PIMA
POLYISOCYANURATE INSULATION MANUFACTURERS ASSOCIATION

PROVIDER NUMBER G501

Reroofing Requirements for Commercial Buildings in the 2015 International Codes

COURSE NUMBER: PIM005

PIMA | pima@pima.org | 703-258-0093 | October 8, 2019

Credit(s) earned on completion of this course will be reported to AIA CES for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

This course is registered with 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.

Course Description

The International Code Council (ICC) publishes a coordinated set of model codes that provides comprehensive minimum requirements for the building and construction environment.

Most of the I-Codes are based on the default requirements for new construction. Roofing, however, is different. Most (about 75%) of the roof systems installed on US buildings end up on *existing* buildings, not new. Reroofing is one of the most common construction projects; most US buildings will have three or more roof systems during their useful lifespans.

While the IBC contains the basic material requirements for roof covering assemblies, other provisions for reroofing can be found in the *International Energy Conservation Code* (IECC).

Recent clarifications and reorganizations to the IECC and IEBC for reroofing have improved the clarity of the code requirements, but given the need to coordinate the provisions across three codes, many users of the code will benefit from a reroofing review.

The PIMA session includes a discussion of the requirements and definitions for roof repair and reroofing (which includes roof recover and roof replacement) in the IBC and IECC. The program is intended to connect the dots and assist attendees in understanding the material and installation requirements for reroofing, as well as compliance with provisions for fire, structural, weather protection and energy efficiency. The program includes a sample permit and inspection checklist developed by PIMA in consultation with code officials.

Learning Objectives

At the end of the this course, participants will be able to:

1. Enforce the Provisions for Roof Recover and Roof Replacement
2. Understand the International Building Code Provisions and Definitions for Reroofing
3. Apply Exceptions to Energy Code Reroofing Requirements
4. Enforce Energy Code Provisions for Roof Replacements

Reroofing Requirements for Commercial Buildings in the 2015 International Codes

Rick Mockler (Hunter Panels)

The Polyisocyanurate Insulation Manufacturers Association (PIMA)

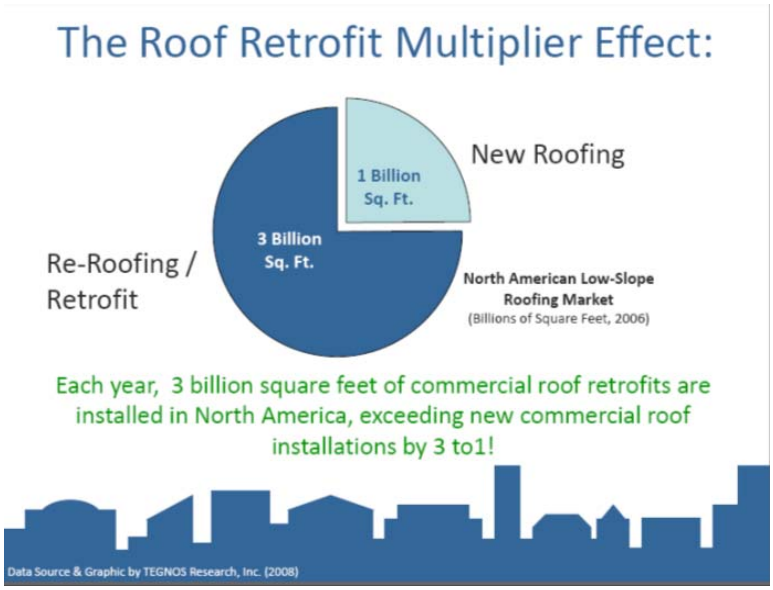
Reroofing is Important!

Roofing is One of the Most Common Renovation Projects.

Most New Roofs are on EXISTING Buildings.

Bringing Roof Assemblies up to Today's Code Standards- whether for Structural Performance, Energy Efficiency, or Fire Testing- is an Opportunity That is Found Once in Several Decades.

CEIR Retrofit Study



Scope: Roofing

Definitions

Let's Start at the Very Beginning!

IBC Chapter 15

IECC CE Requirements

Definitions

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purposes of its maintenance.

REROOFING. The process of recovering or replacing an existing *roof covering*. See "Roof recover" and "Roof replacement."

ROOF RECOVER. The process of installing an additional *roof covering* over a prepared existing *roof covering* without removing the existing *roof covering*.

ROOF REPLACEMENT. The process of removing the existing *roof covering,* repairing any damaged substrate and installing a new *roof covering*.

Definitions

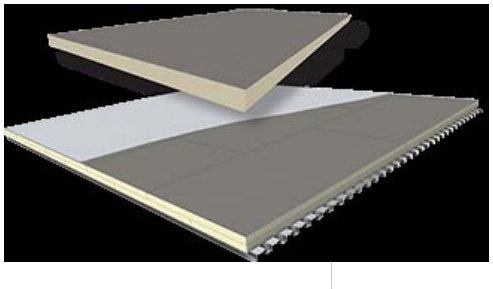
ROOF ASSEMBLY. A system designed to provide weather protection and resistance to design *loads.* The system consists of a *roof covering* and *roof deck* or a single component serving as both the roof covering and the *roof deck*. A roof assembly includes the *roof deck*, *vapor retarder*, substrate or thermal barrier, insulation, *vapor retarder* and *roof covering*.

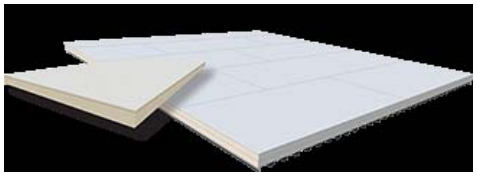
ROOF COVERING. The covering applied to the *roof deck* for weather resistance, fire classification or appearance.

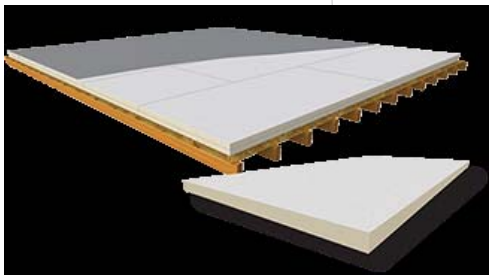
ROOF DECK. The flat or sloped surface constructed on top of the *exterior walls* of a building or other supports for the purpose of enclosing the *story* below, or sheltering an area, to protect it from the elements, not including its supporting members or vertical supports.

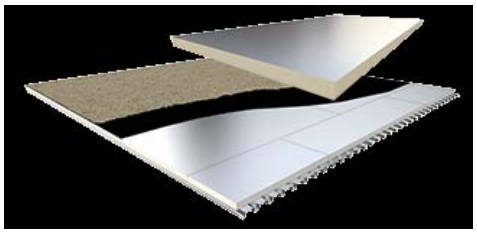
Insulation Types

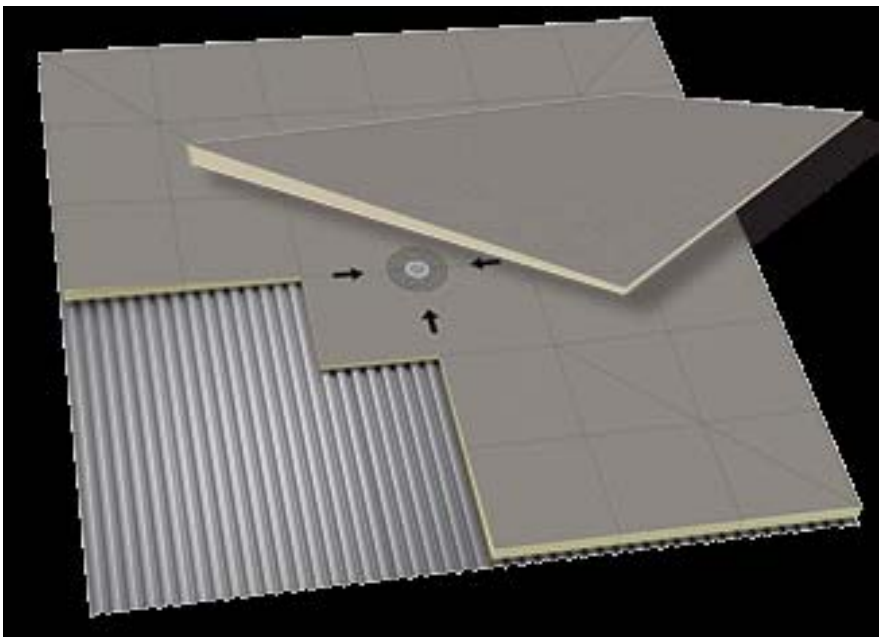
- Polyisocyanurate
  - High R-value Per Inch
  - Fire Resistance Properties
  - Lightweight
  - Easy to Handle, Cut and Install
- Expanded Polystyrene
- Extruded Polystyrene
- Mineral Fiber



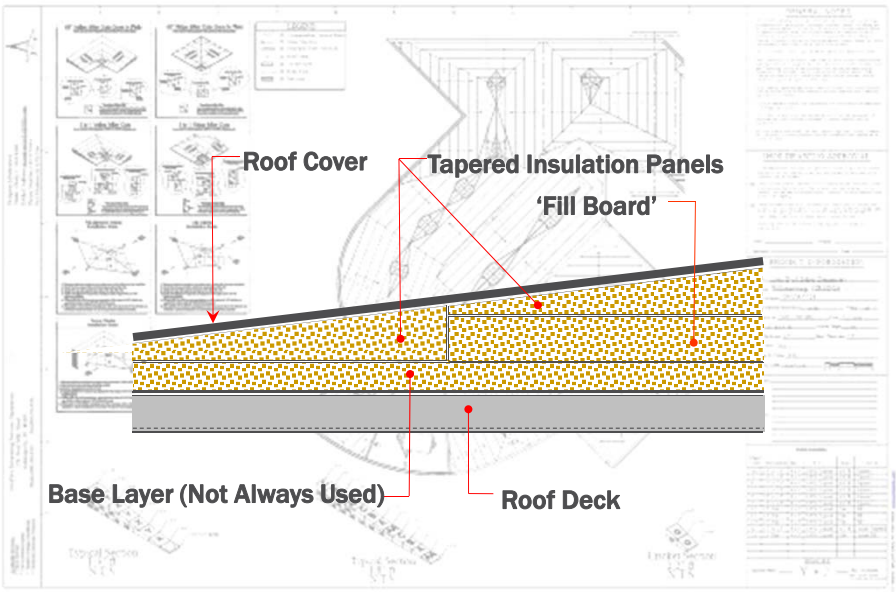




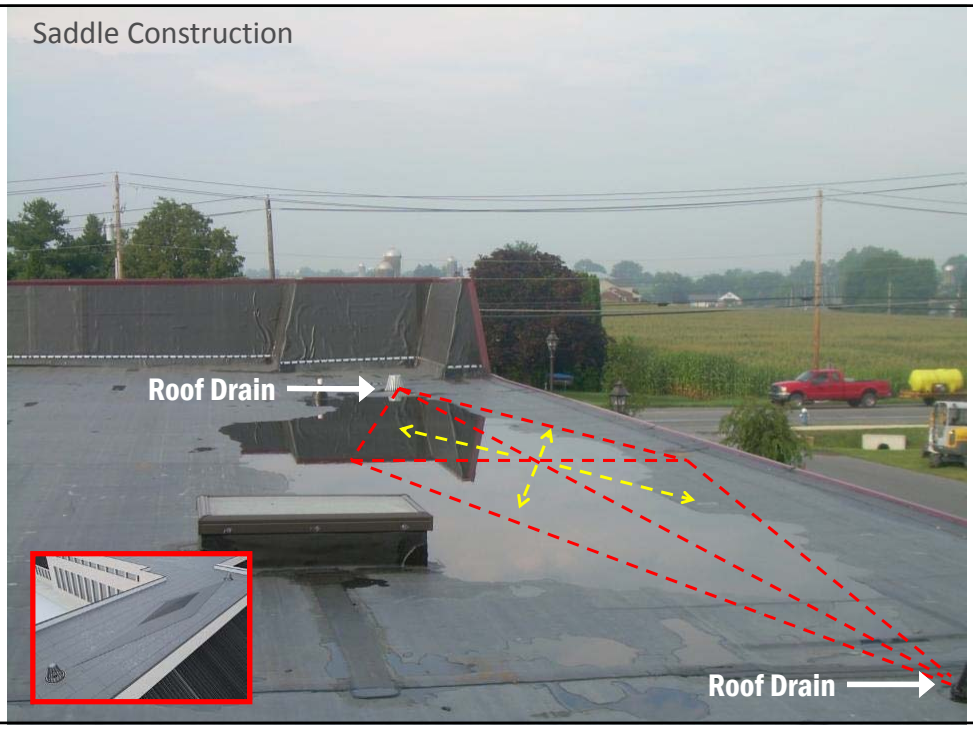




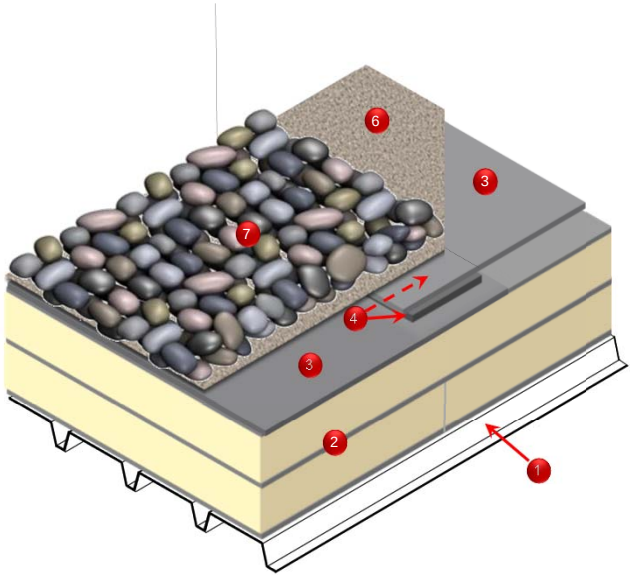
Tapered Insulation Systems



Saddle Construction

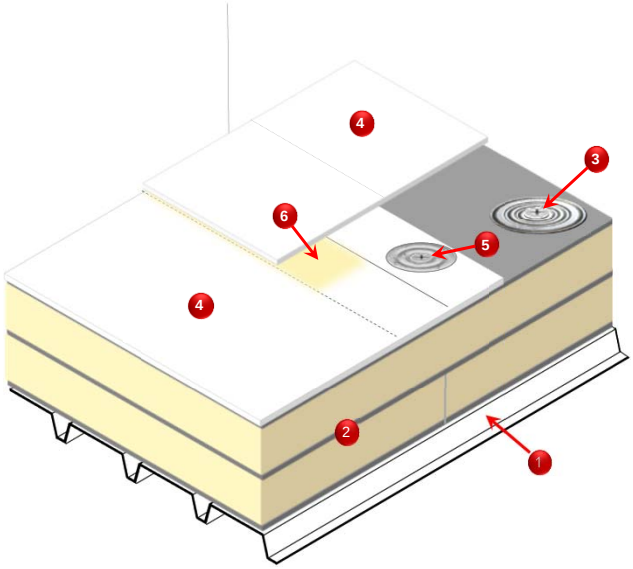


Ballasted EPDM



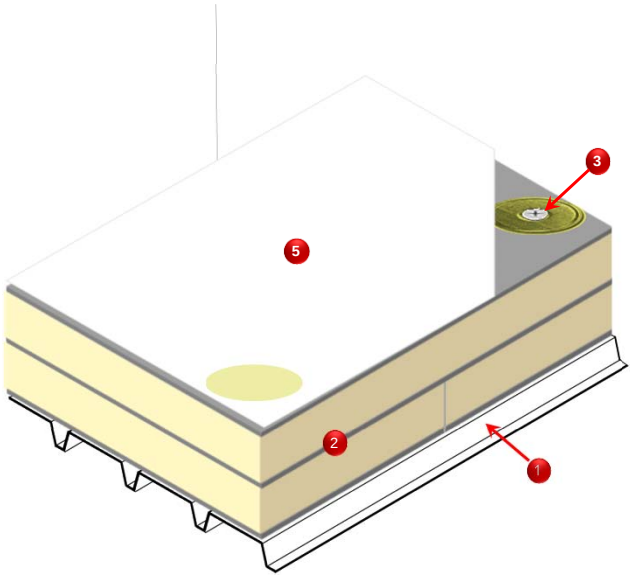
1. Roof Deck
2. Roof Insulation – multiple layers – loose laid
3. EPDM Membrane
4. Primer Wash (all areas that will contact membrane)
5. 3” Seam Tape
6. Optional Fabric Protection Map
7. Smooth, Rounded Stone, min. 10 lb/sf

Mechanically Attached TPO & PVC



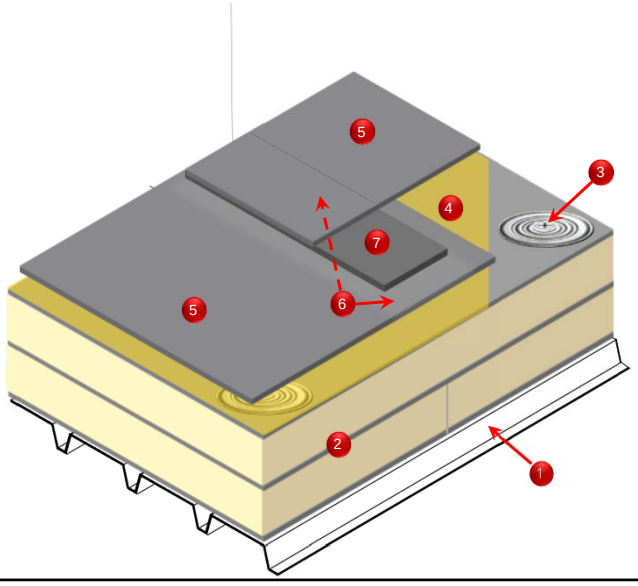
1. Roof Deck
2. Roof Insulation – Multiple Payers
3. Fasteners & 3” Plates to Mfr Specs
4. Thermoplastic Membrane
5. Fastener & Membrane Plate to Mfr Specs
6. Hot Air Weld to Mfr Specifications

Induction Welded Thermoplastic



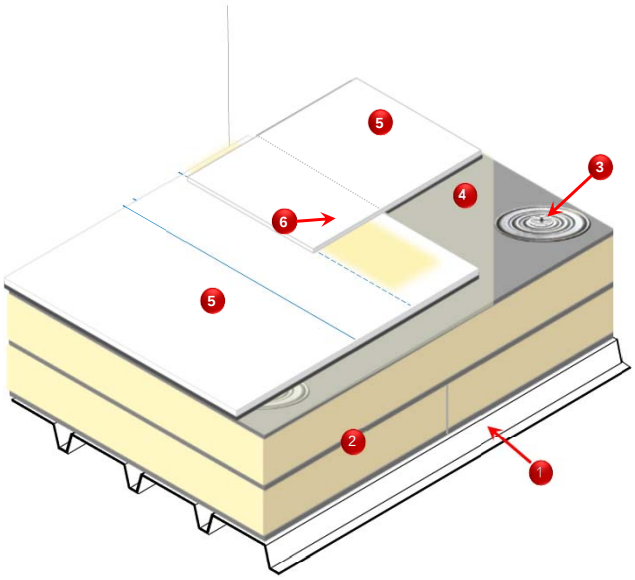
1. Roof Deck
2. Roof Insulation – Multiple Payers
3. Fasteners & Special 3” Plates to Mfr Specs
4. Thermoplastic Membrane, Loose Laid
5. Induction Weld through Membrane to Special 3” Plate

Fully Adhered EPDM



1. Roof Deck
2. Roof Insulation – Multiple Payers
3. Fasteners & 3” Plates to Mfr Specs
4. Membrane Adhesive (by Manufacturer)
5. EPDM Membrane
6. Primer Wash (all areas that will contact membrane)
7. 3” Seam Tape

Self-Adhered TPO Membrane



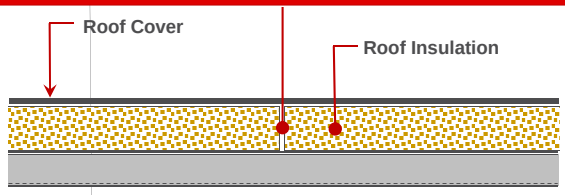
1. Roof Deck
2. Roof Insulation – Multiple Payers
3. Fasteners & 3" Plates to Mfr Specs
4. Substrate Primer (if req'd by Manufacturer)
5. Self-Adhering Membrane
6. Hot Air Weld to Mfr Specifications

What is this & what caused it to happen?

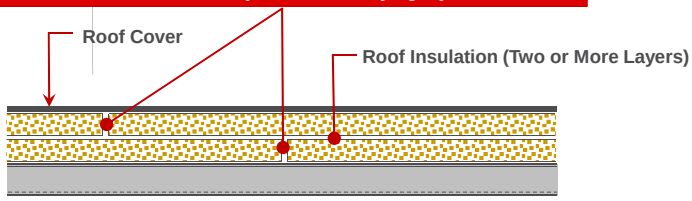
Cold Insulation Joints

What causes them and how to avoid them

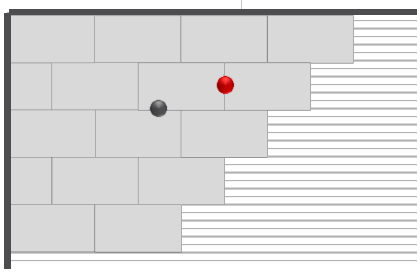
Joints in single-layer installations (a.k.a. "Cold Joints") allow heat gain/loss. This decreases the insulation's efficiency and can cause condensation if no vapor barrier/retarder is installed.



All joints in second layer (and subsequent layers) should be offset at least 6" from all joints in underlying layers.

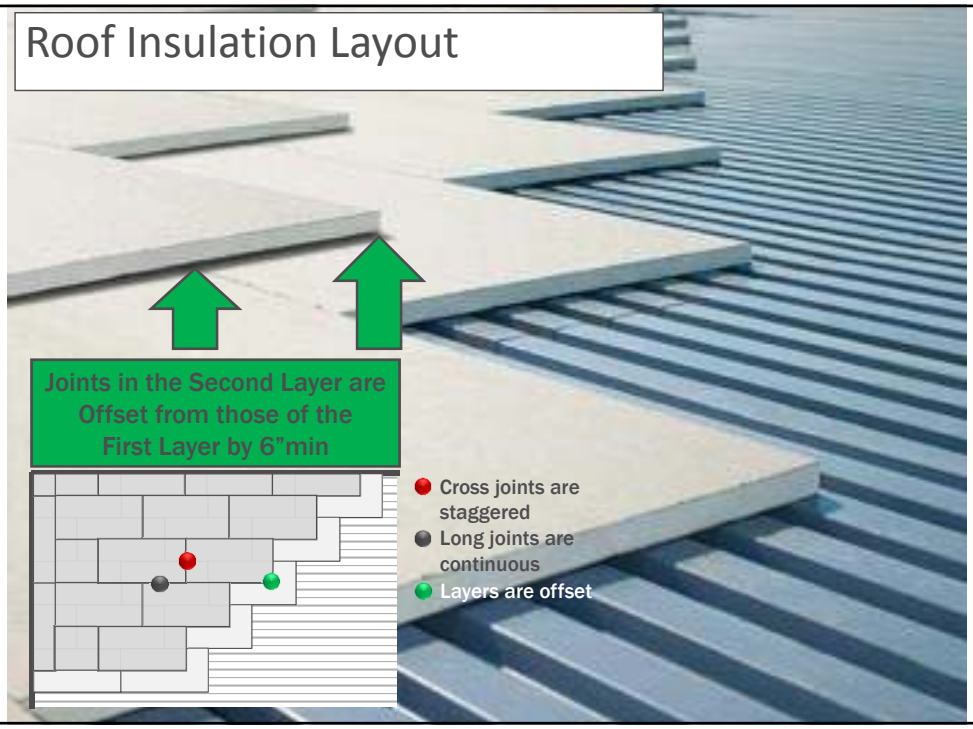


Roof Insulation Layout



- Cross joints are staggered
- Long joints are continuous

Roof Insulation Layout



IBC 1511: Reroofing

1511.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15.

Exception: *Reroofing* shall not be required to meet the minimum design slope requirement of one-quarter unit vertical in 12 units horizontal (2-percent slope) in Section 1507 for roofs that provide positive roof drainage.

1511.2 Structural and construction loads. Structural roof components shall be capable of supporting the roof-covering system and the material and equipment loads that will be encountered during installation of the system.

Roof Replacement

1511.3 Roof Replacement. *Roof replacement* shall include the removal of all existing layers of roof coverings down to the roof deck.

Exception: Where the existing roof assembly includes an ice barrier membrane that is adhered to the roof deck, the existing ice barrier membrane shall be permitted to remain in place and covered with an additional layer of ice barrier membrane in accordance with Section 1507.

Roof Recover

1511.3.1 Roof recover. The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing-seam metal roof panel systems, that are designed to transmit the roof loads directly to the building's structural system and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.

Roof Recover

1511.3.1 Roof recover. The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs when applied in accordance with Section 1511.4.

4. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear off of existing roof coverings.

Reroofing

NOTE: New Language in 2015 IBC Clarifies that Roof Recover In Accordance With Approved Manufacturers Instructions Shall Be Permitted. This Provision Applies Only to IBC Chapter 15 Requirements.

This is Important: Listings for Wind and Fire Performance of Roof Coverings are Based on Assembly Tests that Include Insulation, Decks, Cover Boards etc.

2015 IEBC

The 2015 IEBC Includes Specific Detailed Reroofing Provisions; but also Does Cover Repairs to Existing Roofs in Chapter 6:

601.2 Conformance. The work shall not make the building less conforming than it was before the *repair* was undertaken.

602.1 Existing building materials. Materials already in use in a building in compliance with requirements or approvals in effect at the time of their erection or installation shall be permitted to remain in use unless determined by the *code official* to render the building or structure unsafe or *dangerous* as defined in Chapter 2.

2015 IEBC

706 REROOFING

Based on IBC Section 1510

Limits Recovering to TWO Layers

Roof Replacement Requires Removal of Existing Roofing Materials to the Roof Deck

IEBC SECTION 908 ENERGY CONSERVATION

908.1 Minimum requirements. Level 3 *alterations* to *existing buildings* or structures are permitted without requiring the entire building or structure to comply with the energy requirements of the *International Energy Conservation Code* or *International Residential Code*. The *alterations* shall conform to the energy requirements of the *International Energy Conservation Code* or *International Residential Code* as they relate to new construction only.

2012 IECC

C101.4.3 Additions, alterations, renovations or repairs.

Additions, alterations, renovations or repairs to an existing building, building system or portion thereof shall conform to the provisions of this code as they relate to new construction without requiring the unaltered portion(s) of the existing building or building system to comply with this code. Additions, alterations, renovations or repairs shall not create an unsafe or hazardous condition or overload existing building systems. An addition shall be deemed to comply with this code if the addition alone complies or if the existing building and addition comply with this code as a single building.

2012 IECC

The 2012 IECC States the following is exempt from the energy code provisions (Exceptions to C101.4.3):

5. Reroofing for roofs where neither the sheathing nor the insulation is exposed. Roofs without insulation in the cavity and where the sheathing or insulation is exposed during reroofing shall be insulated either above or below the sheathing.

Caveat: *PROVIDED* the Energy Use of the Building is Not Increased

IECC 2015: Clarifications

Reroofing

- Definitions from building codes carried over to the IECC as a basis for *Roof Replacement* clarifications on insulation requirements.
- *Roof Repair* and *Roof Recover* are exempt from the envelope requirements- provided the modification does not increase the energy use of the building.
- *Roof Recover* and *Roof Replacement* are exempt from air barrier requirements.

2015 IECC Clarification

C503.3.1 Roof replacement.

Roof replacements shall comply with Table C402.1.3 or C402.1.4 where the existing roof assembly is part of the *building thermal envelope* and contains insulation entirely above the roof deck.

Envelope Requirements

ASHRAE 90.1-2013 & 2015 IECC

OPAQUE THERMAL ENVELOPE ASSEMBLY REQUIREMENTS FOR ROOFING SYSTEMS

Climate Zone	1		2		3		4		5		6		7		8	
Occupancy	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R	All Other	Group R
Roofs: Insulation Entirely Above Deck																
R-Value	R-20ci	R-25ci	R-25ci	R-25ci	R-25ci	R-25ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-30ci	R-35ci	R-35ci	R-35ci	R-35ci
U-Factor	U- .048	U- .039	U- .039	U- .039	U- .039	U- .039	U- .032	U- .032	U- .032	U- .032	U- .032	U- .032	U- .028	U- .028	U- .028	U- .028

What About ASHRAE?

Three Compliance Options Under the IECC Commercial Provisions:

- ASHRAE 90.1
- IECC Prescriptive Path
- IECC Performance Path

ASHRAE 90.1

ASHRAE 90.1 Also Contains Definitions and Provisions For Reroofing

ASHRAE 90.1 Requires Insulation Compliance For Roof Replacement Projects With Above-Deck Insulation

ASHRAE 90.1 Is Not Directly Correlated to the IBC or IEBC

Reroofing Summary

Repairs Are Exempt From Most New Building Provisions Provided the Repair Does Not Diminish Life Safety

Roof Replacements Where Insulation is Beneath The Roof Deck or in the Attic Cavity are Not Required to Meet New Insulation Requirements IF the Cavity is Not Exposed During the Project

Reroofing Summary

New Roof Coverings Must Meet Code Requirements for Structural (Wind), Fire, and Weather Protection

New Roof Coverings Must Not Increase the Energy Use of the Building

Roof Replacements Where the Insulation and/or Roof Deck are Exposed Shall Meet Insulation Requirements

Reroofing Checklist

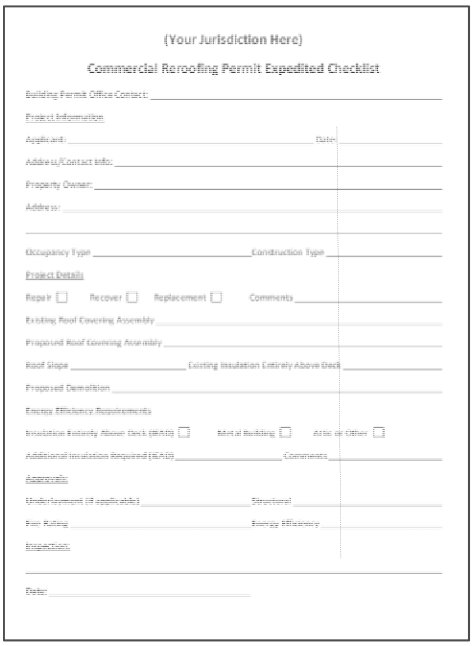
To Be Used as a Building Permit Tool

Project Info and Details

Proposed Roof Assembly

- Roof Coverings
- Insulation
- Approvals

Inspection Tool



(Your Jurisdiction Here)

Commercial Reroofing Permit Expedited Checklist

Building Permit Office Contact: _____

Project Information

Applicant: _____ Date: _____

Address/Contact Info: _____

Property Owner: _____

Address: _____

_____

Occupancy Type _____ Construction Type _____

Project Details

Repair ☐ Recover ☐ Replacement ☐ Comments _____

Existing Roof Covering Assembly _____

Proposed Roof Covering Assembly _____

Roof Slope _____ Existing Insulation Entirely Above Deck _____

Proposed Demolition _____

Energy Efficiency Requirements

Insulation Entirely Above Deck (IECC) ☐ Metal Building ☐ Attic or Other ☐

Additional Insulation Required (IECC) _____ Comments _____

Approvals

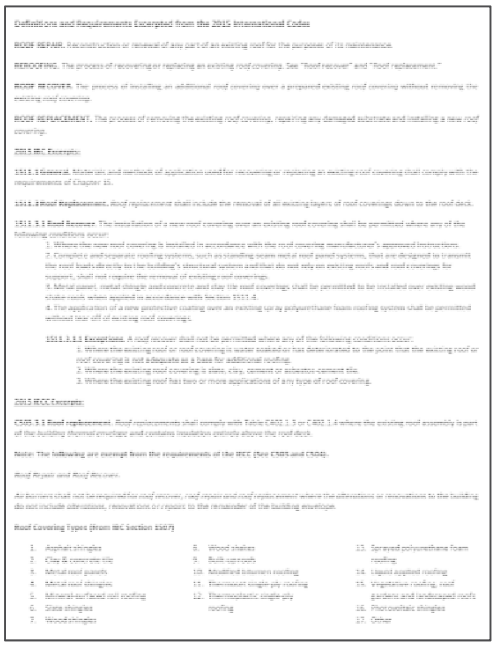
Underlayment (if applicable) _____ Structural _____

Fire Rating _____ Energy Efficiency _____

Inspection:

_____

Date: _____



Definitions and Requirements Excerpted from the 2015 International Codes

ROOF REPAIR. Reconstruction or renewal of any part of an existing roof for the purpose of its maintenance.

REROOFING. The process of recovering or replacing an existing roof covering. See "Roof recover" and "Roof replacement."

ROOF RECOVER. The process of installing an additional roof covering over a prepared existing roof covering without removing the existing roof covering.

ROOF REPLACEMENT. The process of removing the existing roof covering, repairing any damaged substrate and installing a new roof covering.

2015 IBC Excerpts:

1511.1 General. Materials and methods of application used for recovering or replacing an existing roof covering shall comply with the requirements of Chapter 15.

1511.3 Roof Replacement. Roof replacement shall include the removal of all existing layers of roof coverings down to the roof deck.

1511.3.1 Roof Recover. The installation of a new roof covering over an existing roof covering shall be permitted where any of the following conditions occur:

1. Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.
2. Complete and separate roofing systems, such as standing seam metal roof panel systems, that are designed to transmit the roof loads solely to the building's structural systems and that do not rely on existing roofs and roof coverings for support, shall not require the removal of existing roof coverings.
3. Metal panel, metal shingle and concrete and clay tile roof coverings shall be permitted to be installed over existing wood shake roofs where applied in accordance with Section 1511.8.
4. The application of a new protective coating over an existing spray polyurethane foam roofing system shall be permitted without tear off of existing roof coverings.

1511.3.1.1 Exceptions. A roof recover shall not be permitted where any of the following conditions occur:

1. Where the existing roof or roof covering is water soaked or has deteriorated to the point that the existing roof or roof covering is not adequate as a base for additional roofing.
2. Where the existing roof covering is slate, clay, cement or asbestos-cement tile.
3. Where the existing roof has two or more applications of any type of roof covering.

2015 IECC Excerpts:

C503.3.3 Roof replacement. Roof replacements shall comply with Table C402.1.3 or C402.1.4 where the existing roof assembly is part of the building thermal envelope and contains insulation entirely above the roof deck.

Note: The following are exempt from the requirements of the IECC (See C503 and C504):

Roof Repairs and Roof Recovers.

Air barriers shall not be required for roof recovers, roof repairs and roof replacement where the alterations or renovations to the building do not include alterations, renovations or repairs to the remainder of the building envelope.

Roof Covering Types (from IBC Section 1507)

1. Asphalt shingles	8. Wood shakes	13. Sprayed polyurethane foam roofing
2. Clay & concrete tile	9. Built-up roofs	14. Liquid applied roofing
3. Metal roof panels	10. Modified bitumen roofing	15. Vegetative roofing, roof gardens and landscaped roofs
4. Metal roof shingles	11. Thermoset single-ply roofing	16. Photovoltaic shingles
5. Mineral-surfaced roll roofing	12. Thermoplastic single-ply roofing	17. Other
6. Slate shingles		
7. Wood shingles		

Reroofing Checklist

Specific Types of Recover Allowed:

- *Where the new roof covering is installed in accordance with the roof covering manufacturer's approved instructions.*
- Super-Structure Systems Such as Standing Seam Metal Roof Systems
- Metal Panel or Shingle, Concrete or Clay Tile Over Existing Wood Shake Roofs
- New Coatings Over Existing SPF Roofs

Reroofing Checklist

Recover Allowed:

IF there are Less Than Two Existing Layers *and*

The Existing Roof Covering Assembly is NOT Water Damaged or Deteriorated

Recover NOT Allowed:

Where the existing roof covering is slate, clay, cement or asbestos-cement tile.

Reroofing Checklist

Recover Requirements

New Roof Covering Assembly Must Meet All Requirements For New Construction *except*

- Energy Efficiency Performance *if* The Energy Use of the Building is NOT Increased
- Roof Reflectance Requirement Depends on:
  - Climate Zone (IECC Requirements) *and*
  - Existing Roof Covering

Reroofing Checklist

Roof Replacement Requirements

Existing Roof Coverings Shall Be Removed Down to Roof Deck

New Roof Covering Assembly Must Meet All Requirements For New Construction

- Including Roof Insulation For Roof Assemblies That Are Part of the Thermal Envelope and Contain Insulation Entirely Above Deck (IEAD)
- Roof Reflectance Depends on: Climate Zone (IECC Requirements) *and* Existing Roof Covering

Reroofing is Important!

Roofing is One of the Most Common Renovation Projects.

Most New Roofs (Around 75%) Are on EXISTING Buildings.

Bringing Roof Assemblies up to Today's Code Standards- whether for Structural Performance, Energy Efficiency, or Fire Testing- is an Opportunity That is Found Once in Several Decades.

Q&A

Thanks For Your Attention!

Rick Mockler
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This concludes the American Institute of Architects Continuing Education Systems Course

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POLYISOCYANURATE INSULATION MANUFACTURERS ASSOCIATION

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