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Notes for Workshop in Stow

December 11, 2013

1. Fiberglass batts have a nominal R-value of 3.6 to 4 per inch. And it can be severely affected by convection currents of air if not installed tightly and if air-tight electrical outlets and other points of air entry are not sealed.

2. Cellulose has an R-value of 3.9 per inch.
   a. Treated with borate, has mold, insect, and fire resistance
   b. NOT a vapor retarder

3. Foam provides highest R-value.
   a. EXPS board R-5/inch. Vapor-retarder
   b. Spray polyurethane foam, open-cell, R-5.2/inch. NOT a vapor retarder. See later…
   b. Polyisocyanurate board R-5.6/inch (NRCA). Vapor-retarder
   c. Spray polyurethane foam, closed-cell, R-6.7/inch. Vapor-retarder. See later…

4. But foam has health, environmental, and fire- safety issues
   a. Fire-retardants: toxic, persistent, and bio-accumulative
   b. Blowing agents: toxic and damaging to the atmosphere
      1) Ozone depletion
      2) CO2
   c. Fire safety: use in non-combustible construction is being questioned
      1) Fire test being required

5. NFPA 285 and its impacts.
   a. Multi-story full-scale assembly test
      1) Cost of testing ($100,000 plus)e
      2) An assembly; every component which is built must match the test. Often suitable assemblies cannot be found
      3) Manufacturers not sharing what they have tested
      4) UL has unsuccessfully tried to create a database online
      5) Constructability: can the tested assemblies be built to meet real-world conditions?
      6) Weatherproofing: assemblies tested so far often do not have critical weatherproofing components
   b. Has been in the code. But language was vague at best; AHJs are now enforcing
   c. Impacts; architects using mineral wool (low R-value, R-3.5).
      To meet code or design requirements with the lower R-value, they are often adding insulation in the stud cavity

1) Limited amount in this climate without risk of condensation. This makes it not very cost-effective (less than 50% of nominal R-value, due to thermal bridging of metal studs)
2) If use a larger amount need a vapor barrier on inside of the stud wall and therefore a vapor-permeable air barrier on the outside (on the sheathing) and therefore hygrothermal risk with sun causing vapor drive inwards in summer

6. International study underway to look at alternatives
   a. Run by and done by fire protection engineers without any balancing from other interests
   b. Case studies so far are simply examples of shoddy construction, without automatic extinguishing systems

7. Mold occurrence with 40% open-cell spray polyurethane foam (amines – organic). Is this a potential problem with soy-based foams?

   a. Sprayed into the cells of single-wythe concrete block wall. Might this occur with soy-based foams?

8. Curling issues with closed-cell spray polyurethane foam
   a. Damage on 4 large buildings known, many more likely
      1) AVB torn off
      2) Girts bent and wrecked
   b. Cause – lack of training of installers!
      1) High heat
      2) Humidity (being studied by Ned Lyon of SGH)
   c. Control
      1) Cleaning, sanding, and priming adjacent substrates (must STICK to prevent curling)
      2) Picture framing
      3) Small lifts, especially in winter
      4) Controlling moisture

See attached sketches

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Sheet No._____

Project

Date