RE: Flash and Batt System - Performance Limitations

In heating climates we see the flash and batt system being promoted in an attempt to meet the high performance levels set by Icynene®. Competitors are typically using a layer of ½" or thinner closed cell polyurethane foam insulation applied against the exterior sheathing with a layer of fiberglass insulation filling the remainder of the cavity.

During the round table discussions at the 2007 Icynene Dealer Conference, the consensus of opinion was that the flash and batt system was more expensive than the Icynene® system and it was being promoted as a higher performance system. However, building science considerations raise a caution flag regarding the long term performance of the flash and batt system.

In cold heating climates, there is a vapor drive from the warm and humid interior of the building out towards the exterior sheathing. With the flash and batt system, the vapor drive includes both convective and diffusive moisture flow through the fiberglass insulation out to the interior surface of the, let's say, ½" thick foam layer. It is interesting to note that in some instances the use of a poly vapor retarder is not being recommended. This will add to the potential for convective moisture flow through the fiberglass insulation. Even where a poly vapor retarder is used, air leakage is common.

The key performance issue with flash and batt is that the interior surface of the foam layer can serve as a condensation plane if it is not applied in sufficient thickness, and moisture can build up within the wall system including the studs.

As an example, let's look at a building where the interior temperature is 70° F and the relative humidity is 35%. In this case the dew point temperature of the water vapor in the air is 41° F. That means the interior surface of the foam insulation must remain above 41° F or condensation will occur on the interior surface of the foam insulation. Let's say that the outside sheathing temperature is 32° F, the inside temperature is 70° F and an R-13 wall design is used. The ½" R-3 foam insulation makes up 23% of the total R-value. The inside surface temperature of the foam insulation will be 41° F. This is at the dew point temperature. If An R-16 wall system is used, the R-3 foam is 19% of the total R-value. The inside surface temperature of the foam is 39° F. This is below the dew point temperature and condensation will occur on the inside face of the foam surface. On thicker wall systems with greater thickness of fiberglass insulation the system is even more prone to moisture accumulation problems.

In this case where the closed cell foam insulation is sprayed thinner than 1" thickness, the potential for moisture accumulation is increased. Generally speaking, it may be necessary to use 1" or 2" – or greater – thickness of closed cell foam to maintain an interior surface temperature above the dew point with the flash and batt system. In addition, with closed cell foam, moisture damage to the wood studs is possible.

The main problem with the flash and batt system is that it is very susceptible to slow and hidden condensation problems and therefore long term durability may be compromised. Also, system failure can be accelerated where cracking or delamination of the foam occurs and air leakage carries additional moisture into the wall system.

With Icynene®, convective moisture flow into the wall system is eliminated and therefore condensation on the inside surface of the sheathing is eliminated. In a cold climate where vapor diffusion is a factor, Icynene recommends the use of vapor retarder paints to prevent moisture ingress into the wall system. Icynene promotes moisture control and the long term durability of building envelope systems.

Flash and batt cannot provide assurance of long term durability. The Icynene Insulation System® can.