

KEY PROVISIONS

- The insulation requirements for roof alterations apply to all roof replacements and recovers regardless of whether existing insulation is located above or below the roof deck.
- The prescriptive minimum requirements for roof alterations are:
 - **R-17** or **R-23** (depending on climate zone) with the use of continuous insulation (ci) only; or
 - **U-0.042** or **U-0.037** (depending on climate zone) if the insulation is a combination of continuous and cavity insulation. Assemblies insulated with cavity insulation must have a **minimum R-10ci installed above the roof deck**.
- There are two exceptions that include important backstops:
 - **Roof Recovers:** Recovers are not required to meet the full R-17/23 (or U-0.037/0.042) requirements if at least R-10ci of **new** insulation is installed above the roof deck.
 - **Equipment Curbs and Flashing Heights:** The maximum amount of insulation (up to the prescriptive requirement) or R-10ci, whichever is greater, must be installed where flashing heights associated with HVAC equipment curbs present limiting conditions.



CLIMATE ZONE MAP

The web-based tool for locating the Climate Zone applicable to a specific project can be accessed [here](#).



MINIMUM ROOF INSULATION ASSEMBLY REQUIREMENTS

U-factors/R-values for Span Deck and Concrete Roof Assemblies (R-values are for above deck ci)

| Building Category | Roof Assembly Category | Climate Zones | U-factors | Prescriptive R-value (JA4) | Table |
|--|------------------------|---------------|-----------|----------------------------|--------------------|
| Nonresidential | Span Deck & Concrete | 1-5, 9-16 | U-0.034 | R-30ci | 140.3-B |
| Nonresidential | Span Deck & Concrete | 6-8 | U-0.049 | R-20ci | 140.3-B |
| Hotel/Motel, Multifamily (Option D, Non-Attic) | Span Deck & Concrete | 1-2, 4, 8-16 | U-0.028 | R-32ci or 33ci* | 140.3-C 170.2-A |
| Hotel/Motel, Multifamily (Option D, Non-Attic) | Span Deck & Concrete | 3, 5-6 | U-0.034 | R-30ci | 140.3-C 170.2-A |
| Hotel/Motel, Multifamily (Option D, Non-Attic) | Span Deck & Concrete | 7 | U-0.039 | R-25ci | 140.3-C 170.2-A |

* This R-value is an estimate because the Appendix Table 4.2.6 does not list a corresponding R-value for U-factors \leq U-0.028.

1. Notes for Nonresidential Buildings, Hotel/Motel Guest Rooms and Multifamily Buildings

- Roofs are divided into two categories: “metal building” roofs and “wood framed and other” roofs. The information in this fact sheet applies only to the “wood framed and other” category.
- Unlike the ASHRAE 90.1 Standard and the International Energy Conservation Code, California does not have separate requirements for roofs with “Insulation Entirely Above Deck.” Instead, Title 24’s U-factor requirements account for the insulation that is installed both above the roof deck and in the framing cavities.

2. Calculating Equivalent R-values

- To calculate the insulation R-values that are equivalent to the required U-factors for different roof assemblies, the code user can use CEC-approved software or the tables in **Joint Reference Appendix 4 (JA4)**. Appendix JA4 lists the equivalent insulation R-values for a range of common assembly types. As an example, for span deck and concrete roof assemblies, the equivalent insulation R-values for above deck insulation range from R-20ci to R-30ci depending on the building type and climate zone (see table above). However, the R-values found in Appendix JA4 can only be used for the prescriptive approach.

ROOF ALTERATIONS

MINIMUM ROOF INSULATION ASSEMBLY REQUIREMENTS

When do the Title 24 requirements for minimum roof insulation levels apply to roof alterations?

- When more than 50 percent of the roof area or more than 2,000 square feet of roof, whichever is less.
- Both apply to roof replacements **and** roof recovers.
- Hospitals and other healthcare facilities are exempt from the alteration requirements (see Title 24 Section 141.0, exception).
- Any non-conditioned space (not heating/AC) typically does not require insulation.

1. Nonresidential and Hotel/Motel Buildings (Section 141.0(b)2Bii)

- **Minimum Insulation Requirements:** Roof alterations (both replacements and recovers) must comply with the minimum R-values or U-factors in Table 141.0-C as follows:

Insulation Requirements for Roof Alterations

| Climate Zones | R-value | U-factor | Table |
|---------------|---------|---|---------|
| 1-5, 9-16 | R-23ci | U-0.037 with at least R-10ci above deck | 141.0-C |
| 6-8 | R-17ci | U-0.047 with at least R-10ci above deck | 141.0-C |

• Exceptions and Backstops:

- Recovers are not required to meet the levels specified in Table 141.0-C if at least R-10ci of new insulation is installed above the roof deck.
- When existing mechanical equipment located on the roof will not be disconnected and lifted as part of the roof alteration, insulation added shall be the greater of R-10ci or the maximum installed thickness that will allow the distance between the height of the roof membrane surface to the top of the base flashing to remain in accordance with the manufacturer’s installation instructions. Note: Compliance with Table 141.0-C without exception is required if adding R-10ci necessitates lifting the equipment in order to comply with the manufacturer’s recommendations for flashing heights.
- Tapered insulation with a thermal resistance less than that prescribed in Table 141.0-C may be used at the drains and other low points, if insulation thickness is increased at the high points of the roof so that the “average thermal resistance” equals or exceeds the value specified in Table 141.0-C.
- The area of the existing roof that is “recoated” (i.e., liquid applied roof coating) is not required to be insulated.

2. Multifamily Buildings (Section 180.2(b)1Aiii)

- **Minimum Insulation Requirements:** Roof alterations shall be insulated to R-14 continuous insulation or a U-factor of U-0.039 in Climate Zones 1, 2, 4, and 8 through 16. Note: There are no insulation requirements for multifamily building roof alterations in the other climate zones.
- **Exceptions and Backstops:**
 - Roof recovers with new R-10ci of insulation added above the roof deck are not required to meet the minimum requirements for other roof alterations.
 - When existing mechanical equipment located on the roof will not be disconnected and lifted, the insulation added may be limited to the greater of R-10ci or the maximum installed thickness that will allow the distance between the height of the roof membrane surface to the top of the base flashing to remain in accordance with the manufacturer's installation instructions.
 - Tapered insulation with a thermal resistance less than R-14 may be used at the drains and other low points if insulation thickness is increased at the high points of the roof so that the "average thermal resistance" equals or exceeds R-14.
 - The area of the existing roof that is "recoated" (i.e., liquid applied roof coating) is not required to be insulated.

ISO/COVERBOARD COMBINATIONS

| Prescriptive R-Value | JM Solution (above deck) | |
|----------------------|----------------------------------|---------------------------------|
| R-10 | 1.5" ENRGY3 + 0.5" SeparatoR CGF | 1.5" ENRGY3 + 0.5" ProtectoR HD |
| R-17 | 2.5" ENRGY3 + 0.5" SeparatoR CGF | 2.6" ENRGY3 + 0.5" ProtectoR HD |
| R-23 | 3.5" ENRGY3 + 0.5" SeparatoR CGF | 3.5" ENRGY3 + 0.5" ProtectoR HD |

ENRGY 3® - Flat and Tapered

Meets the following requirements:

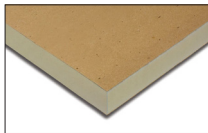
ENRGY 3 / Tapered ENRGY 3

- CAN/ULC S704, Type 2, Class 3 (140 kPa)
- ASTM C 1289, Type II, Class 1, Grade 2 ENRGY 3 25 PSI / Tapered ENRGY 3 25 PSI
- CAN/ULC S704, Type 3, Class 3 (170 kPa)
- ASTM C 1289, Type II, Class 1, Grade 3

Glass-Reinforced Facers: Provides rigidity and resistance to indentation and crushing, and are compatible with BUR, modified bitumen and single ply membrane systems.

Closed Cell Polyisocyanurate Foam Core: Provides high R-value per inch in built-up, modified bitumen, metal roof and single ply roof systems, and utilizes a zero ozone depletion blowing agent that provides high thermal insulation performance.

For more information [Click Here](#)



ProtectoR® HD

Meets the requirements of ASTM C 1289, Type II, Class 4, Grade 1

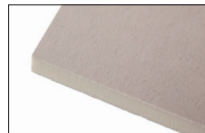
High-Density Polyisocyanurate Foam Core: Closed cell polyisocyanurate foam technology provides additional insulation value (R-value of 2.5), with lightweight and low water absorption characteristics.

High R-Value (2.5 R): Provides significantly more thermal insulation (R-value) than wood fiber or gypsum boards.

User Friendly: Allows for easy and efficient scoring, cutting and snapping. Also, its light weight allows for easy maneuvering.

Up to 50% Fewer Fasteners: Achieves FM 1-90 utilizing 8 fasteners per 4'x 8' board with an adhered reinforced-membrane and 11 fasteners per 4'x 8' board with an adhered non-reinforced membrane over a min. 22 ga steel deck or structural concrete deck.

For more information [Click Here](#)



SeparatoR® CGF

Meets the requirements of ASTM C 1289, Type II, Class 2, Grade 3

Closed Cell Polyisocyanurate Foam Core: Closed cell polyisocyanurate foam technology provides additional insulation value with lightweight and low water absorption characteristics.

High R-Value (2.9 R): Has more than two times the R-value of wood fiber and more than four times the R-value of gypsum boards.

User Friendly: Allows for easy and efficient scoring, cutting and snapping. Also, its lightweight allows for easy maneuvering.

Up to 50% Fewer Fasteners: Achieves FM 1-90 utilizing 8 fasteners per 4'x 8' board with an adhered reinforced membrane and 11 fasteners per 4'x 8' board with an adhered non-reinforced membrane over a min. 22 ga steel deck or structural concrete deck.

For more information [Click Here](#)



JM COATING OPTIONS

| Product | Initial/3-Year SRI | More Information |
|-----------------------|--------------------|----------------------------|
| JM Coating Acrylic | 110/92 | Click Here |
| JM Coating Acrylic CR | 114/96 | Click Here |
| JM Coating Silicone | 114/94 | Click Here |

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