

Moisture Science 101 Outline

Issue: New mechanical ventilation requirements increase responsibility on Builder, HVAC contractor and those writing codes. Once you purposely bring in outside air into the home, you could be considered responsible if there are any problems. Moisture problems are the most important to consider. This forces all of us to recognize and quantify the moisture load (Latent load) in all conditions.

Moisture Sources: The source of Latent load in a humid climate is primarily outside summer air from uncontrolled infiltration and living habits as well as controlled mechanical ventilation. Use Dew Point temperature as an easily accessible reference to reveal how much moisture is in the air. Summer outdoor air does not add additional moisture load whenever the dew point is 55 degrees or lower.

Latent Loads and the Load Calculation: Recognize Sensible vs. Latent (S/L) ratio. This varies from home to home, but more importantly it varies by the hour. The S/L ratio variation between homes is addressed in manual J and S and this leads to proper sizing at design conditions. However, the S/L ratio variations as a result of part load (non-peak) conditions are not considered but should be as they are the most prevalent of all summer hours and change drastically from hour to hour. The Sensible to Latent ratio is what determines if the AC will handle latent load for any given hour.

Weather: Weather data shows that moisture loads are somewhat independent of sensible load. Humid climates can have many consecutive days with very high moisture load but little if any sensible load.

A New Problem? Recent trends; good windows, tight homes, other energy efficiency measures have greatly reduced sensible loads. Mechanical ventilation without regard to outdoor conditions can keep latent loads high regardless of how well the home was built. Mechanical ventilation at high dew point conditions but low sensible conditions results in little or no AC run time and this can flood a home.

Proper Sizing: A properly sized AC should handle the latent load from ventilation during the few summer hours close to design conditions. But design conditions are a very low percentage of the entire summer while we are ventilating. Even a perfectly sized AC (Manual J) cannot handle latent loads in many part-load hours if the AC does not run enough. HVAC doctrine of “proper AC sizing will control humidity” may not apply. This is especially true for homes facing N & S, with good windows and in the shade.

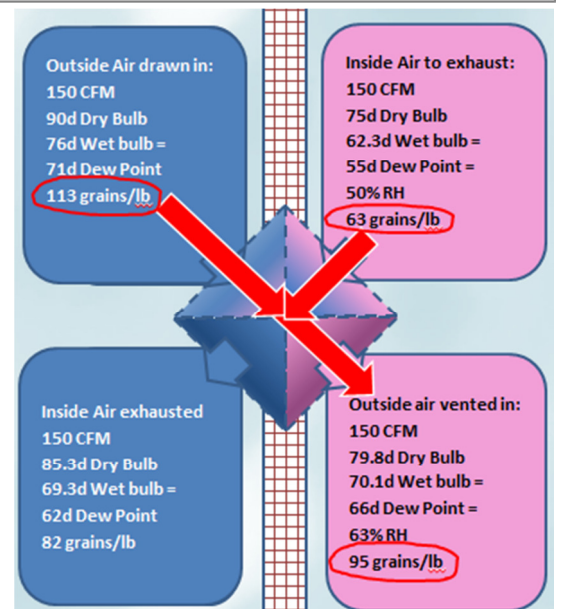
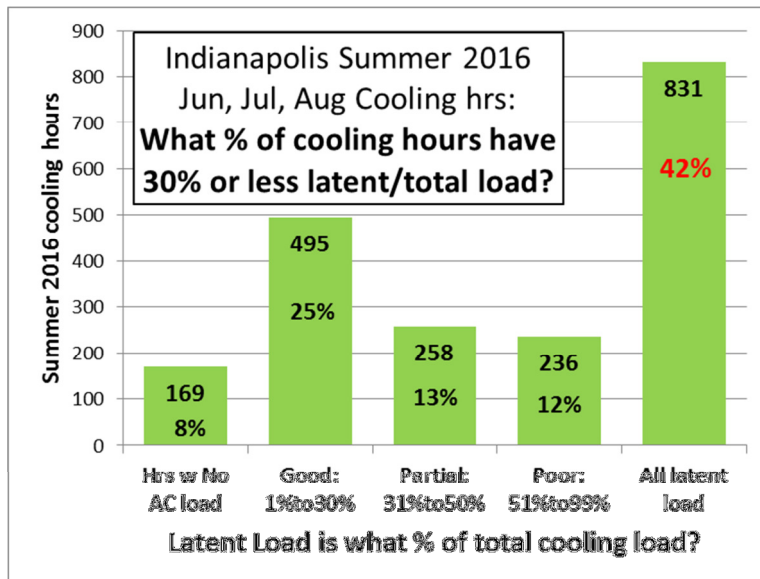
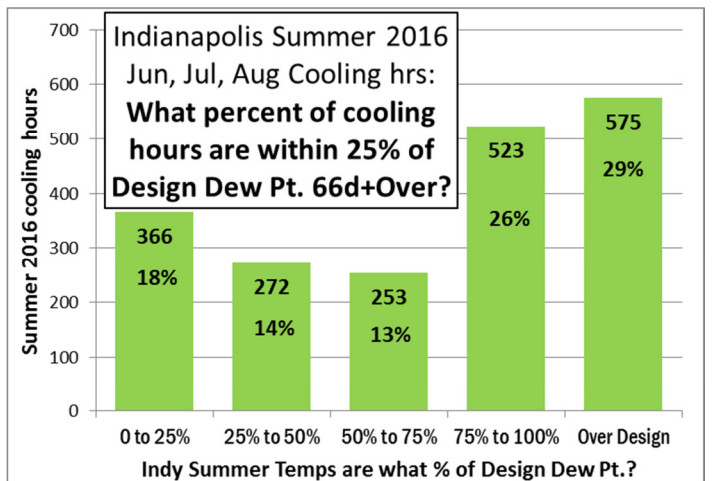
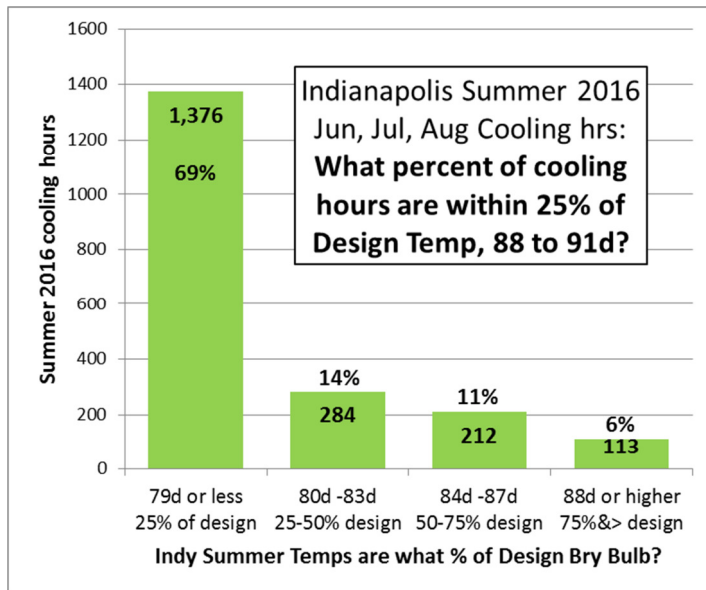
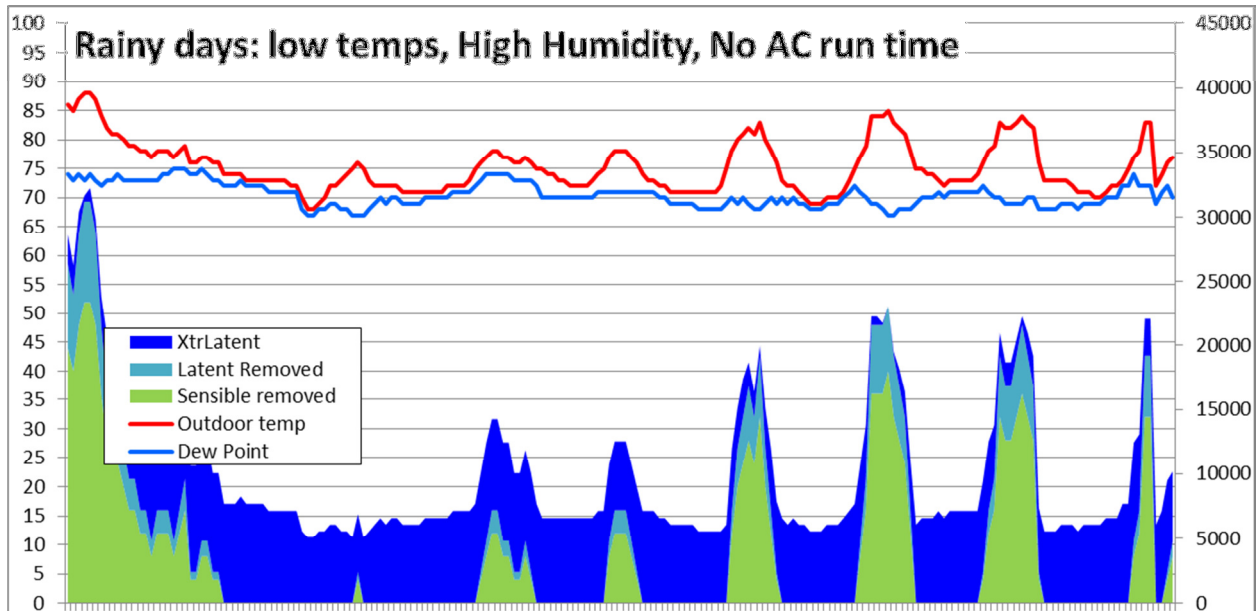
An ERV is not the answer. At best, conventional ERVs will remove about 1 part moisture for every 3 parts invited into the home. ERVs are a bit oversold as dehumidification solutions.

Supplemental dehumidification is very helpful. If mechanical ventilation is used frequently, a ventilating dehumidifier will work independent of the air conditioner and help deal with the moisture load.

Future goals: Minimizing ventilation in poor conditions should be an important goal for future.

Moisture Science 101 in only One Hour?!

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ERV performance