

RECENT TEST RESULTS
CONCERNING
DUST ACCUMULATION

PERFORMANCE TESTING OF RADIANT BARRIERS
(RB) WITH
R11, R19, AND R30 CELLULOSE AND ROCK WOOL
INSULATION

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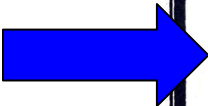
ABSTRACT

TVA has previously conducted testing to determine the effects of attic RBs when used with R19 fiberglass insulation during summer and winter conditions. This previous testing and the testing described in this paper, used five small test cells exposed to ambient conditions. Heat flux transducers measured heat transfer between the attic and air conditioned space. The objective of the testing described in this paper was to determine summer and winter RB performance when used with cellulose and rock wool insulations at R-value levels of R11, R19, and R30.

In addition, several summer side-by-side tests were conducted to determine the effects of: dust on RB performance (emphasis added), a low-emissivity paint, a high-emissivity material (black plastic) laid directly on top of the insulation, and a single-sided RB placed on top of the insulation (RBT) with the reflective side down.

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Table II shows the results of the other side-by-side tests. The RBT (radiant barrier placed directly on top of mass insulation) with dust sprinkled on the RB (line 2) was tested to assess the impact of dust buildup. This is a critical concern for the RBT configuration. Arizona dust was used; this dust is commonly used for testing air filters and has dust micron sizes of: 0-5 microns: 39 percent; 5-10 microns: 18 percent; 10-20 microns: 16 percent; 20-40 microns: 18 percent; 40-80 microns: 9 percent. No attempt was made to weight the dust applied to the RB but a dust covering was used which by visual observation was similar to that which caused a rise in emissivity of RB samples, as measured by an emissometer, from 0.05 to 0.50.



Surprisingly, the dust appeared to have little effect on the effectiveness of the RB. The percent reduction in ceiling heat flux was remarkably similar to that of a RBT with no dust (emphasis added). This issue definitely needs further research, and more detailed testing in planned.

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Table II: Summer Results-
Average Ceiling Heat Fluxes
for miscellaneous Configurations

Config.	Heat Flux (80°-85°F)	Heat Flux (85°-90°F)	% Savings (vs Same R-Value no RB Paint) (80°-85°F)(85°-90°F)	
1	2.08	2.31	---	---
2	1.26	1.35	39%	42%
3	2.05	2.23	1%	3%
4	2.17	2.38	-4%	-3%

Configuration:

- 1: R19 Only
- 2: R19/RB on Top/With Dust
- 3: R19/RB on Top/Single Sided/Reflective Side Down
- 4: R19/Black Plastic on Top of Insulation

CONCLUSIONS

The following was a key conclusion resulting from the 1986 summer testing:

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#3. Even with significant dust accumulation on the RBT, the RB's performance or reduction in ceiling heat flux may not degrade nearly as much as would be expected from the significant increases in RB emissivity caused by small amounts of dust.