



e-mail correspondence between Steve McGuinness of Advanced Coatings Systems and Gordon Hart

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Mr. Hart,

I read a brief biography on you on the www.insulation.org website. With your 25 years of experience in the thermal insulation industry you are more than qualified to help answer this question.

Below is a statement taken from the website of a company that promotes their ceramic elastomeric coatings as offering an R-value of R > 22. Is this possible?

Below was taken from their literature:

STEADY STATE HAT FLUX MEASUREMENTS - THERMAL TRANSMISSION
PROPERTIES ASTM D-177/ ASTM C-1045

-- Roof Coating (at 5-mil thickness): K-value = .0454, R- value 22

-- NOTE: Some specialists say the ASTM formula of R-value in this test " $R = 1/K$ " is oversimplified and does not take enough information into consideration

Would you please comment on this claim of R-22 for a ceramic coating?

I look forward to your reply.

Best regards,
Steve McGuinness

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----- Original Message -----

From: Steve >

Date: Friday, December 8, 2006 10:02

Subject: Insulative ceramic coatings

Steve -

These numbers don't make any sense. So, no, I don't believe that a 20 mil thick material would provide an R-value of 22 unless it was at an extreme vacuum and even then, I would be suspect. As for the thermal conductivity value of 0.0454, I wonder what the units are (Btu/hr-ft-deg F would make sense; multiplying by 12, this would then be the equivalent of 0.545 Btu-in/hr-sf-deg F). Since R-value = thickness / thermal conductivity, then $R = 0.020 \text{ inches} / 0.545 \text{ Btu-in/hr-sf-deg F} = 0.04 \text{ hr-sf-deg F/Btu}$. That's hardly a value of 22 now, is it?

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The material with the lowest thermal conductivity of all, at atmospheric pressure, is aerogel blanket insulation. That material provides an R-value of about 9 to 11 per inch of thickness and it does this through nano-sized pores that are smaller than the mean free path of air molecules. I don't believe that thermal insulation coatings have a thermal conductivity even close to that of aerogel blankets ($k = 0.1$ Btu-in/hr-sf-deg F).

So, as usual, it's "Buyer beware!"

Regards,

Gordon Hart

Gordon Hart is a consulting engineer for ARTEK Inc., having spent more than 25 years in the thermal insulation industry. He is an active member of ASTM C16 on Thermal Insulation, ASHRAE's Mechanical Insulation Systems Committee and NIA's Technical Information Committee.