

ROOFING NO. 3007

SUBJECT: LONG TERM R-VALUE OF POLYISOCYANURATE INSULATION

DATE: JANUARY 2008 (REVISED JANUARY 2019)

There has been extensive debate regarding the long-term or “In-Service” R-value of polyisocyanurate insulations. Numerous scientific studies have been conducted by scientists, researchers, and professional associations attempting to determine the actual performance of polyisocyanurate insulation when applied as roof, wall and other insulation applications. The central issue is whether polyisocyanurate retains its R-value over its useful life. It is argued by many that polyisocyanurate loses R-value due to loss of its low conductance blowing agents early in its life, while continuing to lose R-value as normal atmosphere infiltrates its cell structure. Many organizations have come out with published recommendations that polyisocyanurate does in fact lose R-value, and if used it should be designed with the long term R-value.

R-Shield[®] has had occasion to test samples of polyisocyanurate taken from an 8 year old roof from the Northwestern part of the United States. The insulation was used under a light colored single ply roofing membrane. Nominal 4” samples were submitted to an independent laboratory for R-value Testing under ASTM Standard C518-91, “Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.” The polyisocyanurate samples were in excellent condition. They were dry and contained relatively no moisture. The density of the samples exceeded 2.5 lbs. per cubic foot and were faced with felt paper on both sides.

The tests confirmed that polyisocyanurate insulation* does undergo thermal drift and does indeed lose significant R-value. One sample tested at 5.48 R-value per inch, the second tested at 5.26 R-value per inch, having an average of 5.37 @ 75°F per inch. The total R-value for the samples (actual average thickness measured 3.8”) averaged 20.45.

Reminder:

R-Shield insulation does not experience thermal drift and subsequent R-value loss. R-Shield insulation has a stable R-value due to its processing technique which captures normal atmosphere within its cell structure, thereby making for stable R-values.

Update:

The same samples were resubmitted to an independent laboratory for further R-value analysis when the samples were ten years old. The samples tested in December of 1994 had an average R-value of 5.37 per inch. Testing of the same samples after 10 years average an R-value of 5.18. Thermal loss was still occurring.