

Continuous Insulation for Code-Compliant & High Performance Walls

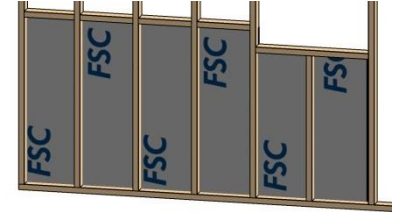


ABTG
Applied Building
Technology Group, LLC

INTRODUCTION

Introduction

- Welcome
- Scope:
 - Above-Grade Exterior Walls
 - Commercial and Residential Buildings
 - Foam Plastic Insulating Sheathing (FPIS)
 - Continuous insulation (CI) application
 - Two audience groups:
 - Builders, installers, inspectors & field sales staff
 - Design professionals and plan reviewers



Outline

- Three Parts:
 - PART 1: Continuous Insulation
 - Definition, types, properties, functions, applications
 - PART 2: Energy Code & CI
 - Wall insulation and air-barrier requirements, code compliance resources, and non-equal substitutes
 - PART 3: Building Code & CI
 - Fire safety, structure, vapor retarders, water-resistive barrier and code compliance resources

Who is FSC and ACC?

- The Foam Sheathing Committee (FSC) of the American Chemistry Council focuses on technical research and education to advance the appropriate use of foam sheathing and promote its application in codes, standards, and other resources for the construction industry.

- Current Regular Members Are:

- [Atlas Roofing](#)
- [Dow](#)
- [GAF](#)
- [Hunter Panels](#)
- [Johns Manville](#)
- [Owens Corning](#)
- [Rmax](#)



OVERVIEW

Why learn about Continuous Insulation?

- A well-informed market is a successful and sustainable market
- Designers, builders, code officials, and installers need:
 - Access to good information to guide decisions in the appropriate use of continuous insulation.
 - Resources to help comply with code requirements and identify optimal solutions, including:
 - Literature research, testing, analysis and code defined [Research Reports](#)
 - Code compliance Research Reports
 - Installation details
 - Manufacturer instructions
 - Educational programs
 - To gain experience and confidence to maximize CI's:
 - Cost-effective use
 - Various benefits and capabilities.

Benefits & Capabilities of CI

– ***Energy Code Compliance:***

- A simple and effective solution to prescriptive R-values in colder climate zones
- An effective alternative in any climate zone.

– ***Above-Code Performance:***

- More CI = enhanced thermal and moisture control
- Increasing cavity insulation only to meet energy code can increase risk of moisture condensation, unless other mitigating actions are considered.

Benefits & Capabilities of CI

– ***Resource and Environment Conservation:***

- CI reduces energy consumption and greenhouse gas emissions over the life of the product and building

– ***Economic Payback:***

- Investment in CI is paid back throughout the life of the building with reduced energy use

Benefits & Capabilities of CI

– ***Occupant Comfort:***

- CI can provide a more comfortable interior environment because it isolates the structure and interior from outdoor extremes and helps minimize cold-spots (thermal bridges).

– ***Durability:***

- CI protects structural materials and interior finishes from excessive moisture and temperature extremes, prolonging life expectancy and reducing risk of “call-backs”

Benefits & Capabilities of CI

– ***Multi-Functional:***

- CI can be used as a cost-effective 4-in-1 solution for:
 1. Continuous insulation
 2. Continuous air-barrier system
 3. Water-resistive barrier system
 4. Water vapor control layer
- This 4-in-1 performance of CI is often associated with the concept of a “perfect wall” for high-performance buildings, yet the same principles can be used for minimum code wall assembly.
 - Some proprietary CI products can provide structural bracing (a 5th capability)

Execution

- Like most building products, the benefits of CI depend on proper execution in design and installation.
- CI needs to be properly integrated with the energy code, building code and components for a complete wall assembly.
- Fortunately, there are excellent resources to help the user succeed.

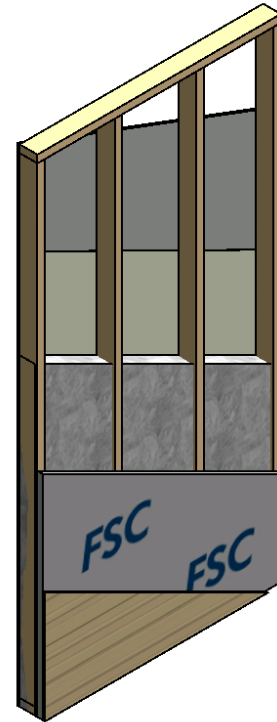
OUTLINE

Topical Outline

- **PART 1 – Continuous Insulation Primer**
 - Definition
 - History of CI
 - Integrated Role of CI in Building Construction
 - Energy Conservation and Environmental Value of Continuous Insulation
 - Types & Properties of CI Materials
 - Overview of Multiple Functions & Applications of CI
 - Resources for Code Compliance and Technical Support (tabulation with code references and TER references/links)

Topical Outline

- **PART 1a – Foam Sheathing Applications For All Climate Zones**
 - 1-2
 - 3-4
 - 5-6
 - 7-8



Topical Outline (cont'd)

- **Part 2 – Energy Code Compliance**
 - Importance of Energy Efficiency and CI
 - Multiple Paths for Compliance
 - Three Wall Insulation Methods
 - Wall insulation requirements
 - Prescriptive R-values (IECC-C or ASHRAE 90.1)
 - Prescriptive R-values (IECC-R / IRC Chapter 11)
 - U-factors for alternative insulation strategies
 - Calculator for U-factor alternatives with CI (pending)
 - Application of whole building UA analysis
 - Energy Rating Index and Performance Path

Topical Outline (cont'd)

- **Part 2 – Energy Code Compliance**

- Cautions:

- Ensure accurate calculation of thermal performance
- Avoid excessive thermal trade-offs in whole building UA analysis
- Check moisture performance
- Use CI to control moisture vapor and maximize inward drying potential.
- Avoid thermal bridging through details that short-circuit continuous insulation

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Fire Safety
 - Requirements for CI
 - Type I-IV buildings
 - » Reference [TER No. 1202-04](#)
 - Type V buildings
 - » Reference [TER No. 1202-03](#)
 - NFPA 285
 - Type I-IV buildings
 - » Reference [TER No. 1202-01](#)

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Structural Components
 - Sheathing
 - Reference code requirements [IBC 1403/IRC R703](#)
 - Reference [ANSI/SBCA FS100](#)
 - Cladding Attachment
 - Reference code requirements [IBC 1609/IRC R703.1.2](#)
 - Reference [TER No. 1303-04](#) (attachments)
 - Reference [TER No. 1205-05](#) (details)
 - Window Attachment
 - Reference code requirements [IBC 1405.13/IRC R612.7](#)
 - Reference [TER No. 1304-01](#)

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Structural Components
 - Vinyl Siding Wind Pressure Rating
 - Reference code requirements [IBC 1405.14](#) / [IRC R703.1.2](#)
 - Foam behind PC Stucco ([IBC 2510.6](#) and [IRC R703.2](#))
 - Explain use of exception to justify foam sheathing behind PC stucco
 - Reference [TER No. 1303-04](#)
 - Reference [TER No. 1205-05](#)

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Structural Components
 - Foam behind wood shingles/shakes ([IRC R703.5](#))
 - Mention [BC Cedar Shake & Shingle Guide](#) as alternative for single layer furring
 - Refer to use of drainscreen products as alternative to furring
 - Show FSC case study report with no furring
 - A single layer of furring is the recommended minimum practice unless the wall is completely shielded from weather – e.g., under porch roof, etc.
 - A double layer of furring appears most applicable in only the most severe climates (e.g., > 800 mm/yr horizontal rainfall, or on walls in milder climates with limited protection by roof overhangs.

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Structural Components
 - Bracing
 - Reference code requirements ([IRC R602](#) / [IBC 2308](#))
 - Reference [FSC guide](#) and [ICC guide](#) and [APA guide](#)
 - » Recommendations and guidelines
 - Many builders are using a building designer or engineer for bracing code compliance.

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Structural Components
 - Bracing
 - Foam sheathing integration

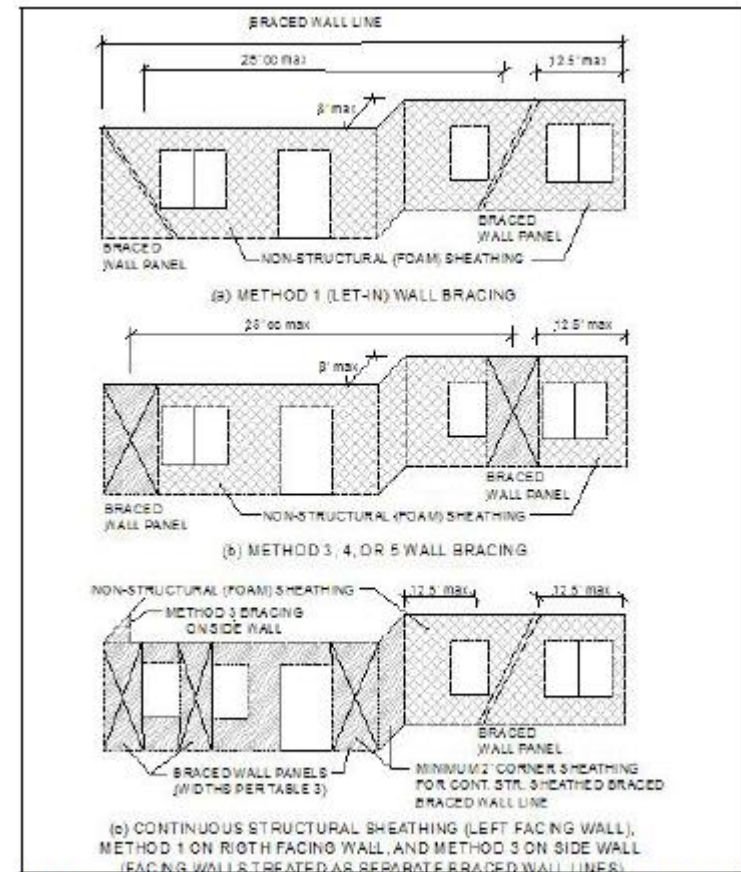


Figure 10: Illustration of Bracing Methods with Foam Sheathing

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**

- Moisture Control

- Water resistive barrier (WRB)

- Reference code requirements ([IBC 1404.2](#) / [IRC R703.2](#) 2015)

- Reference WRB [TER No. 1410-05](#)

- Installation detail [TER No. 1205-05](#)

- » Refer to manufacturer's specific code compliance research report and details

- » Do not make component substitutions unless specifically permitted by the manufacturer

- » Be very careful of “or equal” specifications

- » Routinely inspect and verify installation of flashing and sealing components.

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Moisture Control
 - Air-Barrier (just to mention importance of this items to moisture vapor control, even though it is addressed in energy code)
 - For more about Air-Barriers refer to energy code Part 2

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**
 - Moisture Control
 - Integrated vapor retarder and insulation strategies
 - Reference code requirements
 - » 2012 [IBC 1405.3/IRC 702.7](#),
 - » 2010 NBCC Subsections 5.5.1 and 9.25.4
 - Reference ABTG Research Report (pending)
 - Illustrate determination of acceptable solutions
 - Coordinate with energy code R-value or U-factor requirements
 - Recommend that insulation ratios should be considered in CZ 4 or higher any time exterior sheathing and other exterior components have a net perm < 5 perm.
 - Recommend exterior low perm in moist/humid climates CZ 1 and 2 and CZ 4C (marine) with high perm interior (Class III)

Topical Outline (cont'd)

- **PART 3 – Building Code Compliance**

- Cautions:

- Beware of false claims about moisture performance
 - Ex. EIFS
 - Ex. Must dry to the exterior
- Be sure adequate indoor RH control (ventilation in north, dehumidification in south) is provided for any moisture control strategy.