

# ATRF-2040: BUILT UP ROOFING II

## Cuyahoga Community College

**Viewing: ATRF-2040 : Built Up Roofing II**

**Board of Trustees:**

1/30/2025

**Academic Term:**

Spring 2025

**Subject Code**

ATRF - Applied Industrial Technology - Roofing

**Course Number:**

2040

**Title:**

Built Up Roofing II

**Catalog Description:**

Cover's insulation, felts, flashing components and details, surfacing of felts, and safe work practices for Built- Up Roofing systems. Includes preparation and installation procedures.

**Credit Hour(s):**

2

**Lecture Hour(s):**

2

## Requisites

**Prerequisite and Corequisite**

Departmental approval: admission to Roofer's apprenticeship program.

## Outcomes

**Course Outcome(s):**

Identify and describe various types of insulation materials, including both organic and inorganic options, and understand their applications in building systems

**Objective(s):**

1. Describe the different types of insulation
2. Explain what an R Value is
3. Explain the reasons for insulation in a roof system.
4. Discuss the advantages and disadvantages of different types of organic vs. inorganic insulation.
5. Identify the different types of organic and inorganic insulation.

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**Course Outcome(s):**

Install insulation for a Built-Up Roof in accordance with specifications.

**Objective(s):**

1. Describe the proper storage methods for insulation to protect from the weather.
  2. Discuss the importance of using a night seal (also called a seal-off or cut-off).
  3. Demonstrate how to measure, mark, and cut insulation for specified job.
  4. Demonstrate how to layout insulation in staggered patterns.
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**Course Outcome(s):**

Explain the necessity of tapered insulation in roofing systems and its role in proper drainage.

**Objective(s):**

1. Discuss the need for tapered insulation.
2. Identify the amount of taper on a specified piece of insulations based on the markings.
3. Explain the variations in R-value needed for the roof.
4. Discuss the process for developing and manufacturing the tapered insulation for the roof.

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**Course Outcome(s):**

Read and utilize a key plan to accurately verify the materials required for a built-up roof insulation installation.

**Objective(s):**

1. Identify the different parts of a key plan and specification sheet for tapered insulation for built-up roofs.
2. Read a key plan to identify the required materials for the insulation for a built-up roof.
3. Utilize key plan to verify materials needed for installation.
4. Verify the mechanical fasteners based on the key plan.
5. Explain the importance of using a night seal at the end of each workday.

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**Course Outcome(s):**

Utilize mechanical fasteners to install insulation for a built-up roof.

**Objective(s):**

1. Describe different types of fasteners used in roofing.
2. Operate a screw gun.
3. Recognize problems that could be caused by installed fasteners.
4. Identify the different features of fasteners.
5. Identify the different types of fasteners.
6. Identify the three main concerns that cause a fastener to fail.
7. Install fasteners according to the pattern in the job specifications.
8. Describe the different operating techniques of a screw gun.

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**Course Outcome(s):**

Explain the purpose roofing felts, identify different types and layers of roofing felts, and demonstrate proper handling, storage, and installation techniques for roofing materials.

**Objective(s):**

1. Explain why felts are used on a roof.
2. Describe the different types of felt and how they are used.
3. Demonstrate how to handle and store roofing materials properly.
4. Explain how felts are produced.
5. Identify and describe the different layers of built-up roofing.
6. Demonstrate how to unroll roofing felts.

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**Course Outcome(s):**

Explain how to plan and prepare a new installation and a re-roofing installation job, including delivery of materials, selecting storage areas, locating the kettle and hoists, and deciding where to start the job.

**Objective(s):**

1. Identify where materials should be delivered and located/stored.
2. Describe how to safely store the materials and protect them from the weather.

3. List the safety equipment that is needed to avoid hazards on the job.
4. Explain how materials will be lifted to the roof.

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**Course Outcome(s):**

Follow procedures for installing felt plies for a Built-up Roof.

**Objective(s):**

1. Describe what felt exposure you have with different plies.
2. Explain what lap lines and ply lines are.
3. Demonstrate how to start a roof at the roof edge.
4. Demonstrate how to end the plies either against a wall or roof edge.

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**Course Outcome(s):**

Follow procedures for laying and mopping the plies for a built-up roof.

**Objective(s):**

1. Demonstrate how to lay and mop the plies.
2. Explain mopping safety procedures and required personal protective equipment.
3. Evaluate the hazards of handling a mop in order to avoid personal injury.
4. Demonstrate a mopping pattern.
5. Demonstrate mopping the plies and laying the felt.
6. Discuss how to envelope a roof edge.

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**Course Outcome(s):**

Follow procedures for applying surfacings, sealants, and coatings.

**Objective(s):**

1. Explain the difference between surfacings, sealants, and coatings
2. Explain the purpose of each.
3. Explain how to apply each.
4. Demonstrate how to apply a sealant or caulk to seal the joints in a built-up roof.
5. Describe the most common surfacings used in built-up roof.
6. Discuss the procedures for applying aggregate onto a built-up roof.
7. Explain the importance of having walkways installed on the built-up roof.

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**Course Outcome(s):**

Install flashings used in a built-up roofing systems.

**Objective(s):**

1. Demonstrate how to apply flashing to the outside roof edge.
2. Demonstrate how to apply flashing to the wall.
3. Demonstrate how to apply flashings to the outside corner.
4. Demonstrate how to apply flashing to the inside corner.
5. Demonstrate how to place counterflashing.
1. Demonstrate how to apply flashings to Curbs, penetrations, scuppers, drains, and pitch pockets.

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**Course Outcome(s):**

Determine whether to replace or recover a roof and discuss re-roofing process.

**Objective(s):**

1. Explain the reasons for you would either replace or recover a roof.
2. Describe the procedures for putting a new roof over an old one.
3. Describe the procedures for tearing off an old roof and laying a new one.

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**Course Outcome(s):**

Locate a leak and repair roof damage.

**Objective(s):**

1. Identify causes of built-up roofing failure.
2. Describe how to find a leak.
3. List common causes for roof leaks.
4. Demonstrate the procedure for an emergency repair.
5. Demonstrate the procedure for a permanent repair.

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**Methods of Evaluation:**

1. Quizzes from Roofer's International Training Resource Center
2. Exams from Roofer's International Training Resource Center
3. Hands-on projects
4. Participation

**Course Content Outline:**

1. Introduction to Insulation
  - a. Purpose
    - i. Heat barrier
    - ii. Controls
    - iii. Absorbs sound
    - iv. Fire barrier
    - v. Forms substrate
    - vi. Recovery board
  - b. R-Value
  - c. Features
    - i. Cost
    - ii. Ease of installing
    - iii. Fire rating
    - iv. Compatibility
    - v. Compressive strength
    - vi. Dimensional stability
  - d. Types
    - i. Organic
      1. Fiberboard
      2. Polystyrene board
        - a. Expanded
        - b. Extruded
      3. Polyurethane foam board
      4. Polyisocyanurate foam board
    - ii. Inorganic
      1. Perlite board
      2. Fiberglass board
      3. Cellular glass
    - iii. Advantages and Disadvantages of organic vs. inorganic
2. Installing Insulation
  - a. Storing insulation
  - b. Protect installed insulation
    - i. Cut-off/Night seal

- c. Cutting procedures
      - i. Measuring for cuts
      - ii. Marking for cuts
      - iii. Cutting to a wall
      - iv. Cutting for a pipe penetration
  - 3. Laying out insulation
    - a. Stagger joints
    - b. Patterns
  - 4. Tapered Insulation
    - a. Need for tapering
      - i. Water drainage
      - ii. Reroofing/slope adjustment
    - b. Factory-tapered insulation systems
      - i. Taper measurement
      - ii. R-Value variations
    - c. Planning and manufacturing process
      - i. Designer role
      - ii. Contractor role
      - iii. Supplier role
    - d. Key plans and specification sheets
    - e. Reading a key plan
    - f. Installing tapered insulation
      - i. Protect the key plan
      - ii. Material list
      - iii. Identify starting point.
      - iv. Fastener list and measurements
      - v. Night seals
    - g. Other tapered systems
  - 5. Mechanical Fasteners
    - a. Why mechanical fasteners are used
    - b. Features
      - i. Head
      - ii. Shank
      - iii. Plate
      - iv. Point
    - c. Types
      - i. Threaded fasteners
        - 1. Plastic/nylon
        - 2. Self-tapping
        - 3. Tapered thread
      - ii. Expansion fasteners
        - 1. Shank that expands
        - 2. Pre-drilling required
      - iii. Nails
        - 1. Roofing Nails
        - 2. Masonry nails
        - 3. 8 & 16 penny nails
        - 4. Simplex nails
    - d. Concerns
      - i. Holding power
      - ii. Backing out
      - iii. Corrosion
    - e. Fastening patterns
    - f. Screw guns
  - 6. Roofing Felts
    - a. Why roofing felt is needed for Built-up Roofs
    - b. Types
      - i. Organic
      - ii. Fiberglass

- iii. Polyester
    - iv. Modified Bitumen
  - c. How felts are produced
  - d. Storage and handling of rolled roofing
- 7. Layers of Roofing
  - a. Vapor barrier
  - b. Insulation
  - c. Base sheet
  - d. From 2 to 5 ply sheets of roofing material
  - e. Cap sheet, aggregate, or coatings
- 8. Planning and preparing a job
  - a. New installation
  - b. Re-roofing installation
  - c. Materials and equipment
    - i. Safety equipment
    - ii. Tear off
    - iii. Hoisting
    - iv. Storage
    - v. Tools
    - vi. Laying the roof
    - vii. Finishing
    - viii. Equipment
  - d. Heating equipment
  - e. Set up equipment
- 9. Starting a Built-Up Roof
  - a. Components
    - i. Vapor barrier
    - ii. Insulation
    - iii. Base sheet
    - iv. Felt plies
    - v. Protective component
  - b. Installation specifications
  - c. Plies and exposures
  - d. Lap lines and Ply lines
  - e. Starting the Plies
    - i. Starter strip
    - ii. Start at roof edge
  - f. Ending the plies
    - i. Wall
    - ii. Roof edge
- 10. Laying and mopping the plies
  - a. Aligning the plies
  - b. Mopping safety
  - c. Mopping practices
    - i. Handling the mop
    - ii. Mopping patterns
    - iii. Mopping the plies and laying the felt
  - d. Envelope at Roof edge
  - e. Felt machines
  - f. Mop disposal
- 11. Surfacing, Sealants, and Coatings
  - a. Protecting the membranes
    - i. Surfacing
      - 1. Pea gravel
      - 2. Crushed rock
      - 3. Slag
      - 4. Decorative rock
    - ii. Sealant

- 1. Caulking compounds
  - 2. Pitch pan sealers
  - 3. Plastic roof cement
- iii. Coatings
  - 1. Emulsions
  - 2. Aluminum roof coating
  - 3. Resaturants
- iv. Walkways
  - 1. Manufactured pads
  - 2. Wood walkways or decks
- 12. Flashing installation
  - a. Roof edge
  - b. Walls
  - c. Outside corner
  - d. Inside corner
  - e. Counterflashings
  - f. Coping
  - g. Expansion joints
  - h. Curbs
  - i. Penetrations
  - j. Scuppers
  - k. Drains
  - l. Pitch pockets
  - m. Night seal
- 13. Re-roofing
  - a. Replace or Recover
  - b. Tear off
  - c. Planning for Re-roofing
  - d. Planning for re-covering roof
  - e. Planning for replacement
    - i. Preparation
    - ii. Remove gravel
    - iii. Remove the old roof and flashing
    - iv. Install new built-up roof
- 14. Leaks and repairs
  - a. Causes of leaks
    - i. Weather
    - ii. Expansion and contraction
    - iii. Ultraviolet light
    - iv. Wind
    - v. Rain and snow
    - vi. Design
  - b. Methods for locating leaks
  - c. Emergency repairs
  - d. Permanent repair

## Resources

*Built-up Roofing Instructor's Guide.* United Union of Roofer's Waterproofers, and Allied Workers National Apprenticeship program, 1997.

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*Roofer's Safety and Health Manual.* Roofer's and Waterproofer's Research and Education Joint Trust Fund, 2024.

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## Resources Other

<https://www.carlislesyntec.com/> 2024.

<https://firestoneflatroofing.com/> 2024.

*Roofers' Training Resource Center.* Rooferstrc.com (<http://catalog.tri-c.edu/courseadmin/5293/Roofersrc.com>). 2024.

*Planning-Teaching and Assessing Effective Lesson Plans Video for Trades Instructors.* United Union of Roofers, Waterproofers, and Allied Workers National Apprenticeship Program, 2023.

Code of Federal Regulations, 29 CFR 1926

NCRA video, Safety Awareness: Its up to You( National Roofers Contracting Association)

NRCA video, Roof Safety

NCRA video Back Injury Prevention: Handle with Care

NRCAvideo Fire Safety: don't Get Burned

Barlock video: Kettle and Hot Stuff Safety

Top of page

Key: 5314