Building Science Innovators, LLC
302 Walnut St, NO, LA 70118, 504-343-1243
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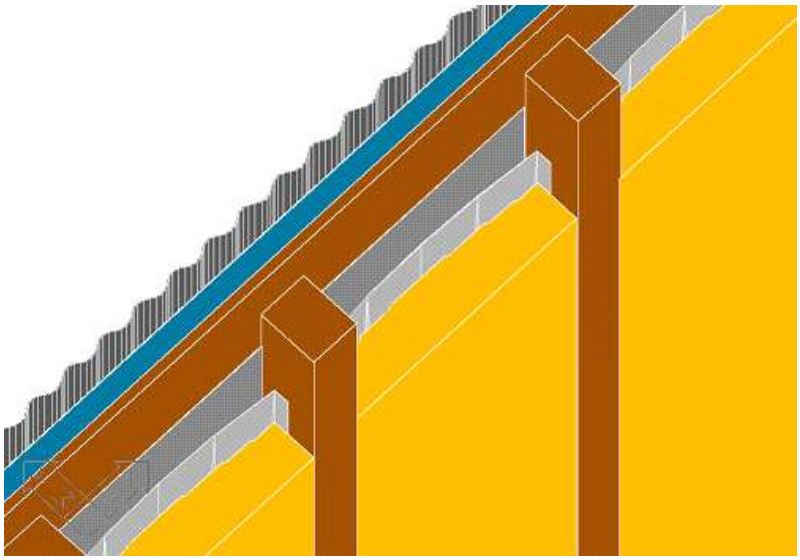
BSI recommends a vented roof with an unvented attic; this *Insulation Solution* is best for just below a roof.



Insulation Solution:
is a 3-layer installation solution: with two radiant barriers and high-borate cellulose below them:
1. Staple perforated aluminum foil to the bottom side of the roof's decking.
2. Staple un-perforated aluminum foil to the sides of the rafters, 1" below the first aluminum layer. This un-perforated aluminum foil sheet must be one continuous sheet of aluminum for each rafter-cavity. Perform this step so that the cavity is as airtight as possible. Fold the flaps toward the main face of the aluminum layer. Pass a continuous bead of *Liquid Nails*™ (of type tolerant of 180°F) onto the rafters. Thereafter, push the flaps onto the glue to create an airtight seal.
3. Fill the rest of the rafter-cavity with high-borate cellulose.

Notes:

1. Cellulose insulation must include a fire-retardant; the two most common fire-retardants are ammonium silicate and borate. Both work well to stop fires, but borate is far superior to defend the building from biological growth. Many cellulose manufacturers use only borate; one of them is *Celbar*™. Applegate manufacturers a good cellulose product that is easier to install but since it has less borate, it is less effective at preventing biological growth.
2. The aluminum foil layers specified are not pure aluminum. They are, in fact, hybrid, multi-layer products sandwiching materials like nylon for strength; but the total product thickness should be hardly much thicker than two sheets of aluminum. Two companies provide good products for this application: *FiFoil*™ (www.fifoil.com) and the better priced: *AtticFoil*™ (www.atticfoil.com).
3. The air space between the aluminum layers *must* be connected to outside — via soffit or ridge vents. This system creates a vented roof and an unvented attic.
4. The cellulose layer is most commonly blown-in dry after a fiberglass cloth is first stapled to the bottom of the rafters. However, if the attic will be converted to a finished or living area, the cellulose can be blown-in wet and then "covered" with sheetrock before the cellulose dries out.

Comments:

A. This specification will out-perform a rafter system completely filled with cellulose: both in controlling heat flows and speeding up drying. This specification is at least 3 times as expensive is pure cellulose, but we think the extra cost is worth it for the reasons described above.
B. High-borate cellulose is better than all other alternative insulation systems in the following ways: cheaper, kills critters, wicks moisture away from moisture concentrations, easier to install, almost impossible to install wrong, more consistent insulating value and highest resistance to fire.