



Code Amendment Proposal Application Proposal 5

Department of Consumer & Business Services
Building Codes Division
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Read the entire code amendment proposal application before completing this form. Please complete all parts before submitting your proposal and refer to the provided checklist.

APPLICANT INFORMATION

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Representing (if applicable): New Buildings Institute		Work phone: 503-761-7339
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PROPOSAL INFORMATION

Specialty code: Oregon Reach Code
Code section(s): 5.5.3.1.1
Briefly explain the subject of your proposal: Cool Roofs

INSTRUCTIONS AND CHECKLIST


Fill in all the information above and submit this page, signed and dated, with the required supplementary information for Parts I, II, and III listed in the following checklist. This application may be submitted by mail to the mailing address above, or by email to BCD.PTSPtech@oregon.gov.

Checklist:

- Part I** Code amendment language is attached in the proper format.
- Part II** Amendment proposal requirements for amending the code have been reviewed.
- Part III** Amendment proposal criteria questions have been answered and are attached.

Note: One application is required for each code section you are proposing to amend. If this proposal requires changes in other sections of the code for alignment, include those changes as part of this application.

APPLICANT SIGNATURE

Signature:  Date: 2/24/2022

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Oregon Reach Code Proposal: Cool Roof Expansion

Part I: Code Amendment Language

Modify Section 5.5.3.1.1 text as follows:

5.5.3.1.1 Roof Solar Reflectance and Thermal Emittance

Roofs in Climate Zones 4 and 5 shall have one of the following follow one or both of the options below.

- ~~a. A minimum three year aged solar *reflectance* of 0.55 and a minimum three year aged thermal *emittance* of 0.75 when tested in accordance with CRRC S100.~~
- ~~b. A minimum Solar Reflectance Index of 64 when determined in accordance with the Solar Reflectance Index method in ASTM E1980 using a convection coefficient of 2.1 Btu/h ft² °F, based on three year aged solar *reflectance* and three year aged thermal *emittance* tested in accordance with CRRC S100.~~
- ~~c. Increased *roof* insulation levels found in Table 5.5.3.1.1.~~

~~The values for three year aged solar *reflectance* and three year aged thermal *emittance* shall be determined by a laboratory accredited by a nationally recognized accreditation organization and shall be *labeled* and certified by the *manufacturer*.~~

Exceptions to 5.5.3.1.1

- ~~1. Ballasted *roofs* with a minimum stone *ballast* of 17 lb/ft² or 23 lb/ft² pavers.~~
- ~~2. *Vegetative roof systems* that contain a minimum thickness of 2.5 in. of growing medium and covering a minimum of 75% of the *roof* area with durable plantings.~~
- ~~3. *Roofs* where a minimum of 75% of the *roof* area
 - ~~a. is shaded during the peak sun angle on June 21 by permanent components or features of the *building*;~~
 - ~~b. is covered by offset photovoltaic arrays, *building* integrated photovoltaic arrays, or solar air or water collectors; or~~
 - ~~c. is permitted to be interpolated using a combination of 1 and 2 above.~~~~
- ~~4. Steep sloped *roofs*.~~
- ~~5. Low sloped *metal building roofs* in Climate Zones 2 and 3.~~
- ~~6. *Roofs* over ventilated attics, *roofs* over *semiheated spaces*, or *roofs* over *conditioned spaces* that are not *cooled spaces*.~~
- ~~7. Asphaltic membranes in Climate Zones 2 and 3.~~
1. Three-year-aged solar reflectance^b of 0.55 and 3-year aged thermal emittance^c of 0.75
2. Three-year-aged solar reflectance index^d of 64

a. The use of area-weighted averages to comply with these requirements shall be permitted. Materials lacking 3-year-aged tested values for either solar reflectance or thermal emittance shall be assigned both a 3-year-aged solar reflectance in accordance with Section C402.3.1 and a 3-year aged thermal emittance of 0.90.

b. Aged solar reflectance tested in accordance with ASTM C1549, ASTM E903 or ASTM E1918 or CRRC-S100.

c. Aged thermal emittance tested in accordance with ASTM C1371 or ASTM E408 or CRRC-S100.

d. Solar reflectance index (SRI) shall be determined in accordance with ASTM E1980 using a convection coefficient of 2.1 Btu/h × ft² × °F (12 W/m² × K). Calculation of aged SRI shall be based on aged tested values of solar reflectance and thermal emittance

Part II –Code Amendment Proposal Requirements

To the best of our knowledge, this proposal aligns with all statutes and rules governing the Oregon state building code

Part III -Code Amendment Proposal Criteria

Installing a cool roof is a relatively inexpensive energy conservation measure to passively reduce cooling load in warmer regions. Cool roofs strongly reflect sunlight and efficiently radiate heat away from the roof surface. Cool roofs are generally light colors like white or grey, but also are available in a variety of traditional colors by using cool-colored pigments. Installing a cool roof reduces the conduction of heat into the building, thus reducing the need for air-conditioning in conditioned spaces. Minimizing the need for air conditioning saves energy and money, and the decreased load helps to moderate peak grid demand during heat waves and very hot summer afternoons, thereby reducing the risk of power outages. Decreasing the convection of heat into the building also offers increased occupant comfort in unconditioned buildings.

Cool roofs also decrease the amount of heat transferred from the roof to the air, thus mitigating the urban heat island effect. Decreased urban temperatures slow the formation of ground-level ozone, which is the primary component of smog – known to aggravate respiratory illness. Extreme heat is the number one weather-related killer in the U.S. In cities, this is a particular concern due to the urban heat island, where temperatures can be 9 to 16 degrees (Fahrenheit) higher than surrounding rural areas. This is due, in part, to the fact that about 60% of urban surfaces are covered by roofs and pavements. Studies have shown that a 10-percentage point increase in urban surface reflectivity would reduce the number of deaths during heat events by an average of 6%. With 80% of the world’s population projected to live in an urban area within the next 50 years, and in a warming climate with more extreme heat events, it is likely that even more lives could be saved if cool roofs were more widely installed.

Cool roofs are currently required by ASHRAE 90.1 commercial new construction requirements in Climate Zones 0 to 3. This proposal would expand cool roof requirements to Climate Zones 4 and 5. and increase the SRI threshold for Climate Zones 0 to 3 to be consistent with cool roof requirements in Title 24. This proposal also corrects an editorial mistake in the code that refers to a solar reflectance index of 55 when it should read as a solar reflectance of requirement 0.55. There are approximately 3,000 roofing products listed with Cool Roof Rating Council (CRRC) and a majority of those are appropriate for both low-sloped and steep-sloped installations. Product types include single-ply membranes, fluid applied coatings and membranes, asphaltic membranes and modified bitumen-based products, and metal products. Within all of these product types, products that meet the 2021 IECC SRI requirements are available. More than one-third of the CRRC-rated products suitable for low-slope installations would still meet the proposed increase in SRI requirement for Climate Zones 0 to 3, across all the product types previously referenced. Recent analysis indicates that these cool roof products can be installed at no additional cost to the consumer.

These cool roof products also consistently save energy. According to modeling completed by LBNL and access via the Cool Surface Savings Explorer, an increase in the SRI of a roof from 16, the average SRI of

an aged typical roof product, to the proposed SRI of 64 and the current commercial cool roof requirement for Climate Zones 0 to 3, would result in average annual energy cost savings for commercial buildings of 0.77% in Climate Zone 4A, 2.18% in Climate Zone 4B, 1.02% in Climate Zone 4C, 0.83% in Climate Zone 5A and 0.98% in Climate Zone 5B.

Increasing the SRI requirements in Climate Zones 0 through 3 to an SRI of 75, the current requirement for commercial roofs in Title 24-2019, would also yield additional energy cost savings. Based on the analysis referenced above, the estimated annual energy cost savings of going from an SRI of 64 (IECC 2021 requirement) to 75 are 0.46% in Climate Zone 1A, 0.40% in Climate Zone 2A, 0.51% in Climate Zone 2B, 0.43% in Climate Zone 3A, 0.49% in Climate Zone 3B, and 0.54% in Climate Zone 3C. It should be noted that the study modeled an increase in roof solar reflectance from 0.20 to 0.40 and 0.60. To obtain the SRI values cited here, the thermal emittance was assumed to be 0.85.

The proposed amendment also aligns the climate zone applicability of cool roofs (IECC climate zones 0 to 5) in the commercial IECC with proposed cool roof requirement submitted as an amendment to the residential IECC.