GUARDIAN BUILDING PRODUCTS

NEWS BULLETIN

Tested Versus Calculated "U" & "R" Values

Contractors should be very careful to make sure that they are satisfying the building code, building owner, and architect with an insulation system that properly complies with a specified U value. We receive numerous calls every year from people who have completely installed the insulation and are then being challenged as to whether or not it provides enough thermal performance. Specifications which include phrases such as "installed" or "in place" or "hot box tested" U or R value need to be carefully evaluated.

The reason for this is has to do with the fact that thermal performance can be determined in more than one way and there is a *significant* performance difference between the methods.

Calculated U[1] Values

The most common measure of thermal performance is called the U value and it is the amount of heat that transfers through a building section over a specific period of time. The traditional method to obtain a U value is to calculate the reciprocal of the sum of the R[2] values of all the building materials that go in to a particular building section. One ***very*** important detail is that heat transfer due to the compression of the insulation at purlins or girts in a steel building is ***not*** considered in the calculated method.

Tested or "in-place" U Values

The most reliable values are those derived from tests of the actual construction simulating in-place conditions. That would include insulation compressed above (and near) the framing members and also would include a representative portion of the rest of the building materials (purlins, girts, fasteners, siding, thermal spacer blocks, etc.). Tests are conducted in a device called a Guarded Hot Box (ASTM C-976/C1363). These tests are expensive, so it is certainly not practical to evaluate every possible insulation alternative in combination with all the various roof systems, purlin sizes, standing seam clips, with/without spacer blocks, etc. Fortunately there are excellent computer models which can also be used to calculate in-place results quite accurately. These results compare quite well to actual Hot Box tests.

Here are the two U Values for **R19 Faced Blanket Insulation installed over purlins with a thermal spacer block:**

Calculated U Value = 1/20.17[3] = .049.

Hot Box Tested U Value = .065[4] .

Guardian Building Products has many high R value (low U value) systems which can help you comply with in-place requirements in all areas of the country. Contact your sales representative if you need help evaluating a given situation.

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[1] *A U value is the amount of heat expressed in Btu's passing through a complete building section including air films. Technically, it is heat transmission in Btu's per hour, per square foot, per degree Fahrenheit of temperature difference from air to air for a composite building section.*

[2] *An R value is a measure of the resistance of a material to heat flow while the U is a measure of the transmittance of heat.*

[3] *This calculated U Value is the reciprocal of the Total R value: 19 (Fiberglass) + .25 (Outside Air Film) + .92 (Inside Air Film)*

[4] The source of this tested U Value is COMcheck compliance analysis software and can be found at www.energycodes.gov.

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