POSITION STATEMENT
COOL VS NON-REFLECTIVE ROOFING

POSITION STATEMENT

IIBEC recognizes that there are many project-specific requirements that require consideration when designing a roof assembly to ensure the roof system performs as intended. Reflectivity is just one of these requirements. While there are advantages to using a reflective roof membrane, there are also disadvantages. The roof consultant should determine the effect a reflective roof membrane has within a given roof assembly and weigh the pros and cons of the membrane's use when making design decisions.

Note that some codes require that a roof membrane have minimum solar reflectance, emittance, or solar reflectance index (SRI) values.

SUPPORTING POSITION STATEMENT COMMENTARY

A. Background

The use of cool or reflective roof membranes and coatings has increased significantly in recent years as a means to reduce energy consumption, to reduce the urban heat island effect, and to comply with local and state requirements.

Cool roof membranes are typically defined by a combination of their aged solar reflectance (0.63 or greater) and aged thermal emittance (0.75 or greater), or by their aged solar reflectance index (SRI) (75 or greater).

SRI is a measure of the constructed surface's ability to stay cool in the sun by reflecting solar radiation and emitting/releasing thermal radiation back into the environment. SRI is defined such that a standard black surface (initial solar reflectance 0.05, initial thermal emittance 0.90) has an initial SRI of 0, and a standard white surface (initial solar reflectance 0.80, initial thermal emittance 0.90) has an initial SRI of 100. To calculate the SRI for a given material, obtain its solar reflectance and thermal emittance via the Cool Roof Rating Council Standard (CRRC-1). The calculation of SRI is per ASTM E1980. The determination of aged SRI is by performing through physical testing of "aged" (3-year-old) materials for reflectance and thermal emittance.

B. Advantages of a Reflective Membrane

- Cool roofs can reduce energy use of a subject building in warm climates by reflecting and emitting the energy of the sun back to the sky in lieu of absorption by the roof and transfer to the building below.
- A cool roof membrane will lower the surface temperature of the membrane and the roof assembly during a sunlit day. Lower roof temperatures will slow the degradation of many roofing materials and may increase the performance of thermal insulation when compared to use under a non-reflective membrane.
- Scientific studies suggest that the collective use of reflective roofs in urban environments may reduce the urban heat island effect by lowering ambient air temperatures.

C. Disadvantages of a Reflective Membrane

- A roof with a high SRI may increase glare from reflective surfaces.
- A reflective roof may increase energy use in cool climates during heating months by lowering the surface temperature of the roof.
- There is an increased risk of condensation forming under the membrane in assemblies without vapor retarders in cool and temperate climates.
- Cool roofs, as a result of their lower surface temperature, do not absorb as much heat as non-cool membranes or coatings and will have less downward drying during summer months.
- Cool roofs have lower surface temperatures, and moisture can remain on the surface for longer periods that could result in biological growth on the surface.

References

- Cool Roof Rating Council (CRRC) Product Rating Program CRRC-1. (http://coolroofs.org/).
- ASTM E1980, *Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces*. (https://www.astm.org/Standards/E1980.htm).
- U.S. Environmental Protection Agency. 2008. "Cool Roofs." in: *Reducing Urban Heat Islands: Compendium of Strategies.* (https://www.epa.gov/heat-islands/heat-island-compendium).