control | |
| 3. Thermal Comfort Control | |
| 4. Controlling Chemical Contaminants | |
| 5. Controlling Microbial Contaminants | |
| B. IAQ and Energy-Efficient Systems and Equipment | |
| 1. Automated Building Management Systems | |
| 2. Air Handling Units | |
| 3. Unit Ventilators | |
| 4. Air Filtration Equipment | |
| 5. Humidifiers and Dehumidifiers | |
| 6. Ozone Generators | |
| 7. Ultraviolet Light Air Purification Systems | |
C. Laboratory
Have trainees use manufacturers’ capacity charts to find the humidifier and
dehumidifier capacities needed for various building types and sizes. This
laboratory corresponds to Performance Tasks 4 and 5.

Session IV. Gas Detectors and Analyzers
A. Gas Detectors and Analyzers
   1. Carbon Dioxide Detectors
   2. Carbon Monoxide Detectors
   3. Volatile Organic Compound Sensors
   4. Other Gas Detectors/Analyzers
B. Laboratory
Have trainees make air measurements using selected detectors/sensors and
combustion analyzers. This laboratory corresponds to Performance Task 3.

Session V. Duct Cleaning
A. Duct Cleaning
   1. Duct Cleaning Equipment
   2. Duct Cleaning Methods
B. Laboratory
Trainees clean and inspect ductwork using one or more approved methods.
This laboratory corresponds to Performance Task 6.

Session VI. IAQ and Forced-Air Duct Systems; HVAC Contractor Liability;
Review and Testing
A. IAQ and Forced-Air Duct Systems
   1. Supply and Return Duct Leaks
   2. Sealing Air Duct Leaks
B. HVAC Contractor Liability
C. Review
D. Module Examination
   1. Trainees must score 70% 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.
E. 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 shows trainees how to perform the diagnostic tests that must be done on a home before and during the weatherization process. Diagnostic information is contained in the weatherization work order. During the weatherization, the crew chief may have to repeat diagnostic tests to pinpoint problem areas or to check on the effectiveness of the weatherization as it progresses. In addition to having the skills to perform diagnostic tests, the crew chief must also have the skills to supervise the work crew to ensure the work is done in a safe and efficient manner.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Fundamentals of Weatherization; Weatherization Technician Level One; and Weatherization Crew Chief Level Two, Modules 33103-10, 27201-07, 03410-09, 03107-07, 03108-07, 03202-07, 03109-07, 03204-07, and 03403-09.

Objectives

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

1. Interpret building audit reports.
2. Perform lead-safe work practices.
3. Perform the following diagnostic tests:
   - Blower door test
   - Pressure pan test
   - Burner efficiency test
   - Carbon monoxide (CO) test
   - Draft test
   - Spillage test
4. Prioritize, schedule, and demonstrate air sealing.
5. Perform quality inspections of completed weatherization work.

Performance Tasks

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

1. Demonstrate how to perform the following diagnostic tests:
   - Blower door test
   - Pressure pan test
   - Burner efficiency test
   - Carbon monoxide (CO) test
   - Draft test
   - Spillage test
2. Given a work order, instruct a crew on how to perform the required work.

Materials and Equipment

- Multimedia projector and screen
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Renovate Right pamphlets
- Blower door instruction manuals
- Blower door test apparatus with manometers
- Pressure pan accessory for blower door
- Combustion efficiency test kit
- Carbon monoxide (CO) tester
- Access to various appliances for testing

continued
Infrared camera  Assorted wrenches
Draft gauge  Assorted pliers
Nontoxic smoke generator  Step ladder
Blank weatherization work orders  Flashlight
Lead paint test kits  Inspection mirror
Portable electric drill  Trade Terms Quiz
Assorted drill bits  Module Examinations*
Assorted screwdrivers  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 such as lead paint that requires special protective equipment. Make sure that all trainees are briefed on appropriate safety procedures.

**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study.


**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 30 hours are suggested to cover *Diagnostics and Management Practices*. You will need to adjust the time required for 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.

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<th>Topic</th>
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<td><strong>Session I. Introduction; Safety</strong></td>
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<tr>
<td>A. Introduction</td>
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<td>B. Safety</td>
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<td>1. Lead-Safe Work Practices</td>
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<td>2. Other Hazardous Materials and Conditions</td>
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<td>A. Crew Chief Duties</td>
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<td>1. Review Building Audit Documents</td>
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<td>3. Work Crew Supervision</td>
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<td>4. Performing Diagnostic Tests</td>
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</table>
Sessions III-V. Combustion Safety Testing
  A. Combustion Safety Testing
     1. Carbon Monoxide (CO) Testing
     2. Checking Flue Gas Spillage, Vent Draft Pressure, and CO Levels in Natural-Draft Appliances
  B. Laboratory
     Have trainees perform burner efficiency tests, carbon monoxide tests, and draft and spillage tests. This laboratory corresponds to Performance Task 1.

Sessions VI-VII. Finding Building Air Leaks
  A. Finding Building Air Leaks
     1. Whole-House Blower Door Testing
  B. Laboratory
     Have trainees practice performing a whole-house blower door test to determine building tightness. This laboratory corresponds to Performance Task 1.

Sessions VIII-IX. Zone Leakage Tests
  A. Zone Leakage Tests
     1. Room Pressure Difference Tests
  B. Laboratory
     Have trainees practice using a blower door and/or thermal imaging camera to find air leaks in barriers and building cavities. This laboratory corresponds to Performance Task 1.

Session X. Zone Leakage Tests, Part Two
  A. Zone Leakage Tests
     1. Finding Leaks in Air Ducts
     2. Post-Weatherization Testing
  B. Laboratory
     Have trainees practice using a blower door pressure pan accessory to find leaks in air ducts. This laboratory corresponds to Performance Task 1.

Session XI. Post-Weatherization Activities
  A. Post-Weatherization Activities
     1. Inspection of the Work
     2. Job Site Cleanup
     3. Consulting the Homeowner/Tenant
     4. Preparing Forms and Reports
  B. Laboratory
     Using a given work order, have trainees practice instructing a crew on how to perform the required work. This laboratory corresponds to Performance Task 2.

Session XII. Review and Testing
  A. 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.