AIA PRESENTATION

OUR PANELS MAKE THE *difference*

Insulated Metal Panels

MBCI®

Metal Roof and Wall Systems

Best Practice

- MBCI is a Registered Provider with the American Institute of Architects Continuing Education Systems. Credit earned on completion of this program will be reported to CES Records for AIA members. Certificates of Completion for non-AIA members are available upon request.

- This program is registered with the AIA/CES for continuing professional education. As such, it does not include content that may be deemed or construed to be an approval or endorsement by the AIA of any material of construction or any method or manner of handling, using, distributing, or dealing in any material or product. Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.

Learning Objectives

- Discover business development opportunities available with insulated metal panels (IMPs)
- Better understand IMPs and the important terms associated with them
- Review policies and codes surrounding IMPs, the construction industry and how IMPs can qualify for LEED & tax credits
- Recognize the advantages of using IMPs to increase the energy efficiency of the building envelope
- Investigate some examples of energy modeling with cost savings via the use of IMPs
- Understand the impact relevant specifications for insulated metal panels can have on the end product

Insulated Metal Panels

IMPs, comprised of two single-skin metal panels and a non-chlorofluorocarbon (non-CFC) polyisocyanurate foamed-in-place core, are manufactured for both roof and wall applications and are ideal for a wide range of building projects and green building construction.

Business Development Opportunities

Insulated Metal Panels

Business Development Opportunities

- Public work – federal, state and local government
- Schools
- Hangars
- Commercial facilities
- Food industry
- Power industry
- Waste water treatment facilities
- Mining operations
- Manufacturing and warehousing

IMP Projects

FORT DRUM BASE

PROJECT TYPE:
Government

LOCATION:
Fort Drum, New York

PANEL:
ECO-FICIENT™ SUMMIT

IMP Projects

LONDON BRIDGE TRADING COMPANY, LTD

PROJECT TYPE: **Commercial Office**

LOCATION: **Virginia Beach, NY**

PANEL: **ECO-FICIENT™ SUMMIT**

FINISH: **Granite Rock Finish**

IMP Projects

WILLIAM PENN UNIVERSITY

PROJECT TYPE: **Institutional**

LOCATION: **Oskaloosa, IA**

PANEL: **ECO-FICIENT™ SUMMIT**

IMP Projects

WS CONSTRUCTION OFFICES

PROJECT TYPE: **Commercial Office**

LOCATION: **Versailles, KY**

PANEL: **ECO-FICIENT™ ROYAL**

IMP Projects

RC DICKENSON YMCA

PROJECT TYPE: **Non-Profit**

LOCATION: **Tulsa, OK**

PANEL: **ECO-FICIENT™ SUMMIT**

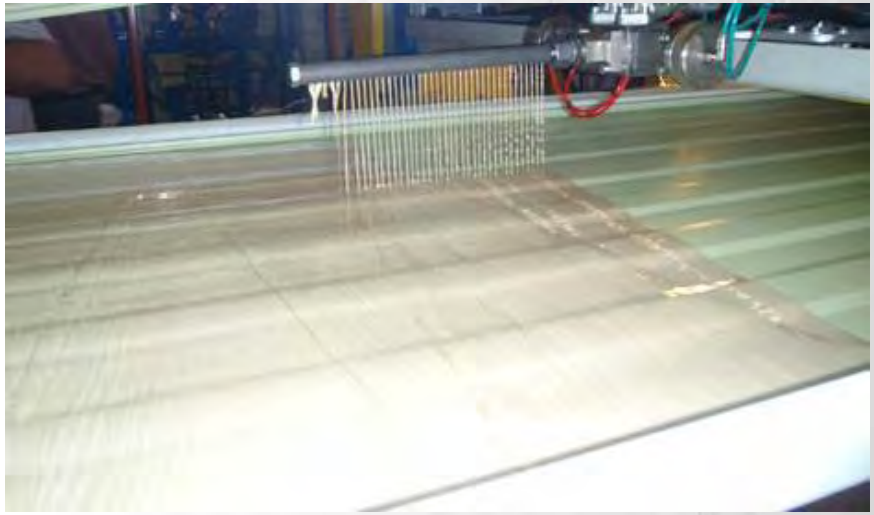
Understanding IMPs & Important Terms

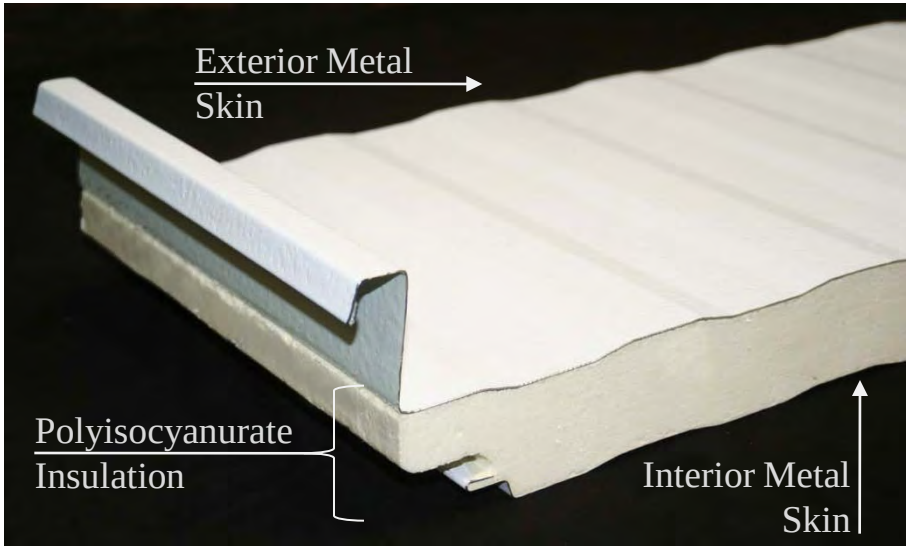
Insulated Metal Panels

Physical Description

FOAM CORE

- Continuously foamed in place
- Non-CFC polyisocyanurate
- 92% closed cell structure
- Density – 2.2 lbs/cu.ft. minimum





Typical Manufacturer Color Chart

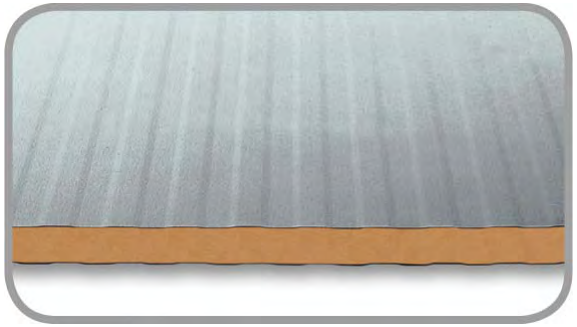
SAMPLE INFORMATION

SR: **.29**

SRI: **31**

- **Type of Paint**
- **Type of Finish**
- **Warranty Information**
- **Energy Star Partner Logo**

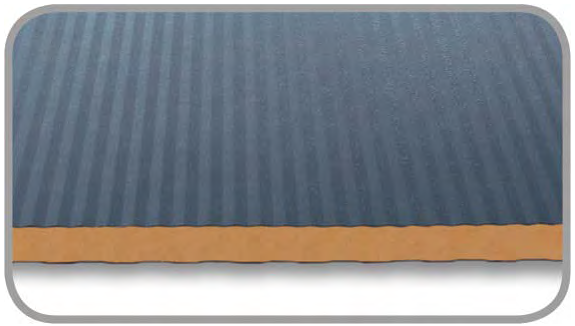
Insulated Metal Panels - Walls



ECO-FICIENT™ ROYAL

ECO-FICIENT™ VINTAGE

ECO-FICIENT™ GRAND

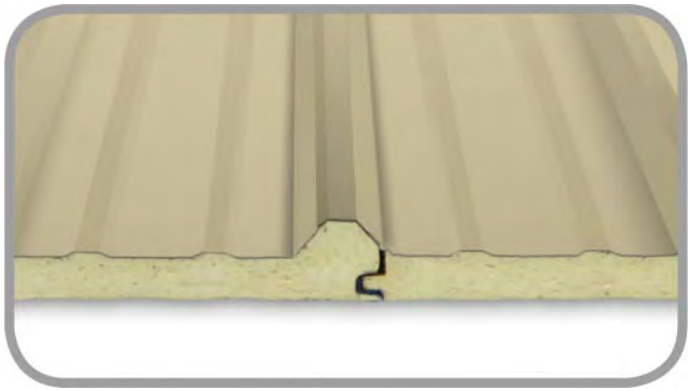


ECO-FICIENT™ SUMMIT

ECO-FICIENT™ CLASSIC

Insulated Metal Panels – Roof & Wall

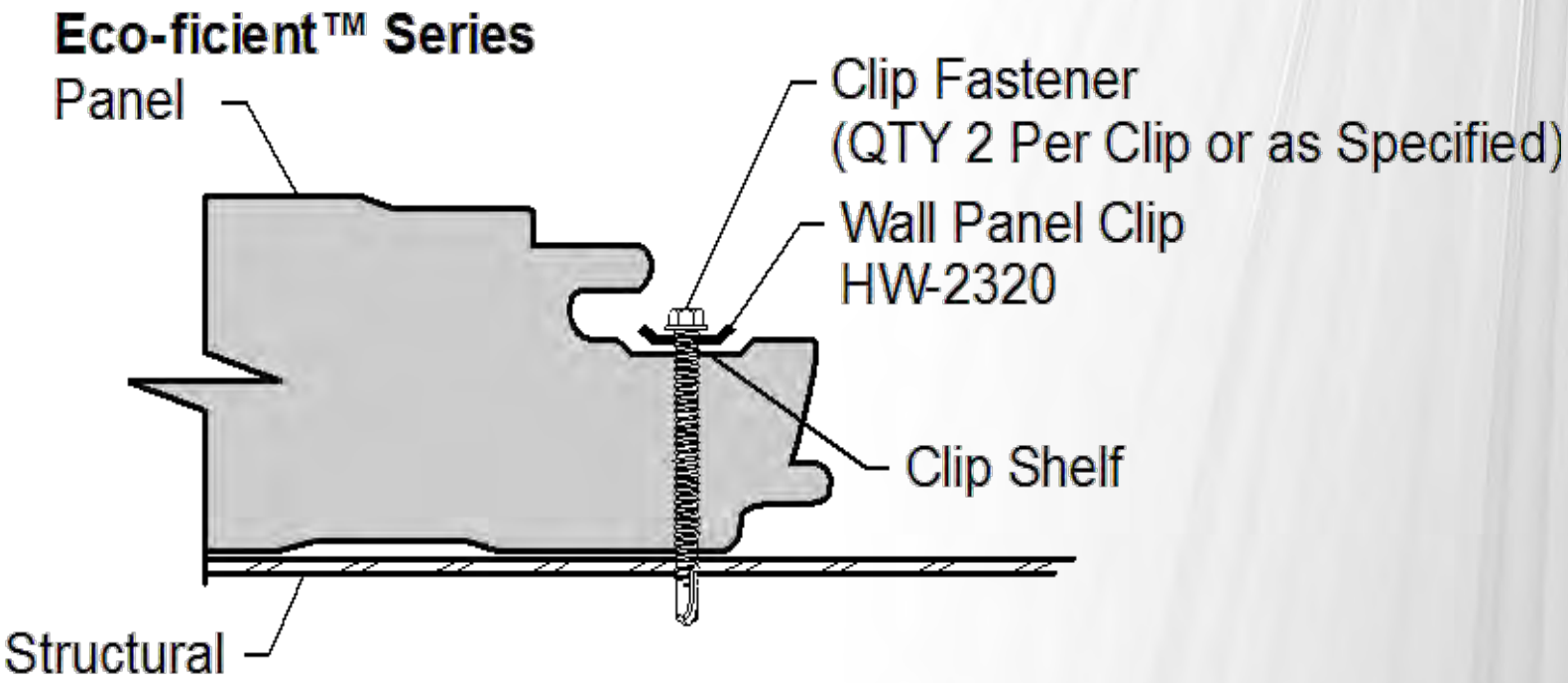
ECO-FICIENT™
INSULATED BATTENLOK ®
INSULATED ROOF PANEL



ECO-FICIENT™
INSULATED R PANEL
INSULATED ROOF & WALL PANEL

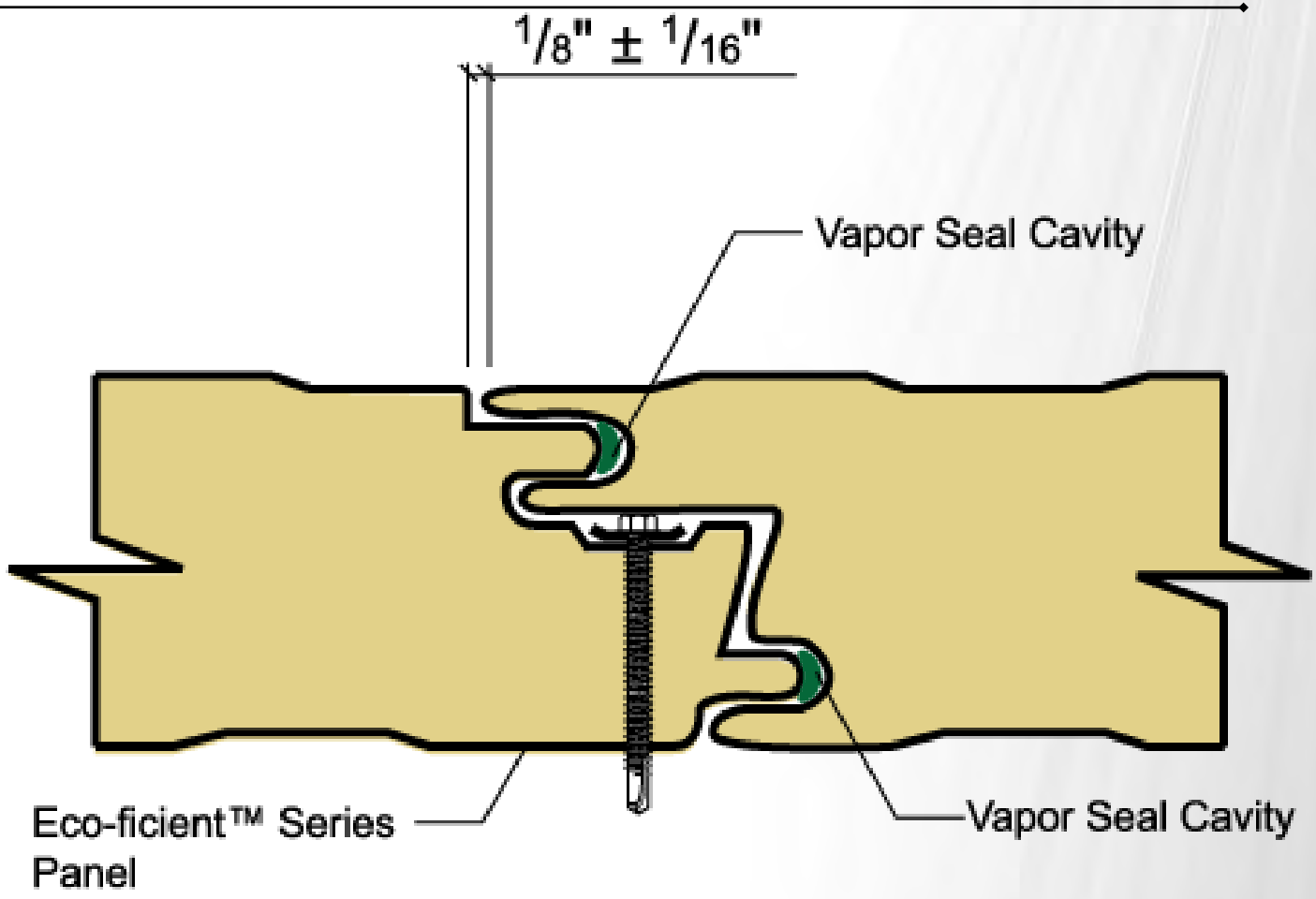
Panel Side Lap – Wall Panel

CLIP AND FASTENER ASSEMBLY



Panel Side Lap – Wall Panel

ASSEMBLED SIDE JOINT



*Option of 0, 1, or 2 vapor sealants factory applied

Important Terms

R-VALUE

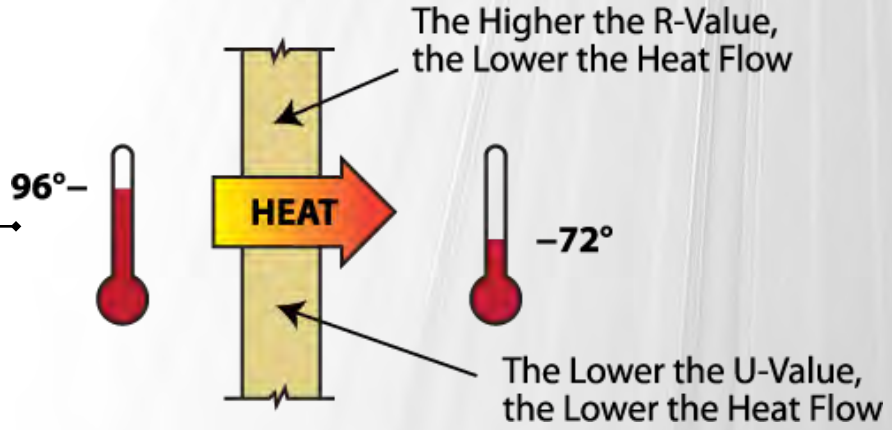
- A measure of the ability to *resist* heat flow through a material.
- The higher the R-Value, the better the insulator.

U-VALUE

- A measure of how much heat is conducted through a material.
- The lower the U-Value, the better the insulator. U-Value = 1 / R-Value.

K-FACTOR

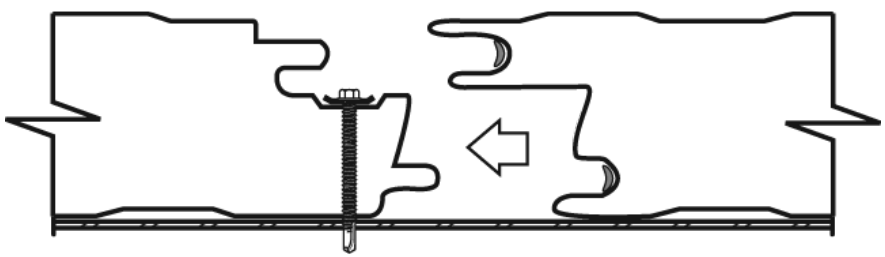
- A measure of a material's ability to transfer heat per unit thickness.
- The lower the K-Value, the better the insulator.
- K-factor (BTU-in/hr-ft²-°F)



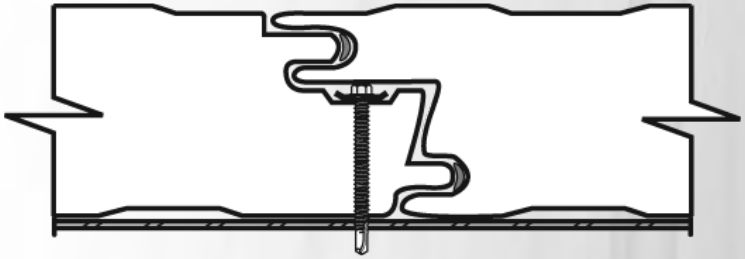
Important Terms

CONTINUOUS AIR BARRIER (CAB)

The combination of interconnected materials and assemblies joined and sealed together with flexible joints that provide the air-tightness of the building envelope above and below grade that separate conditioned from unconditioned space, or from space with conditions that differ by more than 50%.



Clip and Fastener Assembly



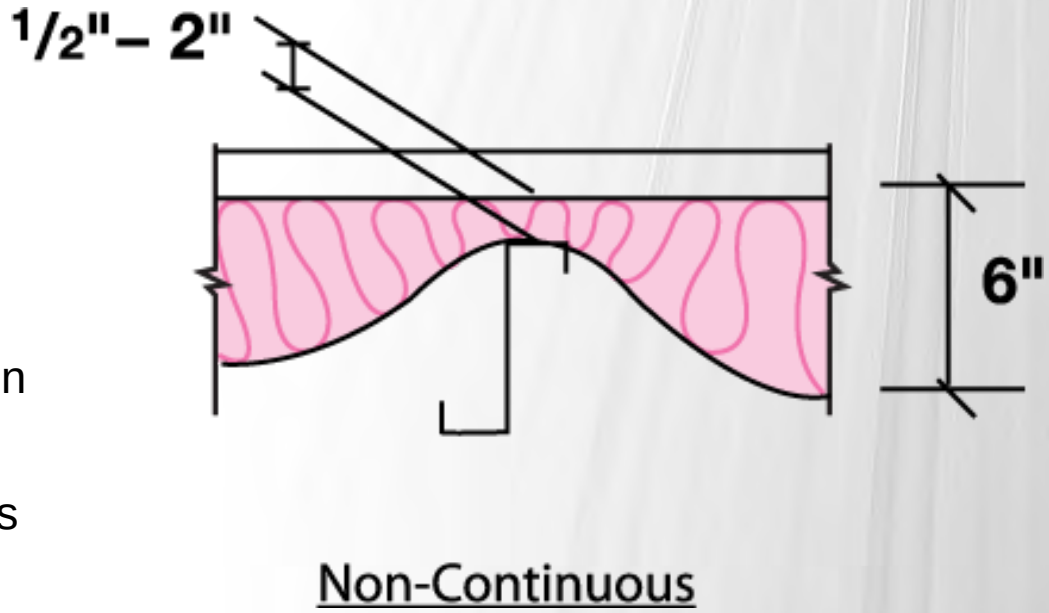
Assembled Side Joint

Important Terms

CONTINUOUS INSULATION (ci)

Insulation that is continuous across all structural members without thermal bridges other than fasteners and service openings.

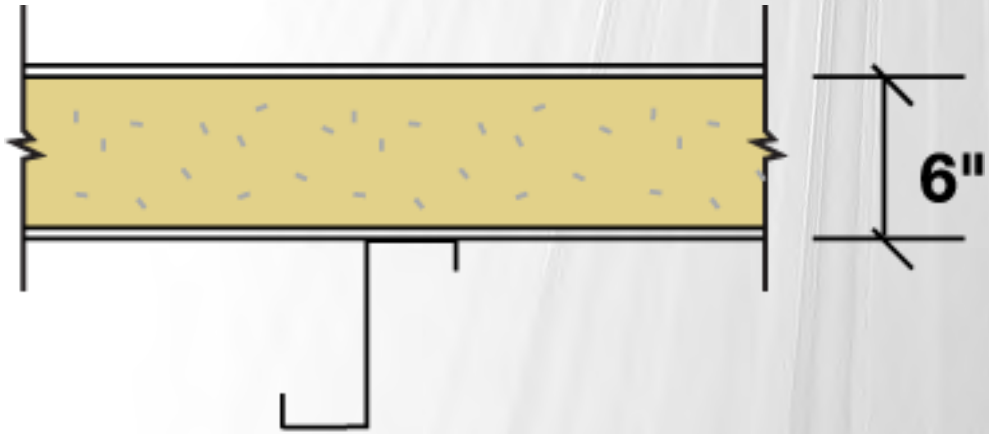
Even small gaps and compressed areas can reduce insulating levels significantly. A study of attic insulation found that just 5% voids in the insulation typical in many installations could reduce the overall R-value by over 40%.



Important Terms

CONTINUOUS INSULATION (ci)

Continuous insulation is important because thermal bridges and discontinuities introduced by compressing non-rigid insulations cause the in-place R-Value of the assembly to be less than the tested R-Value of the insulation used. This effect has become a focus in newer energy efficiency codes such as ASHRAE 90.1 and IECC.



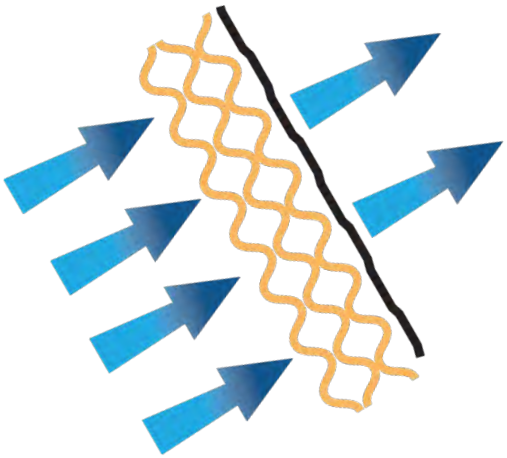
Continuous

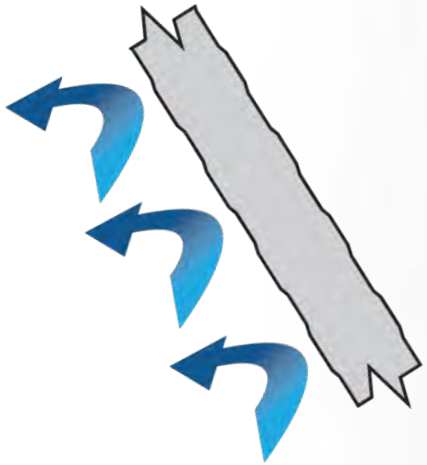
Important Terms

THERMAL DRIFT

A loss in R-Value experienced in rigid board insulation due to the replacement of the foaming gas with air.

IMPs do not experience significant thermal drift due to the metal exterior and interior skins of the panels combined with the closed cell structure.





Rigid Board Un-faced Insulation vs. Insulated Metal Panels

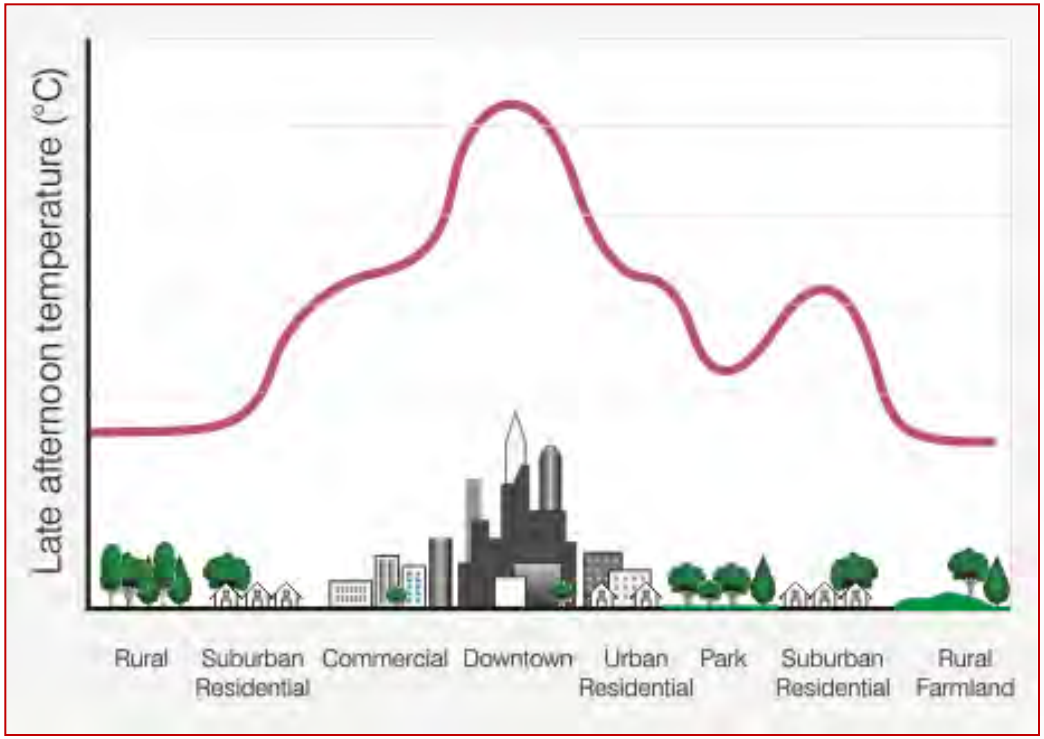
ASHRAE suggests using an R-Value of 5.6 per inch of polyisocyanurate un-faced rigid board insulation.

While some manufacturers publish an R-Value of 7.0 per inch in their literature a 20% reduction, according to the Department of Energy, usually occurs during the first two years of the foam insulation's life.

Important Terms

HEAT ISLAND EFFECT

Describes built up areas that are hotter than nearby rural areas. The annual mean air temperature of a city with 1 million people or more can be 1.8–5.4 F (1–3 C) warmer than its surroundings. In the evening, the difference can be as high as 22 F (12 C).



Cool Roof Paint mitigates the Heat Island Effect in urban areas

*Image owned by EULEB project
http://www.ufficius.com/euleb/en/glossary/index.html

Important Terms

COOL ROOF

The term “cool roof” refers to an outer layer or exterior surface of a roof that has high solar reflectance and high emittance and reduces heat gain into a building.

Considering the environment and the slope of the roof, a cool roof can reduce energy consumption, providing significant cost savings while helping to mitigate urban heat islands.

The Cool Roof Rating Council (CRRC) provides a neutral 3rd party listing service for these systems.

Source: California Title 24

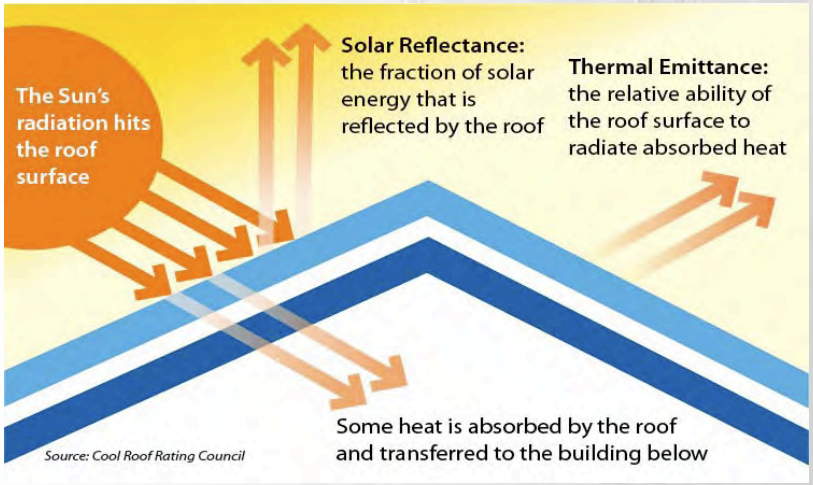


*Image owned by Cool Metal Roofing Coalition

Insulated Metal Panel Advantages

- Come in a wide variety of colors, applied finish offerings, and profiles for buildings to be customized to meet the needs of both design and function.
- High R-Value – 7.14 per inch of panel thickness at 75º mean temp
- No significant thermal drift as experienced with un-faced rigid insulation
- Qualifies as continuous insulation where required by IECC and ASHRAE 90.1
- Panels sealed at side laps and at all perimeter conditions
- ASHRAE/California compliant Cool Roof colors available as listed on Cool Roof Rating Council's (CRRC) website (www.coolroofs.org).

Policies, Codes, & Qualifying for LEED & Tax Credits

Insulated Metal Panels

Policy Issuing Organizations

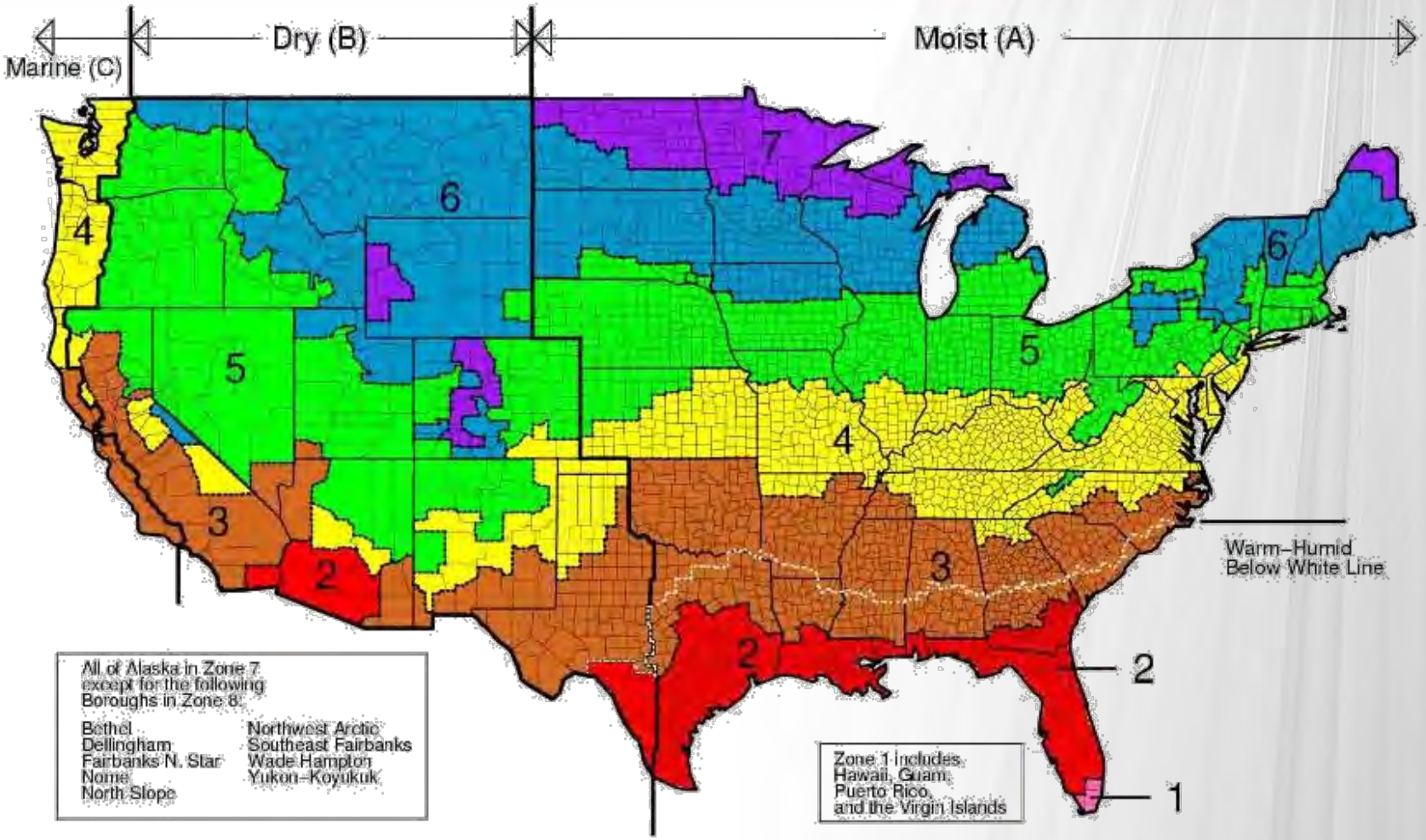
IECC – INTERNATIONAL ENERGY CONSERVATION CODE®

- Establishes provisions that adequately conserve energy, while minimizing any increase in construction costs
- Establishes performance-based provisions that adequately protect public health, safety, and welfare

ASHRAE – THE AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR CONDITIONING ENGINEERS

- ASHRAE, founded in 1894, is an international organization of 51,000 persons. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education.

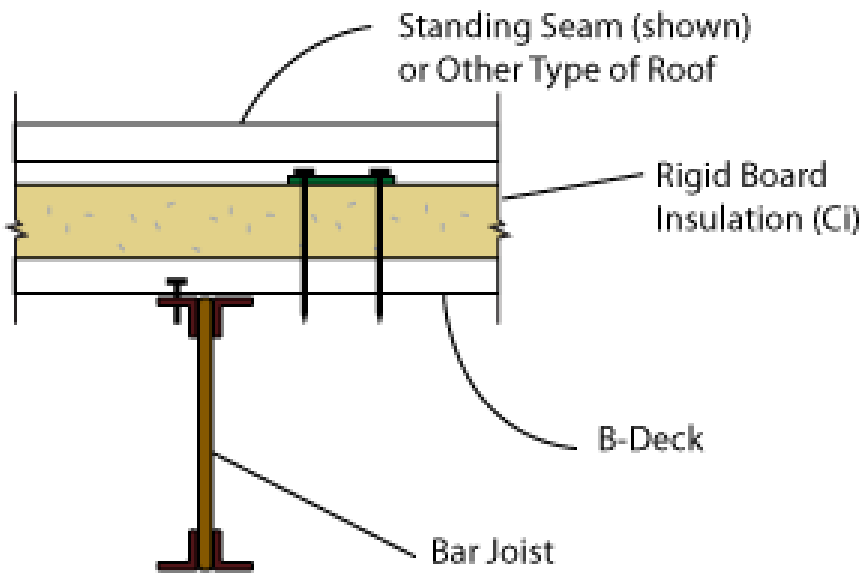
Climate Zones—IECC and ASHRAE 90.1



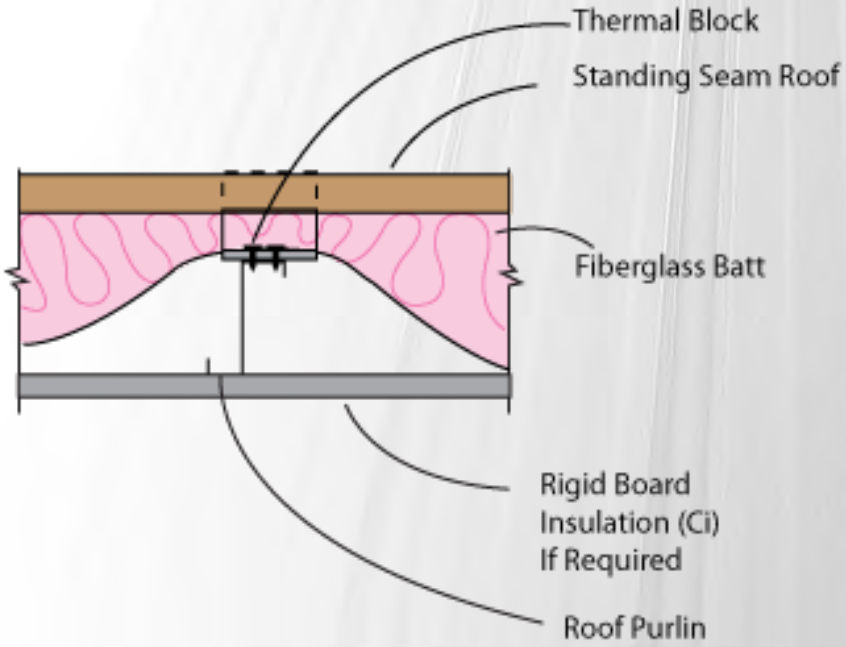
Determining Your Climate Zone is the First Step in the Process

Construction Types—IECC and ASHRAE 90.1

Roofs



Insulation Entirely Above Deck (Roof)

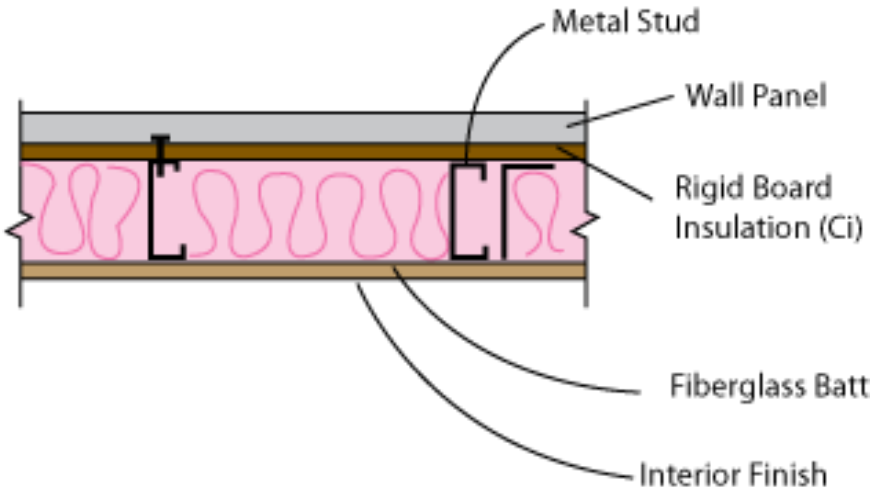


Metal Building (Roof)

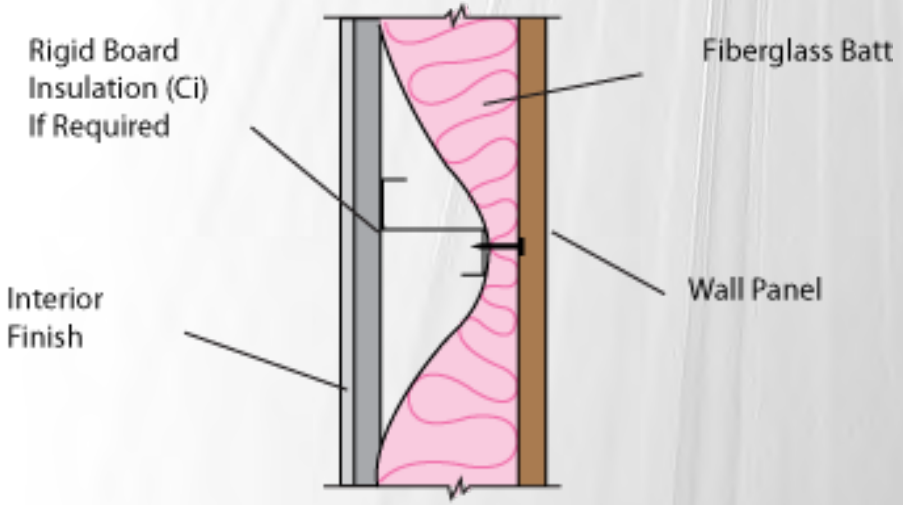
Determining Your Construction Type is the Second Step in the Process

Construction Types—IECC and ASHRAE 90.1

Walls



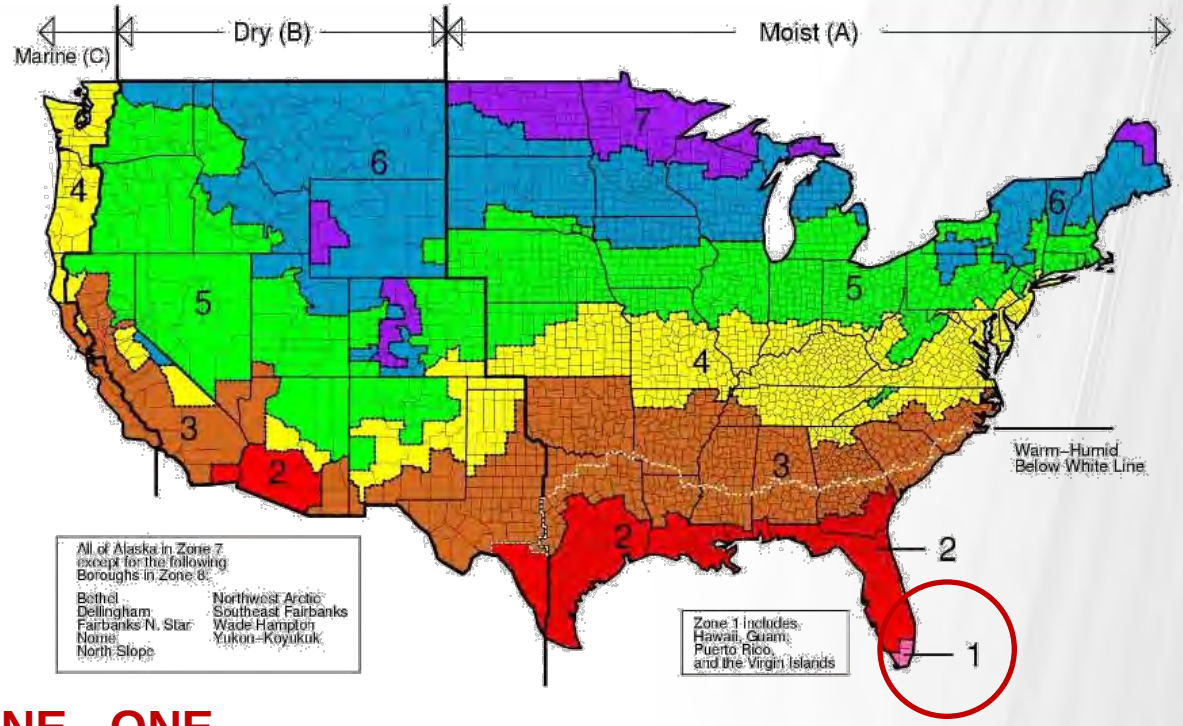
Metal Frame (Wall)
(Horizontal Section)



Metal Building (Wall)
(Vertical Section)

Determining Your Construction Type is the Second Step in the Process

Climate Zones—IECC and ASHRAE 90.1

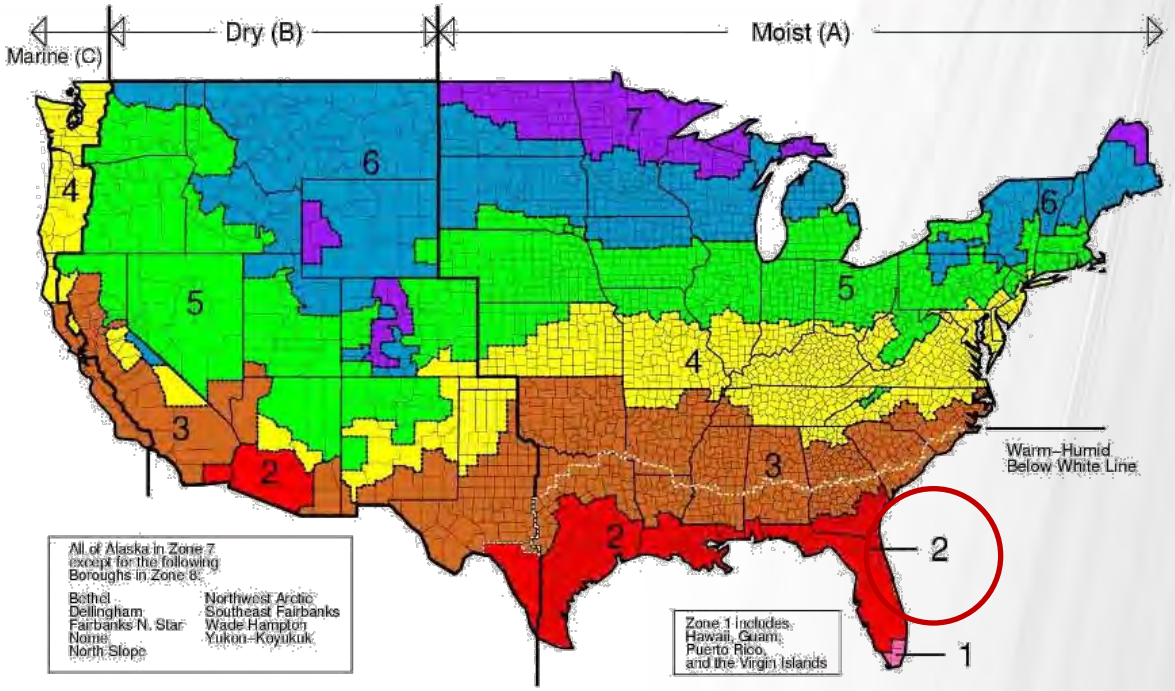


CLIMATE ZONE - ONE

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-15ci	R-15ci
		2.5"	2.5"
	Metal Building	R-19	R-19
		2.5"	2.5"

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-16	R-13
		2"	2"
	Steel Framed	R-13	R-13
		2"	2"

Climate Zones—IECC and ASHRAE 90.1

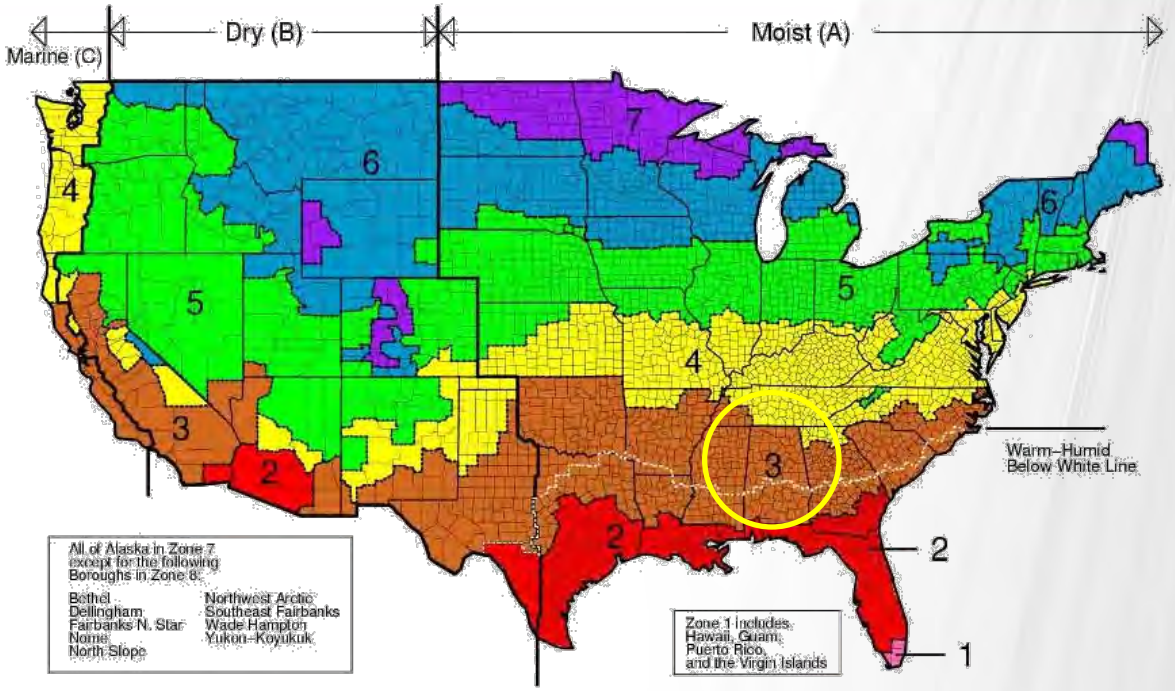


CLIMATE ZONE - TWO

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-20ci	R-20ci
		3"	3"
	Metal Building	R-13+R-13	R-19
		3"	2.5"

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-16	R-13
		2"	2"
	Steel Framed	R-13	R-13
		2"	2"

Climate Zones—IECC and ASHRAE 90.1

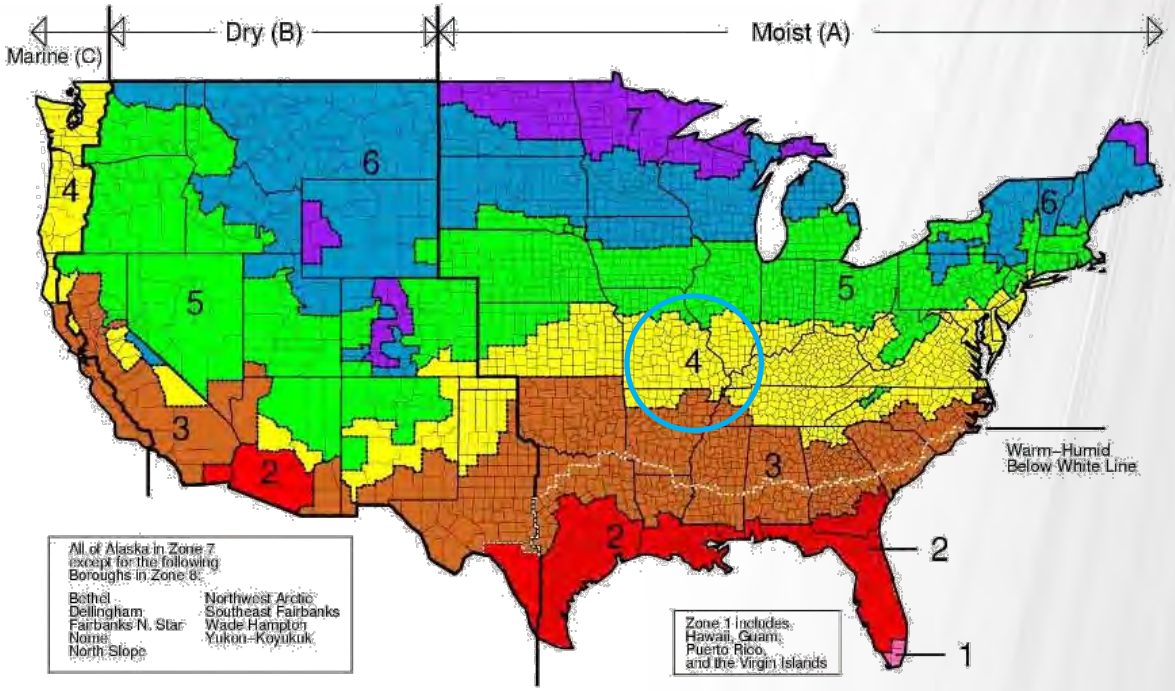


CLIMATE ZONE - THREE

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-20ci	R-20ci
		3"	3"
	Metal Building	R-13+R-13	R-19
		3"	2.5"

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-19	R-13
		3"	2"
	Steel Framed	R-13+R-3.8ci	R-13+R-3.8ci
		2"	2"

Climate Zones—IECC and ASHRAE 90.1

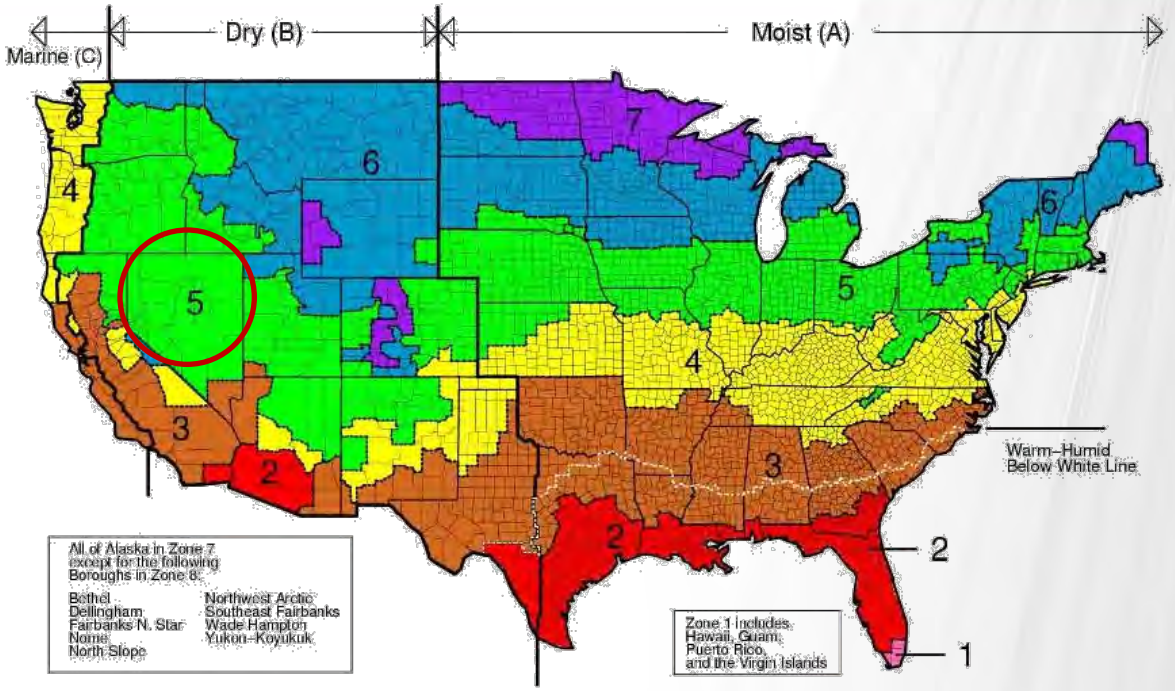


CLIMATE ZONE - FOUR

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-20ci	R-20ci
		3"	3"
	Metal Building	R-13+R-13	R-19
		3"	2.5"

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-19	R-13+R-7.5ci
		3"	2"
	Steel Framed	R-13+R-7.5ci	R-13
		2"	2"

Climate Zones—IECC and ASHRAE 90.1

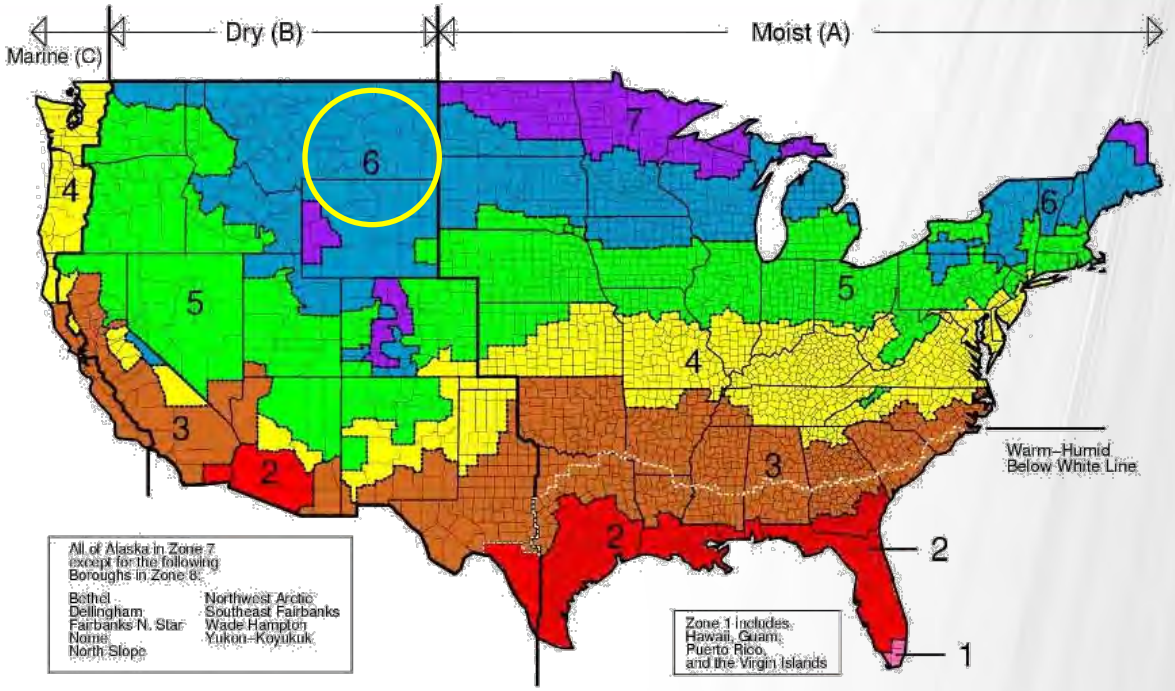


CLIMATE ZONE - FIVE

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-20ci	R-20ci
		3"	3"
	Metal Building	R-13+R-13	R-19
		3"	2.5"

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-13+R-5.6ci	R-13
		2.5"	2"
	Steel Framed	R-13+R-7.5ci	R-13+R-7.5ci
		2.5"	2.5"

Climate Zones—IECC and ASHRAE 90.1

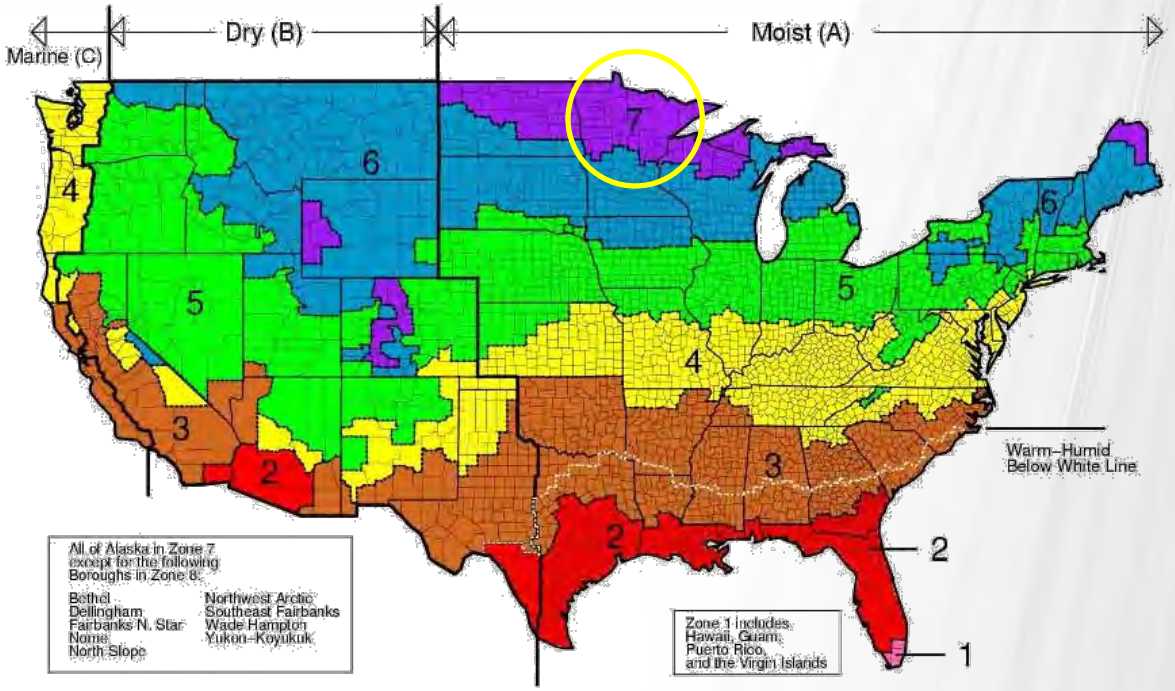


CLIMATE ZONE - SIX

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-20ci	R-20ci
		3"	3"
	Metal Building	R-13+R-19	R-19
		3"	2.5"

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-13+R-5.6ci	R-13
		2.5"	2"
	Steel Framed	R-13+R-7.5ci	R-13+R-7.5ci
		2.5"	2.5"

Climate Zones—IECC and ASHRAE 90.1

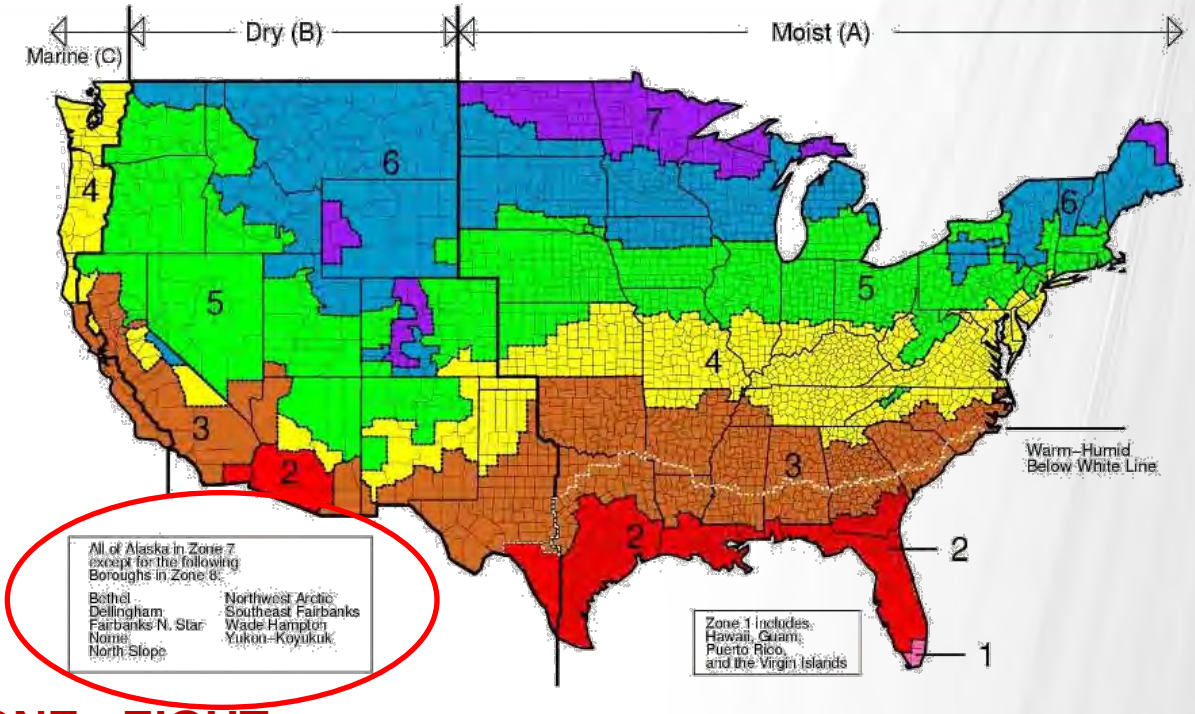


CLIMATE ZONE - SEVEN

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-25ci	R-20ci
		4"	3"
	Metal Building	R-13+R-19	R-19
		3"	2.5"

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-19+R-5.6ci	R-13+R-13
		2.5"	2"
	Steel Framed	R-13+R-7.5ci	R-13+R-7.5ci
		2.5"	2.5"

Climate Zones—IECC and ASHRAE 90.1

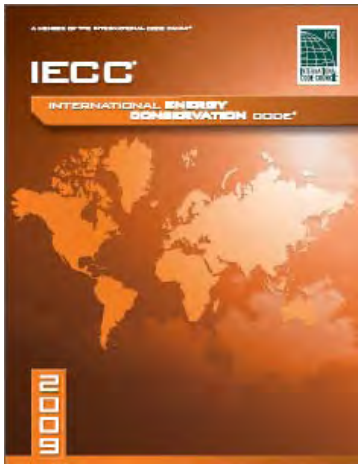


CLIMATE ZONE - EIGHT

Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Roof	Above Deck	R-25ci	R-20ci
		4"	3"
	Metal Building	R-13+R-19	R-13+R-19
		5"	3"

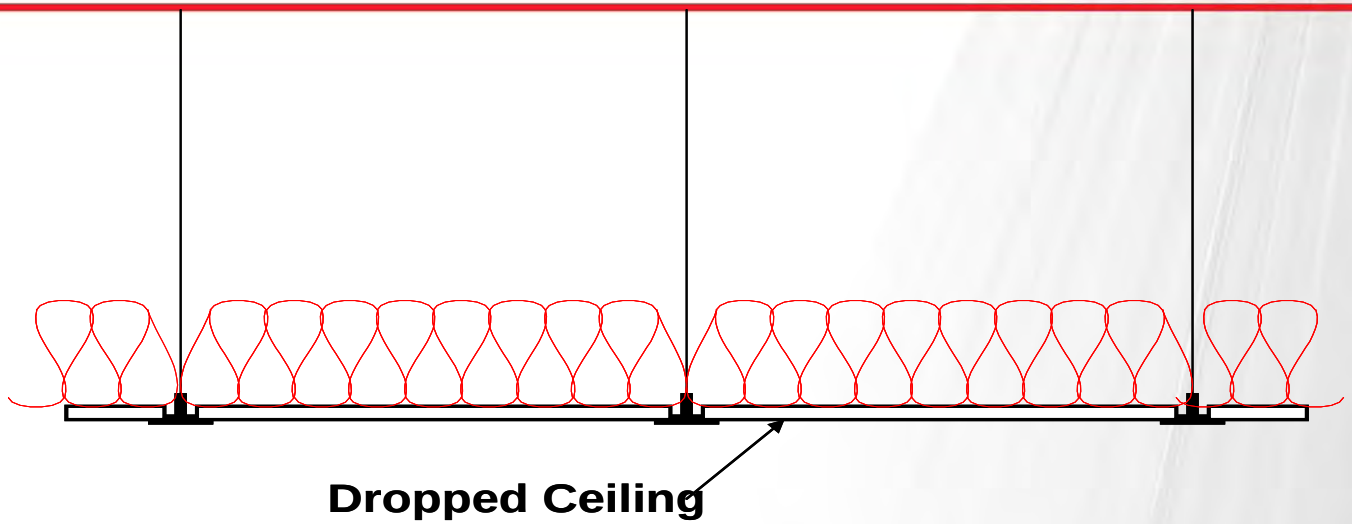
Element	Type of Construction	IECC 2009	ASHRAE 90.1 2007
		R-Value / IMP Thickness	
Wall	Metal Building	R-19+R-5.6ci	R-13+R-13
		2.5"	2.5"
	Steel Framed	R-13+R-7.5ci	R-13+R-7.5ci
		2.5"	2.5"

IECC



ROOFS	DESCRIPTION
R-19	**Standing Seam roof with single fiberglass insulation layer.** This construction is R-19 faced fiberglass insulation batts draped perpendicular over the purlins. A minimum R-3.5 thermal spacer block is placed above the purlin/batt, and the roof deck is secured to the purlins.
R-13 + R-13 R-13 + R-19	**Standing Seam roof with two fiberglass insulation layer.** The first R-Value is for faced fiberglass insulation batts draped over purlins. The second R-Value is for unfaced fiberglass insulation batts installed parallel to the purlins. A minimum R-3.5 thermal spacer block is placed above the purlin/batt, and the roof deck is secured to the purlins.
WALLS	DESCRIPTION
R-16, R-19	**Single fiberglass insulation layer.** The construction is faced fiberglass insulation batts installed vertically and compressed between the metal wall panels and the steel framing.
R-13 + R-5.6ci R-19 + R-5.6ci	**Hybrid system.** The first R-value is for faced fiberglass insulation batts installed perpendicular and compressed between the metal wall panels and the steel framing. The second rated R-Value is for continuous rigid insulation installed between the metal wall panel and steel framing, or on the interior of the steel framing.

IECC and ASHRAE 90.1

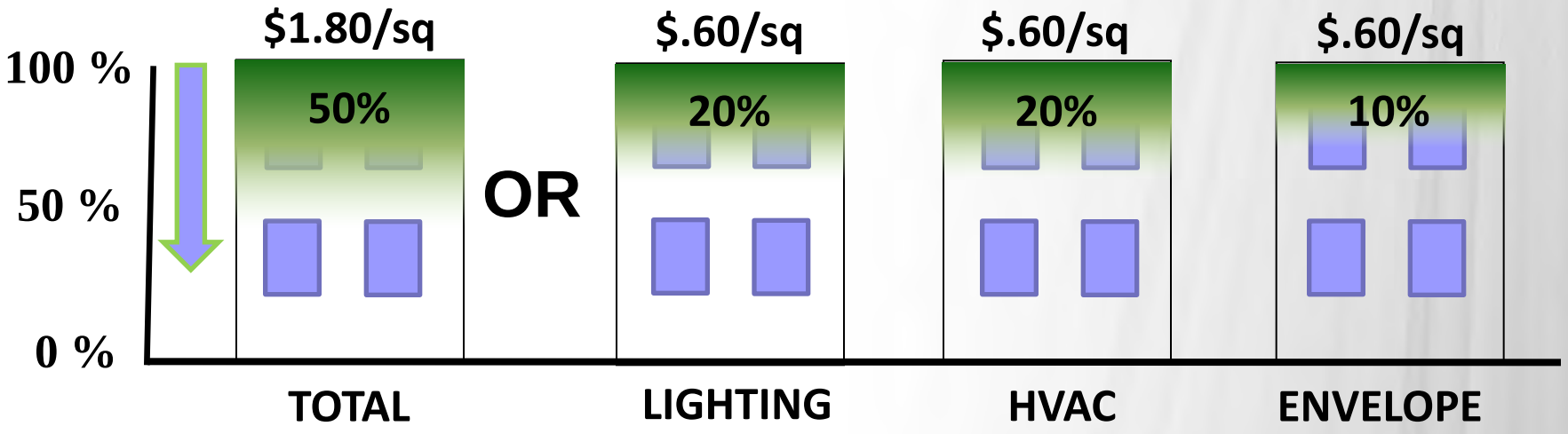


INSULATION PLACED ON SUSPENDED CEILING WITH REMOVABLE CEILING TILES

- Will not count as roof insulation over conditioned spaces
- Will not comply with sealing requirements

Energy Policy Act of 2005

- Rewards owners with a one-time tax deduction of $1.80/sf employing energy-efficient design in their buildings. The energy cost for the building must improve by 50% over an ASHRAE 90.1-2001 compliant building with Appendix G from ASHRAE 90.1-2004.
- As an alternative, individual deductions may be attained at $0.60/sf each for:
  * Lighting (20% better) * HVAC (20% better) * Envelope (10% better)



Energy Policy Act of 2005

- Requires energy modeling with EPA-approved software:
  - DOE-2
  - EnergyPlus
  - Other 3rd party software (see www.eere.energy.gov)
- Must get a licensed engineer or architect to verify that installation is consistent with design.

Energy Policy Act of 2005

Title 26, Subtitle A, Chapter 1, Subchapter B, Part VI, Section 179D (d)

(4) ALLOCATION OF DEDUCTION FOR PUBLIC PROPERTY.

In the case of energy efficient commercial building property installed on or in property owned by a Federal, State, or local government or a political subdivision thereof, the Secretary shall promulgate a regulation to allow the allocation of the deduction to the person primarily responsible for designing the property in lieu of the owner of such property. Such person shall be treated as the taxpayer for purposes of this section.

IMP Advantages for LEED 3.0

SS CREDIT 7.2: HEAT ISLAND EFFECT, ROOF (1 POINT)

- Most manufacturers offer a wide variety of colors that meet steep slope roofs (>2:12)
- Most manufacturers offer whites that meet the requirements for low slope roofs (<=2:12)

EA PREREQUISITE 2: MINIMUM ENERGY PERFORMANCE

EA CREDIT 1, OPTIMIZE ENERGY PERFORMANCE (UP TO 19 POINTS)

Must be at least 10% more energy cost efficient than ASHRAE 90.1 Appendix G baseline building

CREDIT MR 4.1 AND 4.2 FOR RECYCLED CONTENT (UP TO 2 POINTS)

IMPs & The Building Envelope

Insulated Metal Panels

IECC and ASHRAE Mandatory Requirements

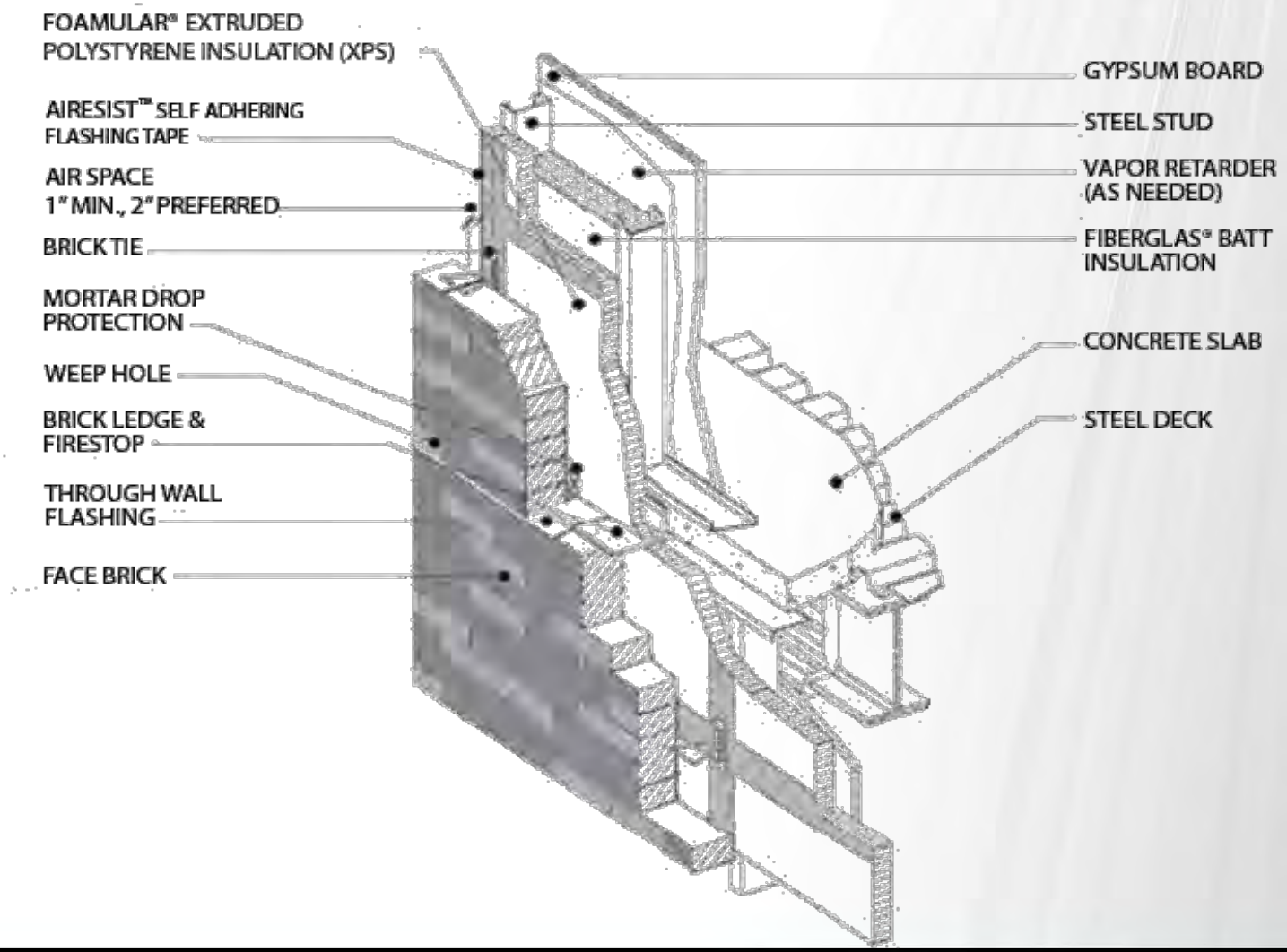
SEALING OF THE BUILDING ENVELOPE

All penetrations, openings, joints and seams in the building envelope must be sealed. Materials that can be used include:

- Caulking
- Gasketing
- Tapes
- Moisture vapor-permeable wrapping material

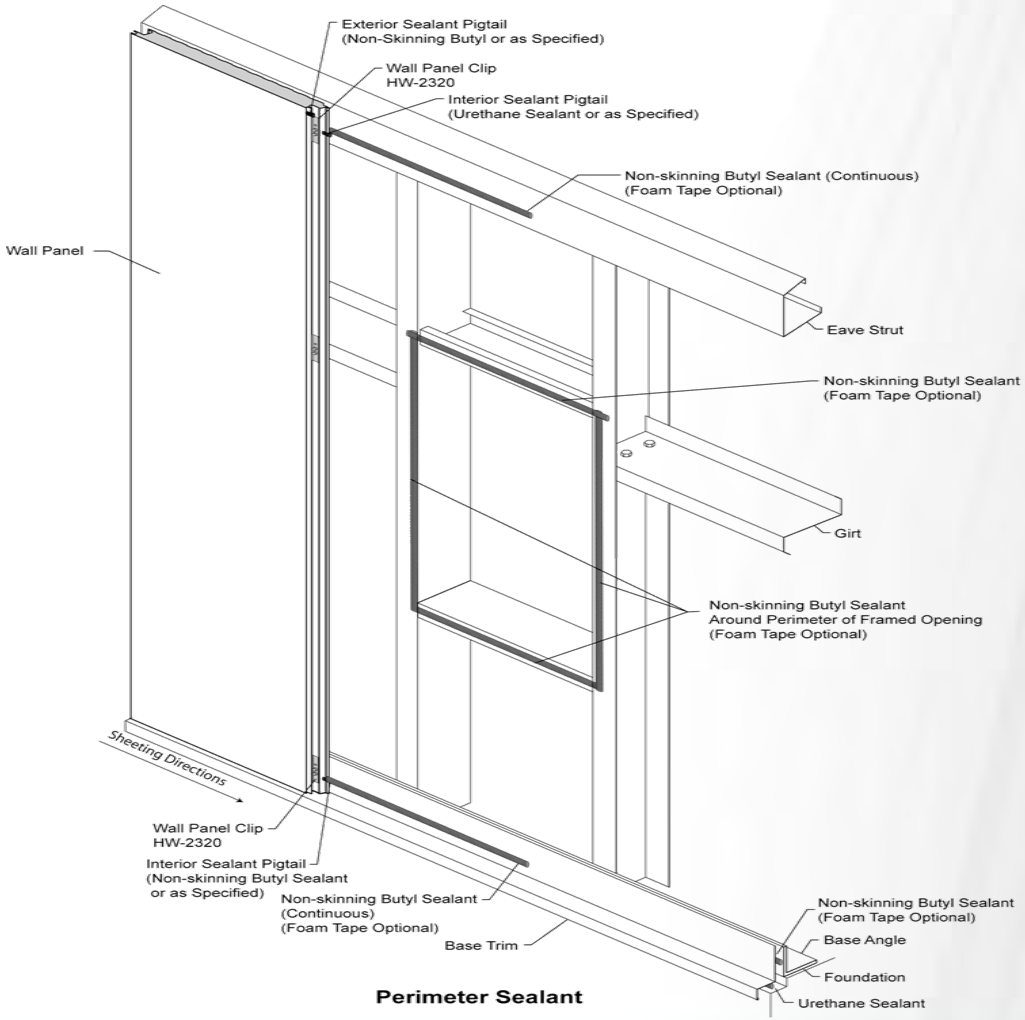
Continuous Insulation and Sealing The Envelope

MATERIAL REQUIREMENTS FOR CONVENTIONAL WALL CONSTRUCTION



Continuous Insulation and Sealing The Envelope

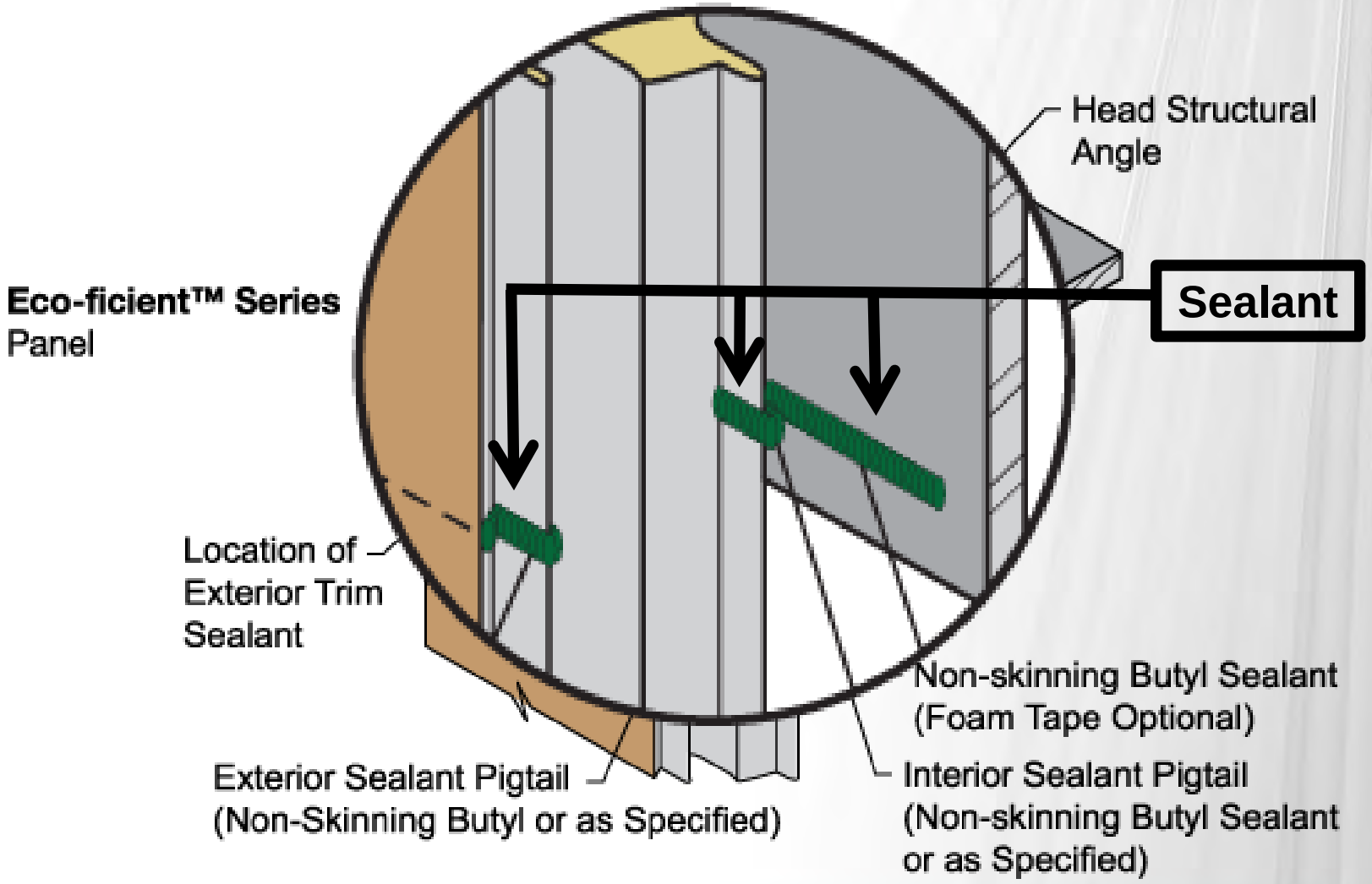
SEALANT DETAIL FOR IMP



Perimeter Sealant

Panel Sealant Detail

SEALANT PIGTAIL AT HEAD JOINT

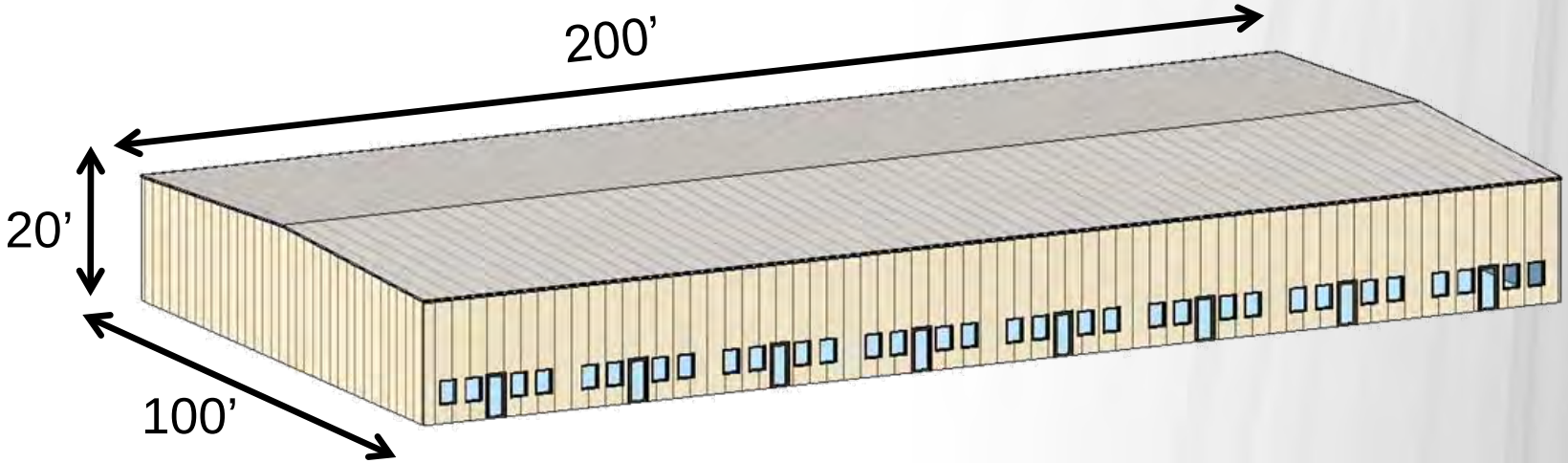


IMP Energy Savings Model

Insulated Metal Panels

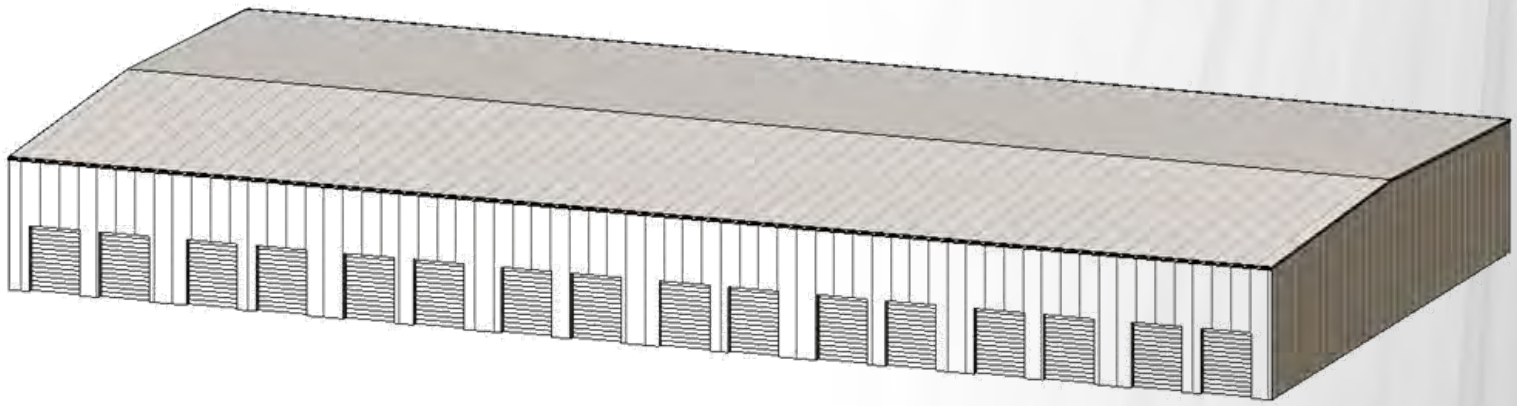
Example Savings – Model

- 100’ x 200’ x 20’ Commercial Warehouse
- ½” : 12” roof (nominally flat)
- 8-25’ Modules, each with
  - (2) 8’ x 10’ overhead dock doors on north wall
  - (4) 4’ x 4’ double pane bronze tinted windows and (1)3’ x 7’ ¼” single pane bronze glass door on the south wall
  - 20’ x 25’ office space with 10’ ceiling with unconditioned plenum above
  - 80’ x 25’ warehouse full height



Example Savings – Model

- Office operating M-F, 8am – 5pm
  - Heating Set Points – 70°(8-5), 64° otherwise
  - Cooling Set Points – 76° (8-5), 82 ° otherwise
- Warehouse (24-7)
  - Heating Set Point– 68 °
  - Cooling Set Point – 78 °



Example Savings – Model

- HVAC System
  - Electric direct expansion cooling
  - Gas furnace
- Two scenarios investigated
  - Single skin metal panels with R-11 on the walls and R-19 on the roof (ASHRAE 90.1 minimum) with Galvalume roof
  - 2” IMP walls and 3” IMP roof (thinnest panels that meet the same ASHRAE requirements)
    - Cool Roof in Houston
    - Dark painted roof in Boston and Minneapolis
    - Galvalume Plus® in Phoenix

Boston, MA

		Single Skin	Insulated Panel	Annual Savings
Energy Consumption	Space Cooling (MWh)	13.60	12.83	5.66%
	Ventilation (MWh)	11.20	10.80	3.57%
	Total Electricity (MWh)	24.80	23.63	**4.72%**
	Space Heating (MBTU)	402	363	**9.70%**
GHG Creation	Tons of CO_2	41.75	38.68	**7.35%**
Peak Cooling Loads	Wall Conduction (kBTU/h)	18.70	11.90	36.36%
	Roof Conduction (kBTU/h)	65.20	42.90	34.20%
	All Loads (kBTU/h)	256	229	**10.55%**
Peak Heating Loads	Wall Conduction (kBTU/h)	48.30	30.80	36.23%
	Roof Conduction (kBTU/h)	57.20	46.40	18.88%
	All Loads (kBTU/h)	197	170	**13.71%**

Minneapolis, MN

		Single Skin	Insulated Panel	Annual Savings
Energy Consumption	Space Cooling (MWh)	15.90	14.80	6.92%
	Ventilation (MWh)	11.90	11.00	7.56%
	Total Electricity (MWh)	27.80	25.80	**7.19%**
	Space Heating (MBTU)	594	541	**8.92%**
GHG Creation	Tons of CO_2	54.68	50.19	**8.21%**
Peak Cooling Loads	Wall Conduction (kBTU/h)	25.70	16.40	36.19%
	Roof Conduction (kBTU/h)	71.10	48.00	32.49%
	All Loads (kBTU/h)	270.4	239	**11.61%**
Peak Heating Loads	Wall Conduction (kBTU/h)	66.60	42.70	35.89%
	Roof Conduction (kBTU/h)	79.00	64.40	18.48%
	All Loads (kBTU/h)	267	229	**14.23%**

Houston, TX

		Single Skin	Insulated Panel	Annual Savings
Energy Consumption	Space Cooling (MWh)	50.4	42.68	15.32%
	Ventilation (MWh)	13.23	10.97	17.08%
	Total Electricity (MWh)	63.63	53.65	**15.68%**
	Space Heating (MBTU)	55.37	55.69	**-0.58%**
GHG Creation	Tons of CO_2	53.44	45.55	**14.76%**
Peak Cooling Loads	Wall Conduction (kBTU/h)	29.2	18.62	36.23%
	Roof Conduction (kBTU/h)	89.5	33.3	62.79%
	All Loads (kBTU/h)	291	225	**22.68%**
Peak Heating Loads	Wall Conduction (kBTU/h)	39.10	25.00	36.06%
	Roof Conduction (kBTU/h)	45.20	39.00	13.72%
	All Loads (kBTU/h)	150	130	**13.33%**

Phoenix, AZ

		Single Skin	Insulated Panel	Annual Savings
Energy Consumption	Space Cooling (MWh)	63.40	58.70	7.41%
	Ventilation (MWh)	14.94	13.50	9.64%
	Total Electricity (MWh)	78.34	72.20	**7.84%**
	Space Heating (MBTU)	27.90	22.00	**21.15%**
GHG Creation	Tons of CO_2	63.57	58.39	**8.16%**
Peak Cooling Loads	Wall Conduction (kBTU/h)	32.00	20.50	35.94%
	Roof Conduction (kBTU/h)	84.90	62.70	26.15%
	All Loads (kBTU/h)	322	290	**9.94%**
Peak Heating Loads	Wall Conduction (kBTU/h)	32.70	21.20	35.17%
	Roof Conduction (kBTU/h)	37.40	29.10	22.19%
	All Loads (kBTU/h)	105	86	**18.10%**

Important Specs You Need to Know

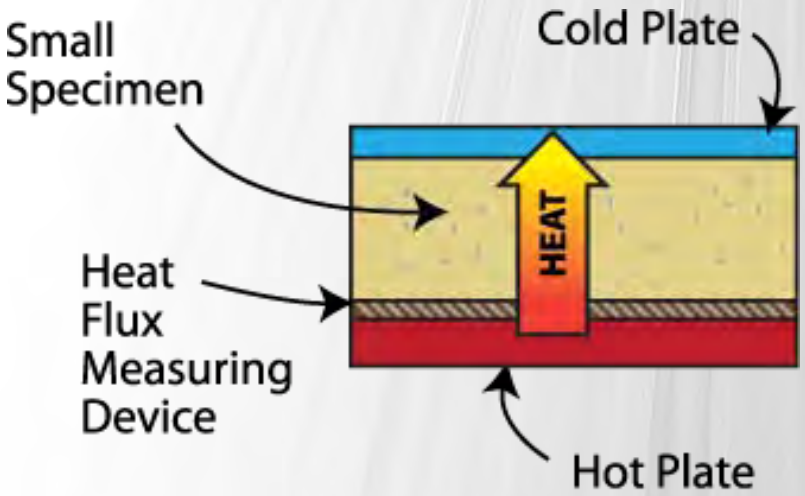
Insulated Metal Panels

Thermal Resistance

ONE OF TWO TESTS ARE COMMONLY SPECIFIED TO DETERMINE ASSEMBLY R-VALUES:

ASTM C518

- Tests only the insulation in flat form – not profiled like the panel
- Measures one panel and no joints
- Heat flow measured with an electronic device



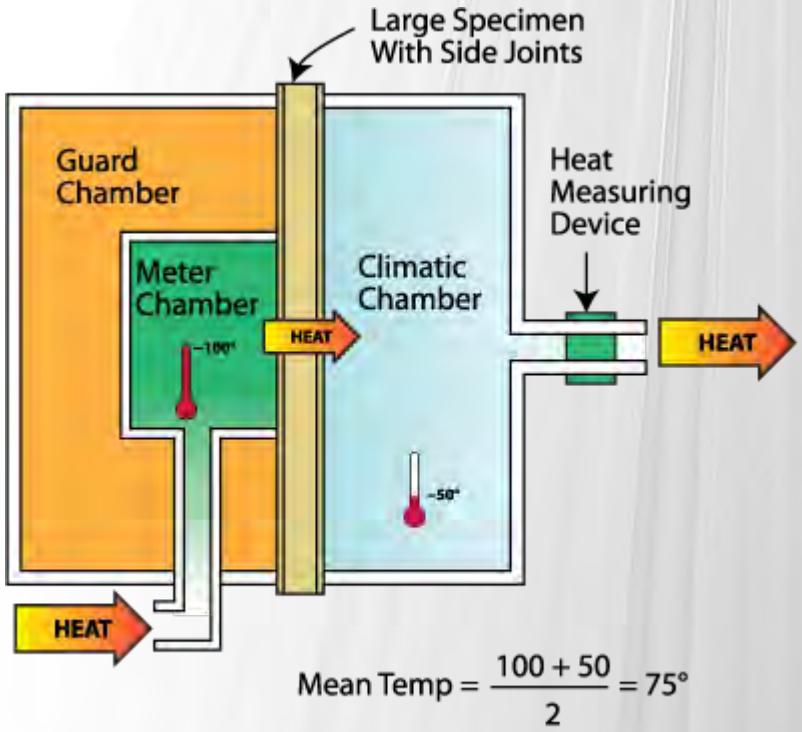
ASTM C518 Apparatus

Thermal Resistance

ONE OF TWO TESTS ARE COMMONLY SPECIFIED TO DETERMINE ASSEMBLY R-VALUES:

ASTM C1363

- Tests a complete panel assembly, including profile effects.
- Measures three panels and two joints. Joint effects are included.
- Performed in a hot box. Heat flow is measured more accurately.



ASTM C1363 Apparatus

Thermal Performance

FOAM THERMAL PERFORMANCE

- For a mean temperature of 75 F, IMPs have an R-Value of 7.14 per inch of thickness when tested to ASTM C1363
- The mean temperature will affect the results, a colder environment will improve the results
- Many manufacturers report R-Values at 40 F
- R-Values at temperatures lower than 75 F are appropriate in design of refrigeration facilities, but not conditioned buildings

Air and Water Infiltration

	Air	Water
Roof	**ASTM E 1680** **Result**: No more than 0.002 cfm/sf at a static pressure difference of 12 psf	**ASTM E 1646** **Result**: No uncontrolled water penetration at a static pressure difference of 12 psf
Wall	**ASTM E 283** **Result**: No more than 0.06 cfm/sf at a static pressure difference of 12 psf	**ASTM E 331** **Result**: No uncontrolled water penetration at a static pressure difference of 20 psf

AAMA 501.1 – WATER PENETRATION

No uncontrolled water penetration through the panel joints when subjected to a 95 mph slip stream air flow and applications of water for 15 minutes.

Fire & Environmental Testing

- **ASTM E84 SURFACE BURNING CHARACTERISTICS** – Establish surface burning characteristics of the foam core – Flame Spread 25/Smoke Developed 145
- **FM STD. 4880** – Class 1 fire rated insulated wall or wall and roof/ceiling panels, interior finish materials or coatings, and exterior wall systems in wall or wall and roof/ceiling constructions installed to maximum heights of 30 or 50 ft (9.1 or 15.2 m) or unlimited heights when exposed to an ignition source simulating a building fire.
- **FM STD 4881,1.1.1** – Exterior wall systems are exposed to a number of natural hazards and must reject rain, wind, hail, water infiltration and other deleterious affects caused from everyday exposure to heat, cold, building movement and sunlight.
- **FM STD 4881,1.1.2** – Exterior wall systems are also exposed to fire and must by able to limit fire propagation over and/or through the assembly.

Physical Characteristics

FREEZE/HEAT CYCLING

No delamination, surface blistering, or permanent bowing when subjected to cyclic temperature extremes of -20 F to +180 F for twenty one eight hour cycles.

HUMIDITY TEST

No delamination or metal corrosion at interface when subjected to a 140 F temperature and 100% relative humidity for a total of 1200 hours.

AUTOCLAVE TEST

No delamination of the foam core from metal skins when exposed to 2 psi pressure at a temperature of 212 for a total of 2 ½ hours

Insulated Metal Panel Advantages - Review

- Come in a wide variety of colors, applied finish offerings, and profiles for buildings to be customized to meet the needs of both design and function.
- High R-Value – 7.14 per inch of panel thickness at 75° mean temp
- No thermal drift as experienced with un-faced rigid insulation
- Qualifies as continuous insulation where required by IECC and ASHRAE 90.1
- Panels sealed at side laps and at all perimeter conditions
- ASHRAE/California compliant Cool Roof colors as listed on Cool Roof Rating Council (CRRC) Website.

AIA PRESENTATION

Retrofit Framing Systems

Presented By: ***MBCI***

AIA PRESENTATION

Devil is in the Details

Presented By: ***MBCI***

AIA PRESENTATION

A Review of Metal Panel Warranties

Presented By: ***MBCI***

MBCI THANKS YOU FOR YOUR ATTENDANCE

QUESTIONS?

www.mbci.com

This concludes the American Institute of Architects
Continuing Education Systems Program

MBCI®
Metal Roof and Wall Systems
www.mbci.com