



RAINBARRIER® CONTINUOUS INSULATION GUIDE

**STANDARDS AND CODE COMPLIANCE
INSTALLATION | ATTACHMENT**



Thermafiber®

Why Continuous Insulation?

Meeting demanding standards and changing codes

What is continuous insulation (ci)?

ASHRAE 90.1 defines continuous insulation as:¹
"...insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings. It is installed on the interior, exterior, or is integral to any opaque surface of the building."

ASHRAE Standard 90.1 is one of two primary baseline building energy codes that may be adopted by states and local jurisdictions to regulate the design and construction of new buildings. ASHRAE 90.1 is limited to commercial buildings, while the International Energy Conservation Code® (IECC), addresses both residential and commercial buildings.

Energy efficiency codes are becoming more stringent. Note the changes in ASHRAE R-value requirements in recent years (red text denotes the changes).²

Steel stud framing

Zone	2007 & 2010		2013		2016	
	Non-res	Res	Non-res	Res	Non-res	Res
0	NA	NA	NA	NA	13	13
1	13	13	13	13	13	13
2	13	13+7.5	13+3.8	13+7.5	13+3.8	13+7.5
3	13+3.8	13+7.5	13+5.0	13+7.5	13+5.0	13+7.5
4	13+7.5	13+7.5	13+7.5	13+7.5	13+7.5	13+7.5
5	13+7.5	13+7.5	13+10.0	13+10.0	13+10.0	13+10.0
6	13+7.5	13+7.5	13+12.5	13+12.5	13+12.5	13+12.5
7	13+7.5	13+15.6	13+12.5	13+15.6	13+12.5	13+15.6
8	13+7.5	13+18.8	13+18.8	13+18.8	13+18.8	13+18.8

Benefits of continuous insulation

- Reduces thermal bridging and increases overall R-value**
 - Thermal bridging is a type of heat loss which occurs when heat flows through the building envelope via a continuous path, such as through wood or, more commonly, highly conductive steel framing members. Thermal bridging dramatically affects whole wall R-value. For instance, a steel stud wall assembly with batt insulation could lose up to 50% of its R-value through thermal bridging.³
- Creates barrier continuity**
 - Air and water barriers can be installed as a single material adjacent to wall sheathing, keeping barriers continuous.
- Reduces moisture concerns**
 - CI reduces the possibility of condensation within the wall when warm, moist air is prevented from reaching a dew pint temperature.

¹ ANSI/ASHRAE/IES Standard 90.1-2016 -- Energy Standard for Buildings Except Low-Rise Residential Buildings. American Society of Heating, Refrigerating and Air-Conditioning Engineers. <https://www.ashrae.org/resources--publications/bookstore/standard-90-1>.
² https://www.energycodes.gov/sites/default/files/iecc/2012iecc_commercial_envelope_BECU.pdf
³ <https://sustainabilityworkshop.autodesk.com/buildings/total-r-values-and-thermal-bridging>

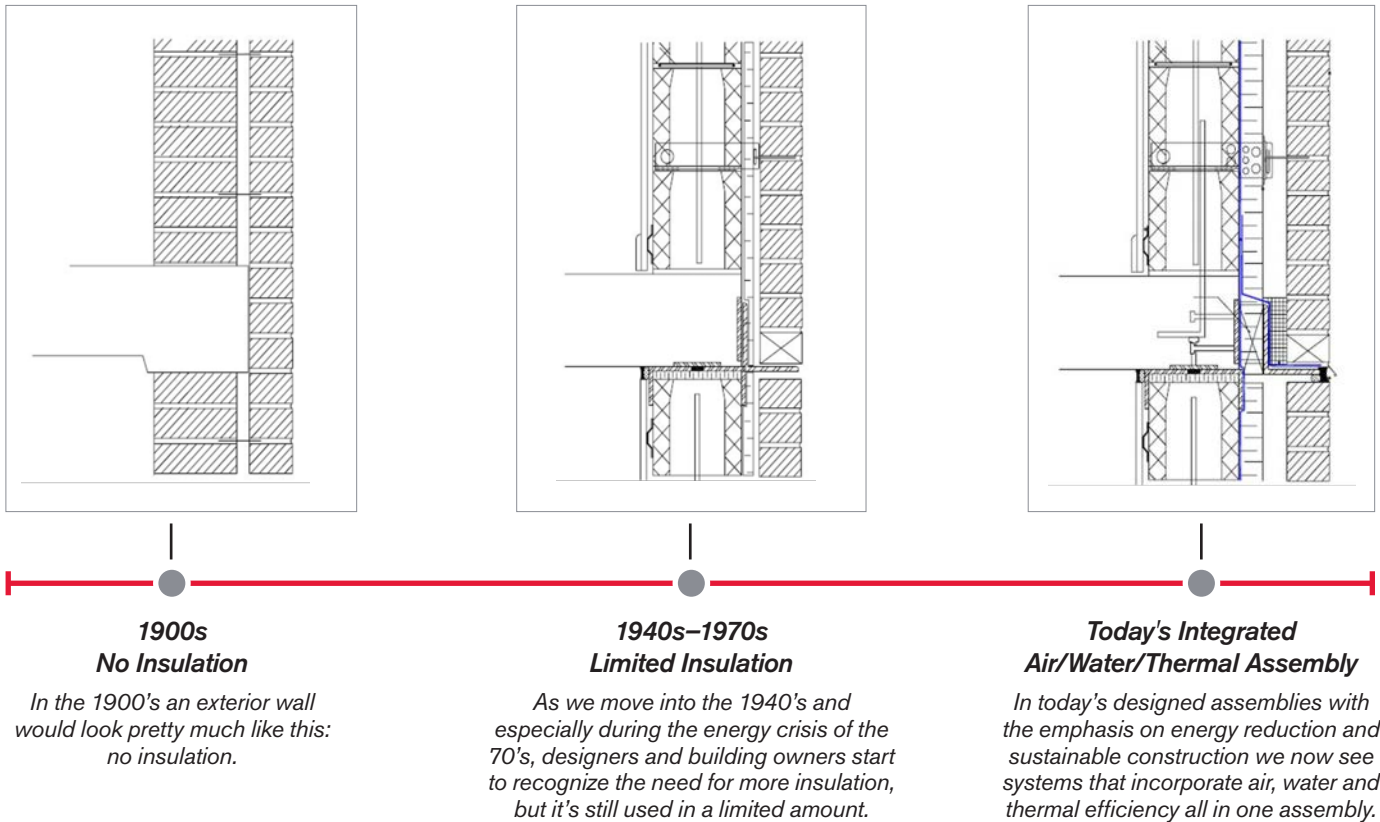


Energy Efficiency

Contributing to sustainable buildings

The evolution of energy efficiency

We have come a long way with the development of energy efficient buildings.



Paths to code compliance

There are three typical paths to compliance:

1. Prescriptive R-value

- Considers R-value of insulation ONLY
- Compliance is achieved by installing insulation with code-prescribed R-value

2. Performance (overall assembly)

- Considers:
 - U-factors: U-value of assembly (above grade)
 - C-factors: Thermal conductance (below grade)
 - F-factors: Slab edge factors
- Compliance is achieved when assembly meets minimum U-value
- Requires calculations or testing to demonstrate compliance but offers greater flexibility in system options

3. Envelope tradeoff

- Tightly defined
- Allows for trades between various parts of the building envelope

- ASHRAE Standard 90.1-2007/2010 provides the basic rules
- Tradeoff is implemented in the COMcheck™ software

Going beyond codes

Many owners, designers, and contractors feel that the insulation requirements set out in state-adopted codes are not robust enough to truly save energy and reduce greenhouse gas emissions. These owners, designers, and contractors look beyond code initiatives to USGBC's LEED® rating system¹, ASHRAE Standard 189.1² or Architecture 2030.³

Including increased insulation levels in the building envelope can help reach these advanced efficiency goals with a negative marginal cost, generating a positive economic return over the building's lifecycle.

¹ U.S. Green Building Council. <https://new.usgbc.org/leed>.
² ANSI/ASHRAE/IES/USGBC Standard 189.1-2014, Standard for the Design of High-Performance Green Buildings. American Society of Heating, Refrigerating and Air-Conditioning Engineers. <https://www.ashrae.org/resources-publications/bookstore/standard-189-1>.

³ Architecture 2030. <http://architecture2030.org/>.
References:
Architecture 2030. <http://architecture2030.org/>.
ASHRAE Standard 90.1, Energy Standard for Buildings Except Low-Rise Residential Buildings; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; 1791 Tullie Circle NE, Atlanta, GA 30329. www.ashrae.org
International Energy Conservation Code; International Code Council, Inc.; 4051 West Flossmoor Road, Country Club Hills, IL 60478-5795. www.iccsafe.org
ASHRAE 189.1, Standard for the Design of High-Performance Green Buildings; American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.; U.S. Green Building Council. <https://new.usgbc.org/leed>.

Non-combustibility

Non-combustible and fire resistant

Standards and testing

Non-combustible material is defined as a material that, in the form in which it is used and under the conditions anticipated, will not ignite, burn, support combustion or release flammable vapors when subjected to fire or heat. Materials that are reported as passing ASTM E136, Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C, shall be considered non-combustible materials.¹

ASTM E136¹

- Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

While it does not duplicate actual building fire exposure conditions, this test method assists in indicating those materials which do not act to aid combustion or add appreciable heat to an ambient fire.

Mineral wool: Non-combustible continuous insulation

Mineral wool products are non-combustible per ASTM E136. Mineral wool will resist flame propagation over the surface of the products.

As a non-combustible material, mineral wool insulation is ideal for assemblies with combustible claddings and/or water-resistant barriers (WRB). When used with other combustible products, mineral wool acts as an aid in passing NFPA 285.

NFPA 285²

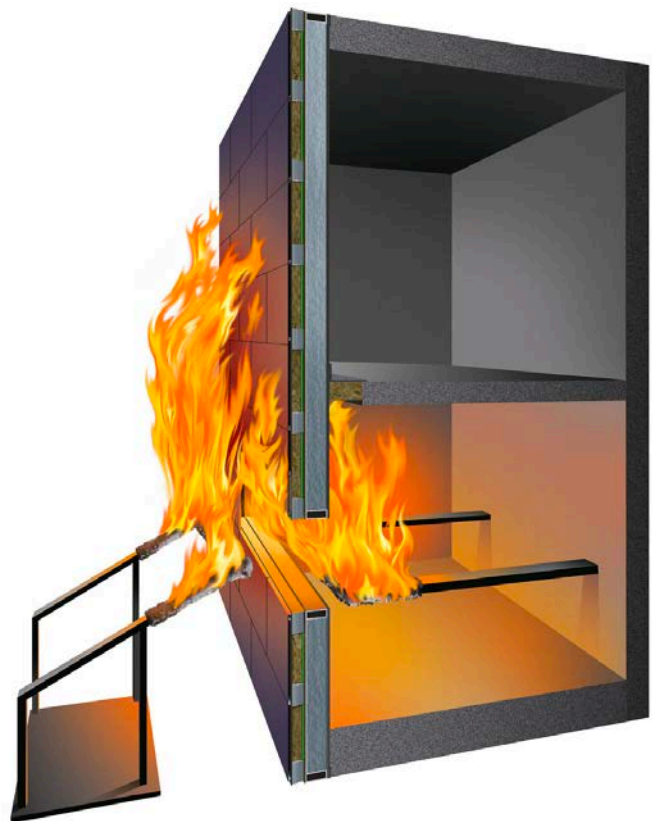
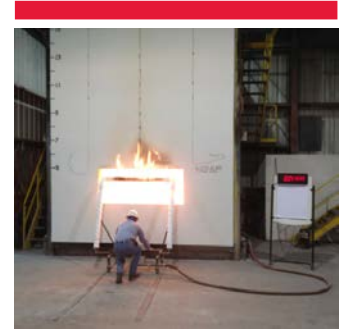
- Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components

NFPA 285 measures what happens during a fire when a non-combustible building is wrapped in combustible materials.

The purpose of NFPA 285

NFPA 285 is required in the International Building Code (IBC) in multiple situations. For example, it is required in many situations when combustible air barriers are used or when foam plastic insulation is used in the exterior walls of construction types I, II, III or IV. These construction types, by code definition, have exterior walls constructed of non-combustible materials. The NFPA 285 test is to determine that combustibles, when exposed to fire on the exterior face of the wall, do not spread flame over the surface or through the core of the otherwise non-combustible wall assembly.

The test standard NFPA 285 is referenced in many sections of the IBC including 1403.5 for water resistive barriers, and Section 2603.5.5 for foam plastic insulation. NFPA 285, or a variation of it, has been referenced in each edition of the IBC since its first edition in 2000, and since the 1980s in the three model codes that preceded it. The now defunct ICBO Uniform Building Code first included the concept in the 1988 edition, requiring testing in accordance with the UBC Standard 17-6, a predecessor of NFPA 285.




¹ ASTM International. ASTM 136-16a. Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C. <https://www.astm.org/Standards/E136.htm>.

² National Fire Protection Association. Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components. <http://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=285>.

Introduction to Owens Corning® Thermafiber® RainBarrier® Continuous Insulation

Comfort, safety and sustainability

Thermafiber® RainBarrier® continuous insulation (ci) is designed to work with a diverse range of cavity wall or open-joint façade systems. Whatever the specifications of your next project, RainBarrier® mineral wool continuous insulation delivers benefits for:

- **Fire and smoke protection:** RainBarrier® continuous insulation can withstand temperatures over 2,000°F for more than five hours.
- **Sound control:** RainBarrier® continuous insulation cuts down on noise between floors, through walls, and from outdoors.
- **Thermal comfort:** RainBarrier® continuous insulation R-values contribute to the energy efficiency and won't decrease as the insulation ages.
- **Installation:** RainBarrier® continuous insulation uses no CFCs or HCFCs and installers need minimal PPE during installation.
- **Sustainability:** Using RainBarrier® continuous insulation contributes to credits in several green building programs such as LEED® and Green Globes®. 

Standards, Codes Compliance — Thermafiber® RainBarrier® 45 and RainBarrier® HD continuous insulation

Code/Standard	RainBarrier® 45	RainBarrier® HD
ASTM C 665	Non-corrosive Type I (unfaced material)	Non-corrosive
ASTM C 795	Pass	Pass
ASTM C 612	Rain Barrier® 45 Type IA, IB, IVA	Rain Barrier® HD Type IA, IB, II, III, IVA
ASTM E 136	Non-combustible as defined per NFPA Standard 220	Non-combustible as defined per NFPA Standard 220
CAN/ULC S114	Complies	Complies
ASTM E 96	Unfaced, 50 Perms as tested	Unfaced, 50 Perms as tested
ASTM E 84	Flame Spread 0, Smoke Developed 0	Flame Spread 0, Smoke Developed 0
CAN/ULC S 102	Flame Spread 0, Smoke Developed 5	Flame Spread 0, Smoke Developed 5
ASTM C 1104	Absorbs 0.03% by volume	Absorbs 0.03% by volume
ASTM C 356	Linear Shrinkage <2% 1200° F (650° C)	Linear Shrinkage <2% 1200° F (650° C)

Product Options

Owens Corning® Thermafiber® RainBarrier® 45 and RainBarrier® HD

Recycled content option[†]:

EPA Choice Fiber (US Government Buildings).....Minimum 75%

Standard Fiber.....Minimum 70%

* Recycled content verified by ICC-ES. † Recycled content options other than standard must be specified at time of order.

Technical data

	Actual density	Tested to ASTM C 518		Tested to ASTM E 84 Unfaced	
		"k" @ 75° [24° C] BTU. In./hr. sq. ft. °F	"R" value per inch of thickness [^]	Flame Spread	Smoke Developed
Thermafiber® RainBarrier® 45	4.5 pcf	0.23	4.3	0	0
Thermafiber® RainBarrier® HD	6.0 pcf	0.23	4.3	0	0

[^] R=thickness divided by "k"

Acoustical performance

Thermafiber® RainBarrier® 45

Coefficiencies at frequencies per ASTM C 423							
Thickness	125 Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	NRC
1 1/2"	0.22	0.44	0.96	1.06	1.05	1.05	0.90
2"	0.30	0.69	1.08	1.01	1.00	1.03	0.95
3"	0.70	1.07	1.24	1.13	1.07	1.08	1.15
4"	1.03	1.25	1.20	1.05	1.05	1.08	1.15

Thermafiber® RainBarrier® HD

Coefficiencies at frequencies per ASTM C 423							
Thickness	125 Hz	250Hz	500Hz	1000Hz	2000Hz	4000Hz	NRC
2"	0.36	0.79	1.15	1.04	1.01	1.04	1.00
4"	1.15	1.17	1.18	1.03	1.06	1.08	1.10
6"	1.18	1.01	1.11	1.03	1.06	1.10	1.05

Availability

Both Thermafiber® RainBarrier® 45 and RainBarrier® HD are available in:

Thickness*	Widths**	Lengths**
1"-7"	16", 24", 36"	48", 60"

*Thicknesses are available in 1/2" increments. ** Custom sizes are available upon request.



For additional information on green building programs, visit www.owenscorning.com

RainBarrier® Installation

Cladding types legend

	BRICK		STONE		TERRA COTTA		ARCHITECTURAL PANELS
	METAL		MASONRY		CONCRETE	<ul style="list-style-type: none"> ▪ ACM: Aluminum Composite Materials ▪ MCM: Metal Composite Materials ▪ Phenolic Panels ▪ HPL: High Pressure Laminate Panels 	
<p>Metal Panels</p> <ul style="list-style-type: none"> ▪ ACM: Aluminum Composite Material ▪ MCM: Metal Composite Material 							

Impaling pins

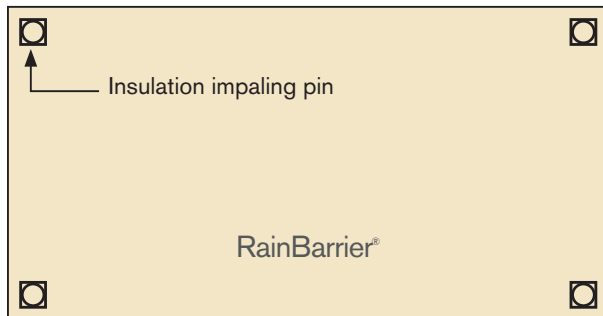
Standard impaling pins

Install RainBarrier® without Z-furring using inexpensive impaling pins.

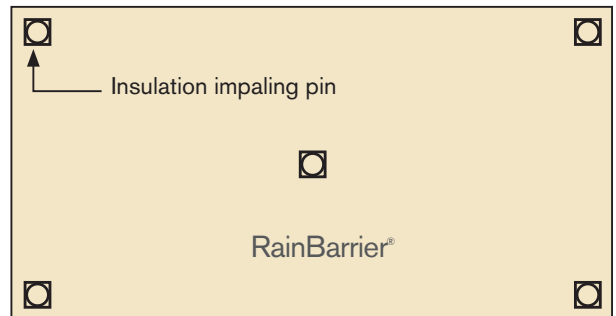


RainBarrier® HD and RainBarrier® 45 can be installed without Z-furring using impaling pins. The following diagrams depict standard positioning of impaling pins, showing different numbers of pins used per panel.

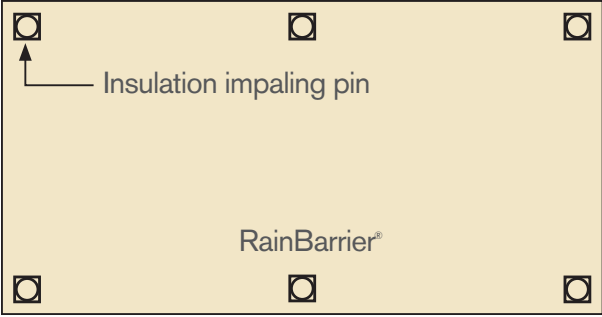
Impaling pins may be installed prior to the air and water barrier, adhered to the air and water barrier (AWB), or screwed through the air and water barrier (AWB). Contact the air and water barrier manufacturer for acceptable installation methods.



4-pin installation



5-pin installation



6-pin installation

Impaling pins/ insulation panel	Thickness	Panel width	Panel length
4	1" to 4"	16"	48"
4	1" to 3"	24"	48"
5	4"	24"	48"
6	1" to 4"	36"	48" or 60"

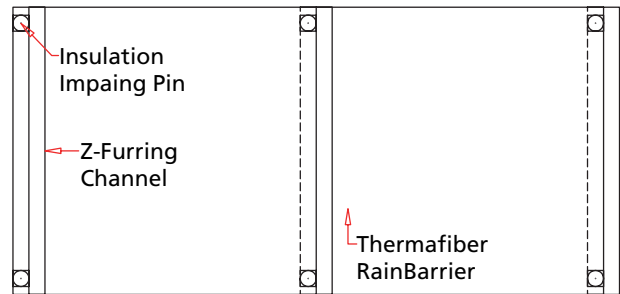
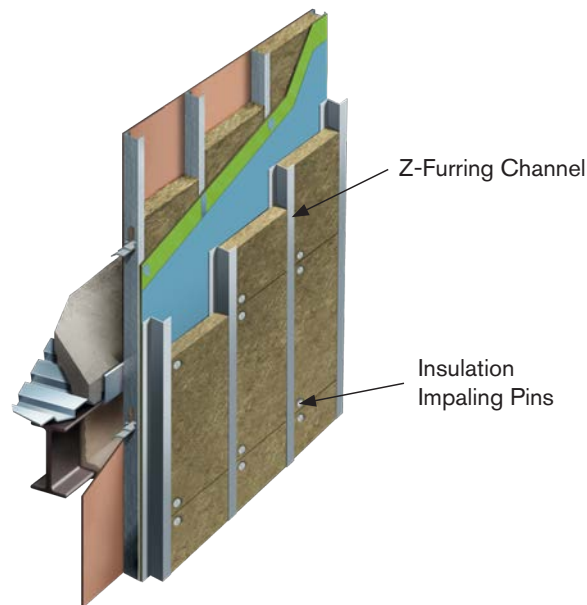
Z-furring with impaling pins

RainBarrier® can be secured into Z-furring channels with inexpensive and easy-to-use impaling pins on insulation panels of all sizes.

Impaling pins may be installed prior to the air and water barrier (AWB), or screwed through the air and water barrier (AWB). Contact the air and water barrier manufacturer for acceptable installation methods.

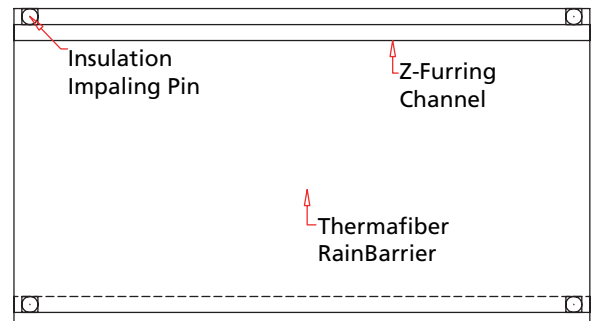
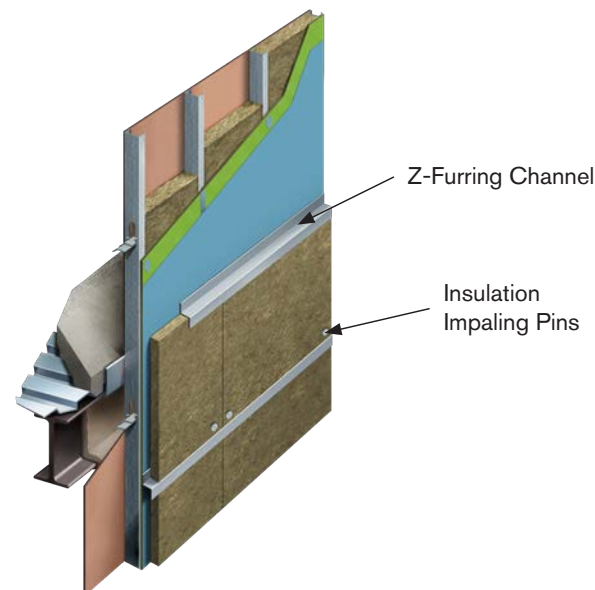
Thickness (in.)	Panel width	Panel length
1" to 3"	16"	48"
1" to 2"	24"	48"
1"	36"	48" or 60"

2 pins per insulation panel | Vertical installation



Vertical Z-Furring (2 pin)

2 pins per insulation panel | Horizontal installation

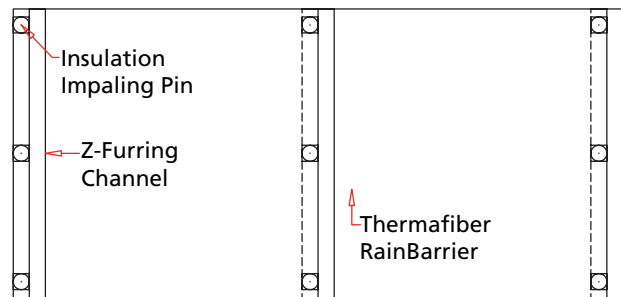
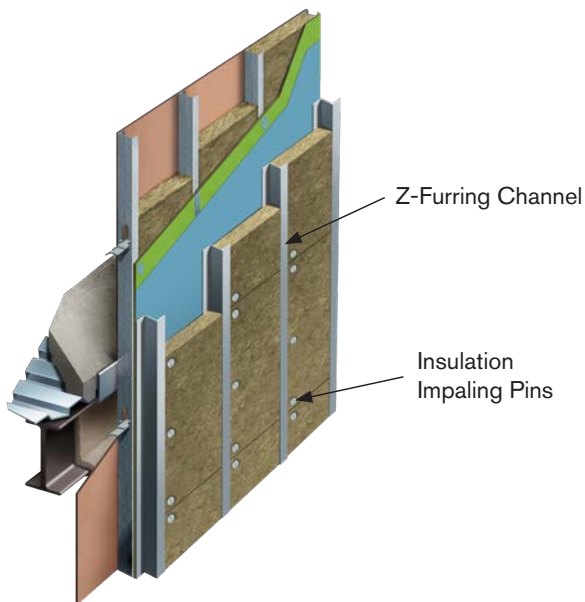


Horizontal Z-Furring (2 pin)

Z-furring with impaling pins

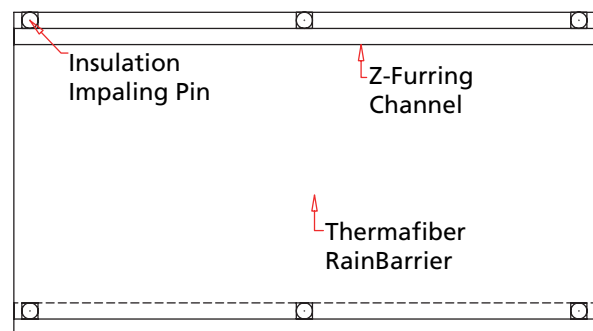
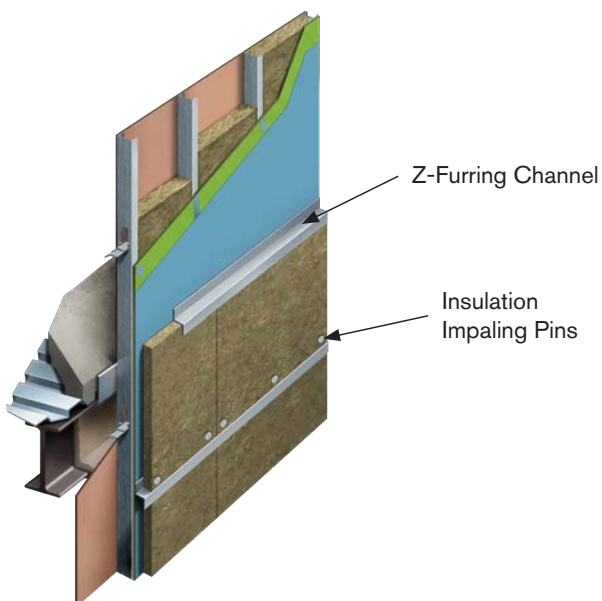
Thickness (in.)	Panel width	Panel length
3½" to 4"	16"	48"
3" to 4"	24"	48"
1½" to 4"	36"	48" or 60"

3 pins per insulation panel | Vertical installation



Vertical Z-Furring (3 pin)

3 pins per insulation panel | Horizontal installation



Horizontal Z-Furring (3 pin)

Impasse® Hangers

Impasse® Hangers provide a precise, faster and safer installation of RainBarrier® without the the need to penetrate the Air and Water Barrier (AWB). Impasse® Hangers facilitate a logical order of installation, installation efficiency, and allow for positive mechanical attachment directly to the steel stud.



Impasse® Hanger



Locking Washer



Custom Impasse® ci Hanger

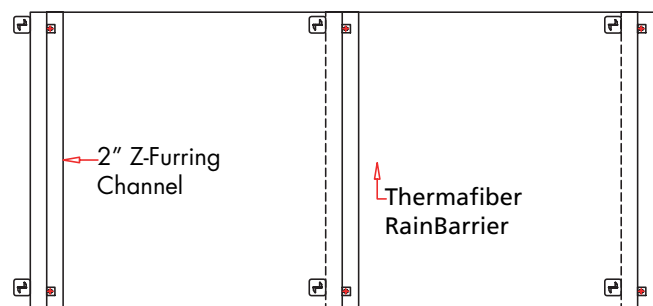
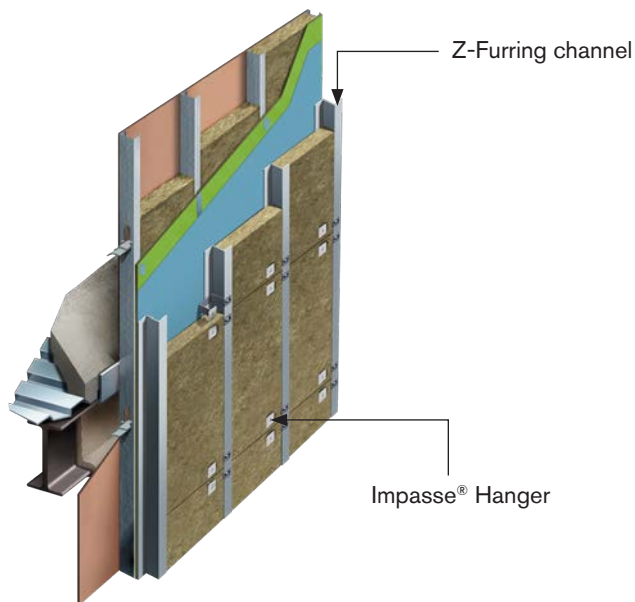
Z-Furring with Impasse® Hangers

The Impasse® insulation system overlaps components to lock in the fire barrier, virtually eliminating the possibility of insulation materials becoming dislodged by fire's turbulent forces. Installation of RainBarrier® HD and RainBarrier® 45 insulation using Impasse® Hangers with Z-furring typically requires only two hangers per insulation panel.

Thickness (in.)	Panel width*	Panel length*
1" to 4"	16", 24" and 36"	36", 48" and 60"

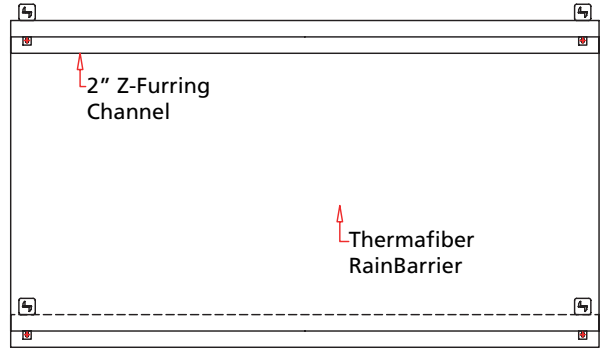
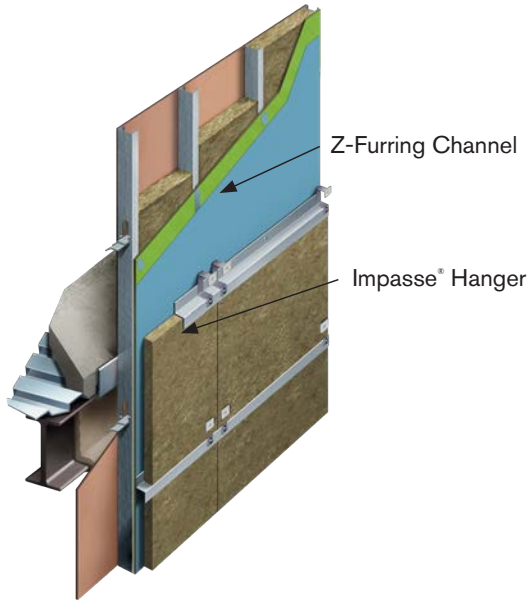
*Standard measurements. Custom sizes are available.

Vertical installation



Vertical Z-Furring

Horizontal installation



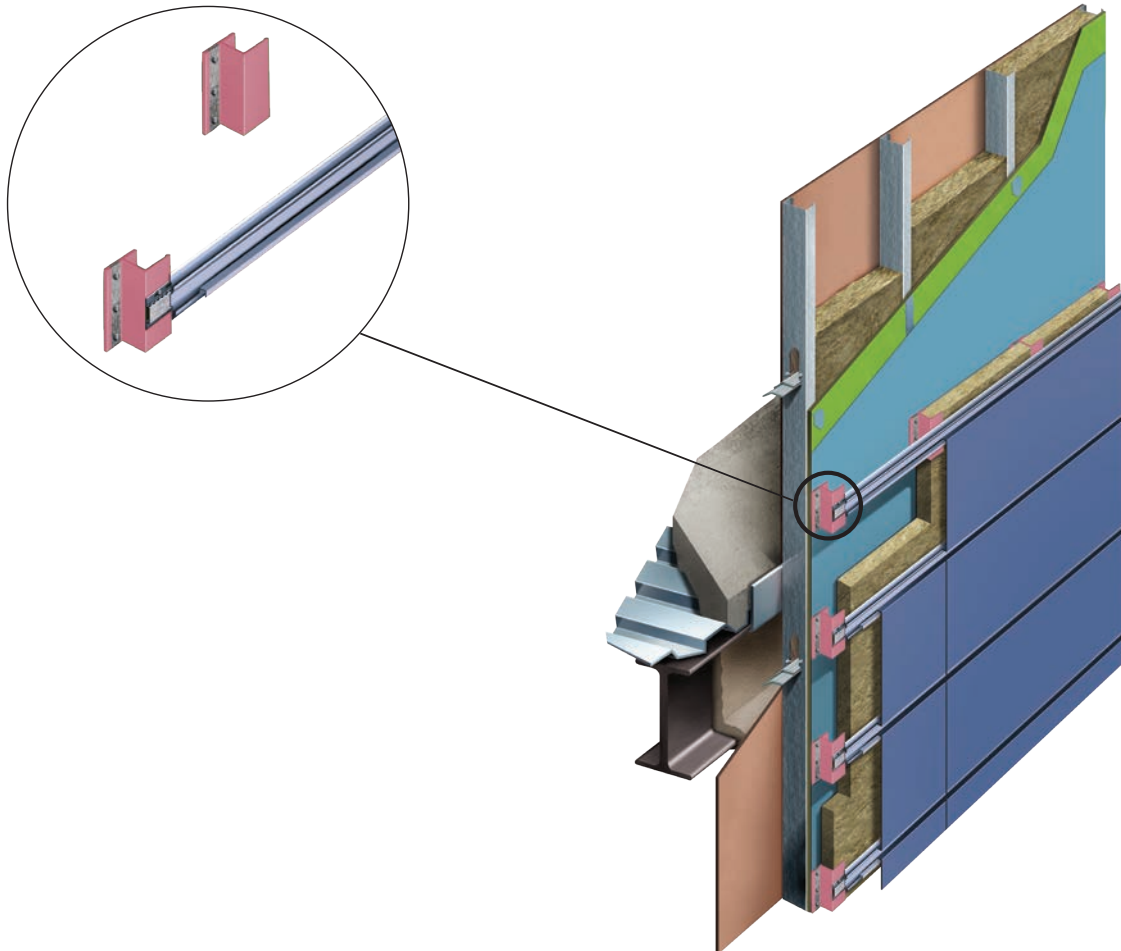
Horizontal Z-Furring

Clip & rail systems

Thermafiber, Inc. is a leader in continuous insulation design by providing installation compatibility with a wide range of RainBarrier® hanging options designed to work with virtually any cladding system in the industry, and accommodate both imaginative designs and demanding specifications.

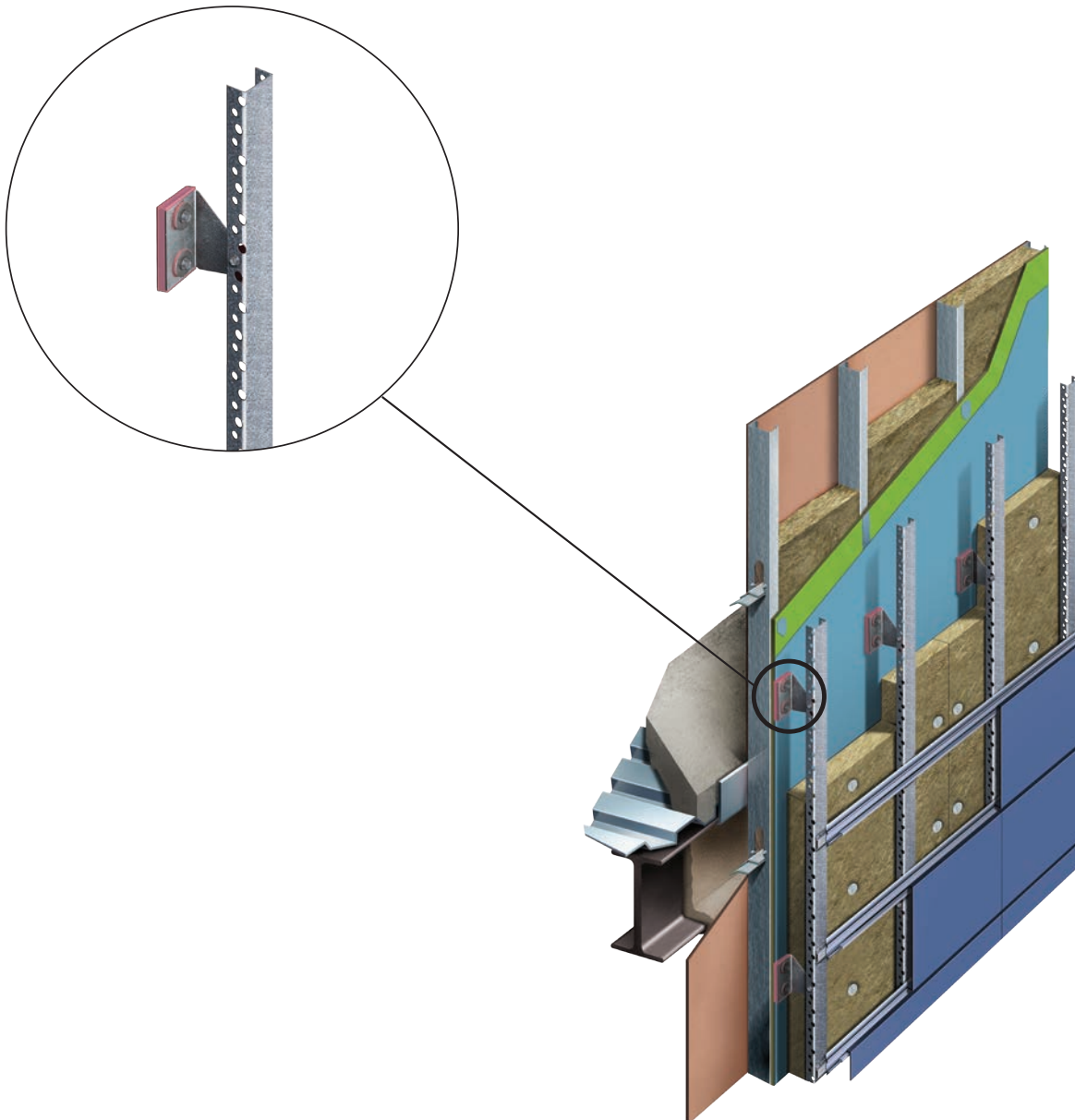
Glass fiber reinforced clips

This insulated composite clip and rail system is composed of bioresin and recycled fiberglass.



Thermally isolated galvanized clips

These clips minimize contact between the wall and the rainscreen bracket and help reduce thermal bridging at the point of contact for insulation efficiency.



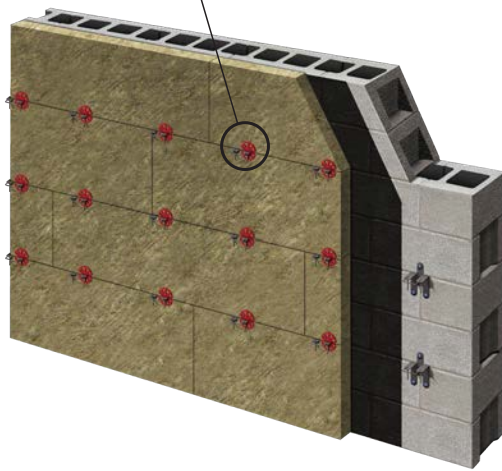
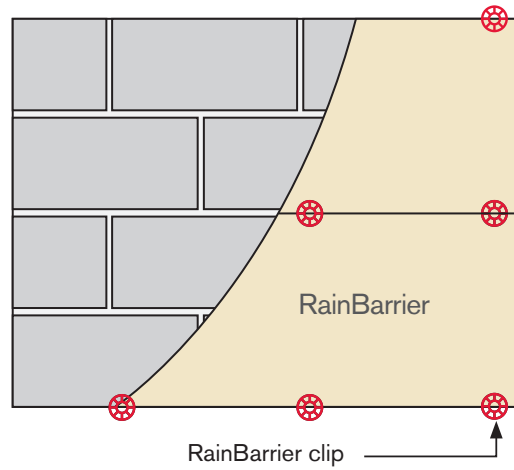
Reinforcement and Attachment Methods

Wire ties or flat anchors

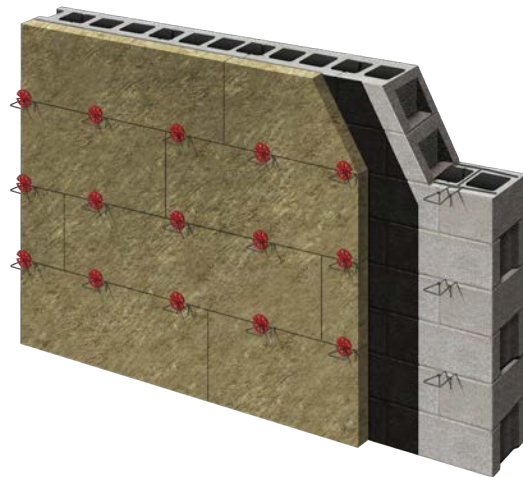
RainBarrier® HD and RainBarrier® 45 insulation can either be impaled onto shelf-type wall ties or installed so wall ties occur at insulation seams. Insulation is then secured to the wall tie with Thermafiber® RainBarrier® clips.



Note that galvanized steel retaining clips are recommended for systems requiring fire performance characteristics.



Shelf-type wall ties



Typical wall ties

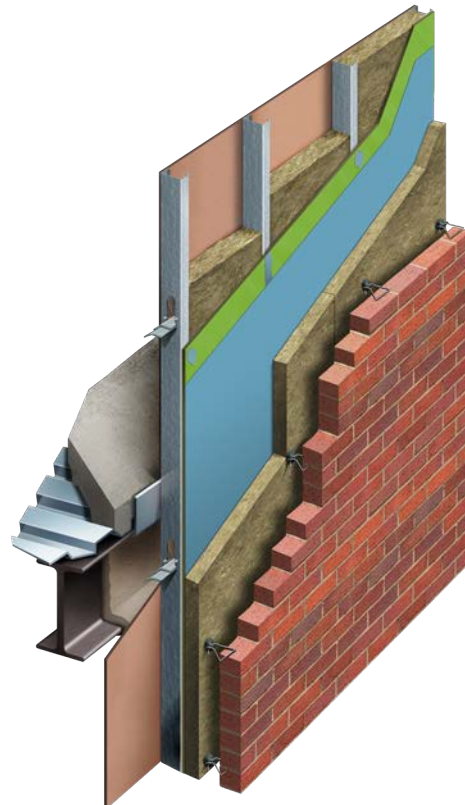
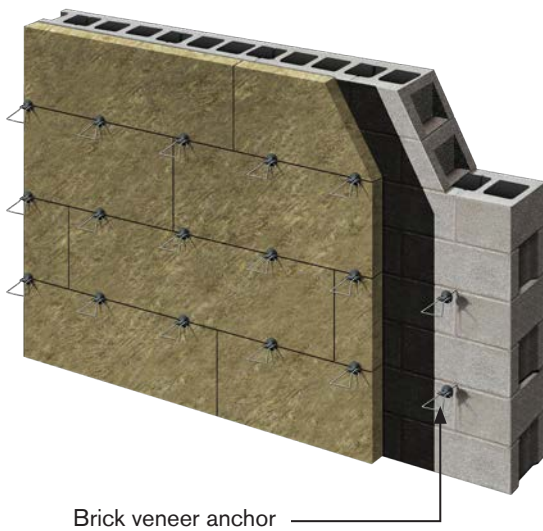
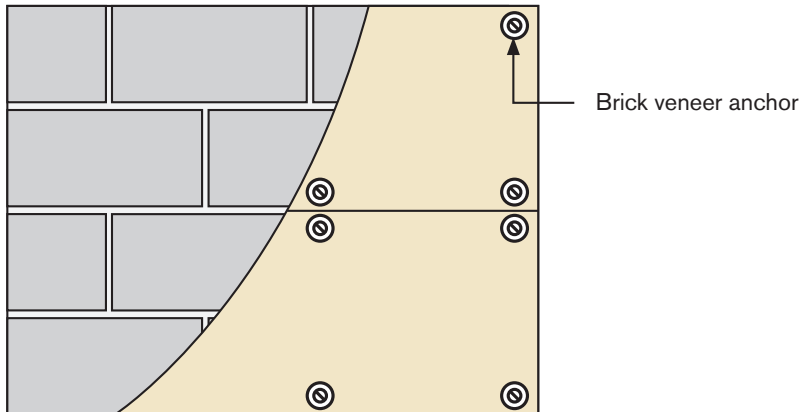
Barrel-style anchors

Owens Corning® RainBarrier® HD and RainBarrier® 45 insulation can be attached to CMU walls with brick tie wall anchors. Secure insulation by screwing anchor screw with minimum 1 1/2" diameter head to the CMU anchor.

Brick veneer anchor wall



Brick and mortar with barrel ties



Project Spotlight

Owens Corning® Thermafiber® RainBarrier®

Owens Corning® Thermafiber® RainBarrier® continuous insulation can be found in some of the most advanced buildings being constructed today. Here are just a few projects that showcase the comfort, safety and sustainability of RainBarrier® mineral wool insulation.

Commercial buildings



SAN FRANCISCO MUSEUM OF MODERN ART (SF MOMA) EXPANSION

San Francisco, California

For a building as striking as the art it houses, the design team turned to Thermafiber® RainBarrier® 45 for continuous insulation. The installation of Thermafiber® products, which have a minimum of 70% recycled content¹, helped the building earn LEED® Gold pre-certification.

Occupancy: Museum



MUSEUM OF THE MOVING IMAGE

New York City, New York

This building, featuring Thermafiber® RainBarrier®, carries a LEED® Silver certification and has been honored with the Red Dot Design Award for Architecture + Urban Design (2013) and the Excellence in Design Award from the Public Design Commission of the City of New York (2011)

Occupancy: Museum



BULLITT CENTER

Seattle, Washington

This six-story building, featuring RainBarrier® Continuous Insulation, is currently the greenest commercial building in the world. The Bullitt Center is Certified Living by the International Living Future Institute's Living Building Challenge.¹

Occupancy: Office

1. <https://living-future.org/lbc/case-studies/bullitt-center/>

Institutions



DISCOVERY HALL, UNIVERSITY OF WASHINGTON, BOTHELL Bothell, Washington

This 74,000 square-foot building features Thermafiber® RainBarrier® 45 Continuous Insulation. The recycled content in Thermafiber® products helped earn this building LEED® Gold Certification.²



MUNGER GRADUATE RESIDENCES, UNIVERSITY OF MICHIGAN Ann Arbor, Michigan

Home to more than 600 graduate students, this building features a number of sustainability features, including Thermafiber® RainBarrier® Continuous Insulation. The building is the first residence hall at the University of Michigan to earn LEED® Gold Certification.³

Healthcare Facilities



SIDNEY & LOIS ESKENAZI HOSPITAL Indianapolis, Indiana

Completed in 2013, Eskenazi Hospital was designed with patient wellness at its center, and features a unique, contemporary façade that combines pre-fabricated concrete, glass and metal. Use of Thermafiber® RainBarrier® contributed to the building's LEED® Gold Certification.



PROMEDICA HEALTH AND WELLNESS CENTER Toledo, Ohio

This \$67M health and wellness center consolidates a full spectrum of medical services and offices under one roof. The Center features a terra cotta cladding, and the design team selected Thermafiber® RainBarrier® 45 to help the building meet NFPA 285 requirements.

¹ Recycled content certified by ICC-ES.

² "Happy Earth Day: LEED Gold for Discovery Hall" <<https://uwb.edu/news/April-2016/leed>>.

³ "Munger is first university residence hall to be LEED Gold certified" <<https://record.umich.edu/articles/munger-first-university-residence-hall-be-leed-gold-certified>>.

Owens Corning® Thermafiber®

The Name In Mineral Wool®



Owens Corning® Thermafiber® mineral wool insulation has brought fire protection, safety and thermal comfort since 1934. Thermafiber, Inc. was acquired by Owens Corning, a leading supplier of building products you can trust.

10 reasons to choose Thermafiber® mineral wool

1. Made from inorganic, non-combustible material per ASTM E136
2. Minimum 70% recycled content²
3. Resists temperatures of over 2,000°F per ASTM E119
4. Does not require a thermal barrier
5. Flame Spread and Smoke Developed ratings of 0 per ASTM E84
6. Allows vapor transmission providing flexibility in vapor barrier placement
7. Consistent R-values per any thickness regardless of installation temperatures
8. Can be installed at any temperature or weather condition
9. Requires minimal Personal Protective Equipment (PPE) to install
10. Provides excellent thermal, acoustical and fire-resistive properties in one product

¹ Recycled content verified by ICC-ES.

* Source: Dodge Data & Analytics - Construction.com Spec Rate Report - September 2017.

To learn more about Owens Corning® Thermafiber® RainBarrier® Continuous Insulation, visit www.owenscorning.com.



THERMAFIBER INC.
ONE OWENS CORNING PARKWAY
TOLEDO, OHIO, USA 43659
888-TFIBER1 [834-2371]
www.thermafiber.com



Made in the USA

Pub. No. 10021356. Printed in U.S.A. January 2018.
© 2018 Owens Corning. All Rights Reserved. © 2018 Thermafiber, Inc. All Rights Reserved.

LEED® is a registered trademark of U.S. Green Building Council.
Green Globes® is a registered trademark of Green Building Initiative, Inc.
UL and the UL logo are trademarks of UL LLC.
THERMAFIBER® and THERMAFIBER INSOLUTIONS® are registered trademarks of Thermafiber, Inc.
THE PINK PANTHER™ & © 1964-2018 Metro-Goldwyn-Mayer Studios Inc. All rights reserved.
Trademarks are the properties of their respective owners.