

## Understanding Air Barriers

### "Water Happens"

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The envelope of an air conditioned space inside a building is required to have an air barrier. Without an effective air barrier, the space may and probably will experience moisture related damage in time. An air barrier is required by section **406.ABCD.1.4.1 of chapter 13 of the Florida Building Code**. The code further specifically **excludes** batt insulation and lay in type drop ceilings as effective air barriers. Reference the term "Air Barrier" in Section 2 Definitions. This requirement is frequently overlooked in building design and construction.

The air barrier's primary purpose is to prevent the commingling of conditioned and unconditioned outside air masses. For most of the year in South Florida, the outside air has high humidity. The temperature at which the water molecules begin to condense to the liquid state for much of the year is 73 degrees F. This is called the Dew Point. Since most air conditioned spaces operate at or near this temperature, it is easy to see that when the two air masses come into contact with each other, there is a high probability that liquid water can form. Water droplets condense on the nearest building material which may be the mineral fibers of batt insulation, the lay in ceiling or the roof structure. The potential for damage when this happens is well documented.

To be an effective air barrier, it must prevent air movement between conditioned and unconditioned spaces. The code specifically identifies gypsum wall board with taped joints to be an effective air barrier. Other systems may also be acceptable but are not identified in the code. It is essential that the barrier be able to prevent air movement across itself when subjected to a pressure differential. Buildings can experience positive and negative pressure differentials for a variety of reasons. Properly designed air conditioning systems will typically maintain a positive pressure differential on the space.

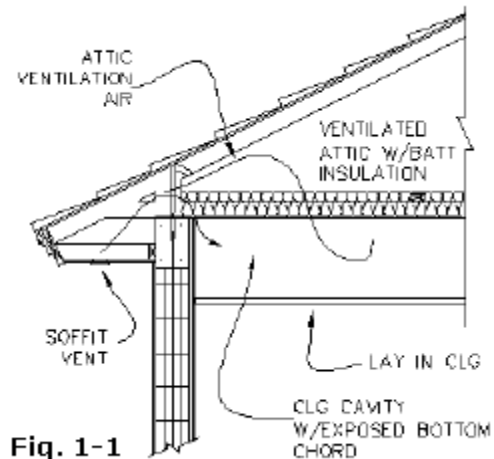


Fig. 1-1

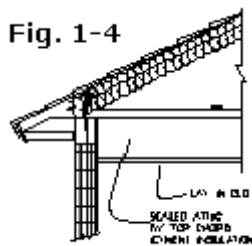
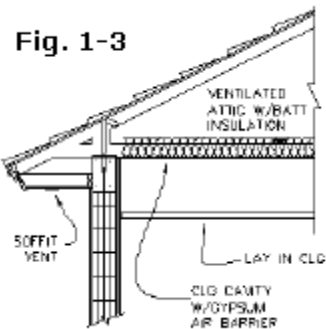
However both conditions have the potential to create serious negative effects on the building if the space is not supplied with an effective air barrier.

The condition observed most frequently in the authors experience is a commercial building with a wood truss roof structure. (Figure 1-1) The batt insulation is installed on the bottom chord of the truss and the lay in ceiling installed below that. The condition is exacerbated by code required attic ventilation above the batt insulation provided by soffit vents and or ridge vents. Conditioned spaces that have this condition usually operate with elevated humidity levels and with moisture related damage occurring at or above the suspended ceiling. The most obvious characteristic of spaces with this condition are sagging ceiling tiles with mold growing on the back side in many cases.



To insure optimum building performance and longevity, the air conditioned envelope must be provided with an effective air barrier. The building code identifies drywall with taped and mudded joints as one method of providing the air barrier. Figure 1-3 illustrates the same configuration with a gypsum layer added to the bottom chord of the truss.

Alternatively, the code allows the insulation to be applied to the top chord and the attic space to be sealed. This method is becoming popular as research indicates that sealed attic spaces are preferable in South Florida. However the requirement for an effective air barrier remains. Applying batt insulation to the top chord of the truss is problematic and it is still not approved by code for use as an air barrier. This is especially true if a mechanically induced pressure differential such as an exhaust fan is involved.



One system that is gaining popularity is **Icynene** spray insulation. This material is sprayed on the roof decking and top chord of the trusses. It can be applied in a range of R values, usually R-30 on roof structures and is accepted as an approved air barrier by most building officials.

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