

# ATIN-2220: FUNDAMENTAL INSULATION V - CLOSED CELL INSULATION

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## Cuyahoga Community College

**Viewing: ATIN-2220 : Fundamental Insulation V - Closed Cell Insulation**

**Board of Trustees:**

October 2024

**Academic Term:**

Spring 2025

**Subject Code**

ATIN - Applied Industrial Technology - Insulators

**Course Number:**

2220

**Title:**

Fundamental Insulation V - Closed Cell Insulation

**Catalog Description:**

Covers the various uses and advantages of closed cell insulation. Includes hazards, application techniques, strengths, and limitations of various closed cell materials.

**Credit Hour(s):**

3

**Lecture Hour(s):**

3

## Requisites

**Prerequisite and Corequisite**

Departmental approval: admission to Heat and Frost Insulator's apprenticeship program.

## Outcomes

**Course Outcome(s):**

Utilize mathematical formulas into field applications for fabricating and installing insulation materials.

**Objective(s):**

1. Apply Pythagorean theory to calculate measurements of insulation materials.
2. Utilize PI to calculate accurate diameters, circumferences, and radii.
3. Apply industry standard formulas to calculate material estimation for job sites.
4. Convert decimals to fractions to determine accurate measurements.
5. Divide fractions into portions.

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**Course Outcome(s):**

Utilize appropriate tools to perform fabrication and installation.

**Objective(s):**

1. Demonstrate proficient use of tape measure and ability to perform related calculations.
  2. Perform accurate settings of calipers and dividers.
  3. Demonstrate proper use of framing squares, combination squares, and straight edges.
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**Course Outcome(s):**

Identify and recognize various types of pipes and pipe sizes.

**Objective(s):**

1. Differentiate between common pipe types.
2. Identify between a schedule 20 and a schedule 40.
3. Identify standard diameters of pipes.
4. Calculate diameters and circumferences of pipes for new installations of insulation.
5. Calculate diameters and circumferences of pipes for replacement of existing insulation.

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**Course Outcome(s):**

Classify closed cell materials.

**Objective(s):**

1. Differentiate the various closed cell materials.
2. Describe the strengths and limitations for each material.
3. Recognize the hazards of working with closed cell materials.
4. Identify the systems best suited for each closed cell application.
5. List the supporting materials necessary for closed cell applications.

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**Course Outcome(s):**

Execute application of cellular foam material.

**Objective(s):**

1. Illustrate the necessary preparatory procedures prior to application.
2. Demonstrate proper Personal Protective Equipment (PPE) to be worn.
3. Practice situational pre-fabrication techniques.
4. Execute single layer application techniques.
5. Execute double layer application techniques.
6. Perform specialty cuts for Tees, Lateral Wyes, etc.
7. Analyze and assess effectiveness of cellular foam application.

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**Course Outcome(s):**

Execute application of cellular glass material.

**Objective(s):**

1. Illustrate the necessary preparatory procedures prior to application.
2. Demonstrate proper Personal Protective Equipment (PPE) to be worn.
3. Practice situational pre-fabrication techniques.
4. Execute single layer application techniques.
5. Execute double layer application techniques.
6. Perform specialty cuts for Tees, Lateral Wyes, Gores, etc.
7. Practice adjustments for pre-formed 90's.
8. Analyze and assess effectiveness of cellular glass application.

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**Methods of Evaluation:**

1. Quizzes from International
2. Tests from International
3. Final exam from International
4. Graded Projects
5. Estimation exercises

6. Homework worksheets
7. Geometric construction projects

**Course Content Outline:**

1. Closed cell Materials
  - a. Cellular Glass (Foamglas)
  - b. Cellular foam/ foam plastics
    - i. Armacell
    - ii. K-Flex
  - c. Polyethylene
  - d. Polyurethane
  - e. neoprene
2. Characteristics
  - a. Hot systems
  - b. Refractory systems
  - c. Cold systems
  - d. Cryogenic systems
  - e. UV characteristics
  - f. Compressive strengths
3. Hazards
  - a. Safety Data Sheets (SDS)
  - b. PPE selection
4. Supporting materials
  - a. Adhesives
    - i. Contact Adhesives
    - ii. Wheat paste
    - iii. Mastics
  - b. Tapes
    - i. Strapping tape
    - ii. Armaflex tape
    - iii. Gorilla tape
  - c. Jackets/ finishing
    - i. Polyvinyl Chloride (PVC)
    - ii. Aluminum
    - iii. Stainless Steel
    - iv. Armacell paint
    - v. All Service Jacketing (ASJ)
5. Applications
  - a. Tools needed
    - i. Knives
    - ii. Saws
    - iii. Reamers
    - iv. Trowels
    - v. Glue applicators
    - vi. Measuring devises
  - b. Layouts
    - i. Tees
    - ii. Lateral Wyes
    - iii. 3-piece 90s
    - iv. 2-piece 90s
    - v. Miters
  - c. Cut techniques
    - i. Cut angles
    - ii. Dig outs
  - d. Single layer applications
    - i. Joint sealing
  - e. Multi-layer applications
    - i. Staggering
6. Analysis

- a. Inspection
- b. Functional results

## Resources

*Fundamental Insulation I Piping Manual*. Version 2. International Association of Heat and Frost Insulators and Asbestos Workers, 2014.

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*Fundamental Insulation II Equipment Manual* . Version 2. International Association of Heat and Frost Insulators and Asbestos Workers, 2015.

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"Heat and Frost Insulators" *Piping Textbook*. Local 3 Cleveland, Ohio, 2023.

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*Armaflex North American Application Guide*. Armacell, 2015.

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*Foamglas Insulation Guidelines*. Pittsburgh Corning, 2001 .

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## Resources Other

[www.owenscorning.com/en-us/insulation/foamglas](http://www.owenscorning.com/en-us/insulation/foamglas). 2024

[www.armacell.com/en-US](http://www.armacell.com/en-US). 2024

[www.foamglasinsulation.com](http://www.foamglasinsulation.com). 2024

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