Technical Bulletin #10

COOL ROOFS

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As a result of Climate Resolve's "Hot City, Cool Roofs" campaign that pushed for solutions to reduce the urban heat island effect, on January 1, 2015, Los Angeles, was the first large city to require new residential construction and re-roof applications to use "Cool Roofs" (LA Municipal Building Code). To encourage the adoption of this provision, the Los Angeles Department of Water and Power (LADWP) offers rebates for installation of Cool Roofs. For more information visit their website – www.ladwp.com/crp.

Boral Steel Stone Coated Roofing panels create an air space above the roof deck, (Above Sheathing Ventilation "ASV"), and provide the same seasonal cooling load equivalent to a roof with cool colors (25% solar reflectance), irrelevant of the roof color.

> The Oak Ridge National Laboratory (ORNL) study, *"The Tradeoff Between Solar Reflectance and Above Sheathing Ventilation for Metal Roofs on Residential and Commercial Buildings,"* by W. A. Miller Ph D., E. Herman & R. Graves, Dated January 2012, states in part, Section 4., 1st bullet, Pg-35;
>
> > *"Task 1A: Solar Reflectance needed for a steep-slope roof fitted with ASV to match the load of a SR 0.25 cool roof attached directly to the deck.*
> >
> > *… a stone coated metal fitted with 0.75 in. (0.019 m) air space can both be black and still have a seasonal cooling load within 0.05% of the conventionally constructed cool-color (solar reflectance of 0.25) metal roof. Computations for retrofit application based on ASHRAE 90 (1980) shows ASV air spaces of 0.75 and 1.5 in. (0.019 and 0.038 m) would permit black roofs to have cooling loads equivalent to the direct to deck cool roof."*

Additional information:
Benefits of the ASV detail are fully explored and summarized in the Oak Ridge report under Section 5, Recommendations, Pg. 37, Paragraph 2.

"The Effects of Infrared-Blocking Pigments and Deck Venting on Stone-Coated Metal Residential Roofs", by, William A. Miller PhD, dated January 2006.

Boral Steel's stone coated steel panel colors meet the revised Los Angeles Department of Water and Power Energy Code. In addition, Boral Steel installation methods assist in meeting California's Title 24 Energy Code.

Solar Reflectance, Emittance & SRI Performance (ASTM C 1371):

COLOR	CCRC	REFLECTANCE		EMMITTANCE		SRI
	Product ID #	Initial	3 - Years	Initial	3 - Years	3 - Years
Dover	0796-0018	0.41	0.38	0.88	0.87	41

Hot-Box R-Value (thermal resistance) Testing:
Two thermal resistance tests were performed using the Shake profile installed in two different construction configurations that are common in California: BATTENS (1X4 Counter-battens & 2X2 Panel Batten Battens) and BATTEN-LESS (Direct-to-the-Roof-Deck).

R-Value Testing Results:

BATTEN-LESS method (Direct-to-Deck) R 2.01
BATTEN method (1X4 & 2X2 Battens) R 2.69

(The Roof deck in both tests used construction grade ½" CDX Plywood)

Test Information:
GEO-Science Ltd., R-value HOT-Box testing – ASTM C-1363, MRP- W-29, W-30 & W-30a Nov-2009

Conclusion:
Both methods prove to exceed the exception to the California Title-24, Energy Code that provides an option of providing an R-Value of 0.85 or greater over an attic area.

Radiant Heat Testing*
Comparing in a side-by-side heat lamp test using a halogen light source, the common asphalt shingles and the Boral Steel Products were exposed to the same heat from the light source. The temperature was measured from within the "attic" space below the decking material. The table below shows the results of measured temperature from six (6) hours of exposure.

	Products Tested	Direct Deck (Batten-Less)	EBS** (2x2 Batten)
	Asphalt Shingle - Brown	149.1	-
	Asphalt Shingle - Black	154.6	-
Boral Steel Products	BARREL-VAULT Tile - Sunset Gold	92.2	82.7
	BARREL-VAULT Tile - Charcoal	91.1	83.0
	PINE-CREST Shake - Sage Green	89.8	84.4
	PINE-CREST Shake - Ironwood	88.8	82.5
	PACIFIC-Tile - Timberwood	90.5	84.4
	PACIFIC-Tile - Barcelona	89.7	84.4
	GRANITE-RIDGE Shingle - Country Blend	125.4	86.3
	GRANITE-RIDGE Shingle - Barclay	129.1	88.1
	COTTAGE Shingle - Ironwood	102.7	85.2
	COTTAGE Shingle - English Suede	111.3	91.0

**Testing conducted at Boral National Lab, Rialto, California*
***EBS - Boral Roofing's Elevated Batten System*
Red numbers indicate that EBS system is not common practice with these panel profiles.