

## Humidity link to human health examined

AT ASHRAE - What is the optimum indoor level for relative humidity?

It's a simple question, but with no simple answer, apparently.

Mechanical contractors and building designers continue to grapple with the question of indoor humidity, with some interesting observations from a recent two-part ASHRAE technical paper, "Indoor Humidity and Human Health."

Currently, ASHRAE Standard 62-1989 recommends that humidity in an occupied space be maintained in a range between 30% and 60%. This may change with the new standard that is about to take its place. According to Edward A. Ahrens and Anne Baughman, authors of the paper, "For the purpose of setting humidity standards, the figure is clearly inadequate.

"To promote good building design it is important to identify the specific physical causes and solutions to health hazards, and to regulate design practice to avoid them."

Ahrens, a professor of architecture at the University of California, Berkeley, makes the point that standing water, or building defects that allow water to accumulate, create more problems than the moisture level of the space itself, since "none of the [biological health] agents grows in the air of the occupied space or the mechanical system."

### Dust mites

The single exception is contamination from dust mites, which tend to thrive at levels of 70% to 80% rh; however, this is often due more to microclimates, such as the moisture level of

plush furniture, mattresses, or carpeting.

"In setting a maximum limit to air humidity in the space, there is little, if any, evidence from field studies that provides a reason for distinguishing 60% relative humidity from 70%," according to the authors.

"Intermittent moisture exposure (from leaks, spills, etc.) is almost never addressed, yet is probably the most common condition in building systems (since the effects on organisms of periodic moistening and drying out (mites and molds) influence their growth and survival."

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Some studies suggest that offgassing from formaldehyde is more of a problem at higher humidity levels.

However, "the health impacts of nonbiological health agents are hard to assess at this time," according to the authors, especially since new building products with lesser offgassing rates are now being introduced.

The authors question the exact effect of indoor humidity levels on overall building health and occupant well-being.

"Finally, very little of the literature on health effects is expressed in terms of risk to the occupant: first, the likelihood of humidity-influenced pollutants occurring in the building, and then the likelihood of the pollutant affecting the occupant."

In their paper, the authors targeted building problems such as dust mites, fungi, and bacteria, and cited frequent recommended remediation procedures.

Most often, these involve re-

moval of the contaminated material, adherence to hvac operations and maintenance practices, and use of adequate ventilation.

### **Dust mites**

- Remove contaminated carpeting, bedding and/or furniture.
- Provide frequent hot water cleaning of bedding.
- Encase mattresses with semipermeable vinyl casing.
- Use special vacuuming procedures (e.g. HEPA filter, central vacuum system with outside equipment).
- Use surface treatments (e.g. benzyl benzoate). *And*
- Reduce ambient humidity, specifically within the microhabitat of mites (e.g., through the use of electric blankets, radiant heating of carpeted floor surfaces, etc.).

### **Fungi**

- Remove damaged material where possible (i.e., carpeting duct liners, wallpaper, etc.).
- Clean water-resistant materials with chlorine bleach.
- Provide proper maintenance and operation of conditioning

systems (e.g., cleaning and disinfecting cooling coils and drain pans, continual operation of forced-air systems to avoid condensation).

- Provide proper construction techniques to avoid water damage (e.g., proper placement of vapor barriers to avoid condensation within walls, design of drainage systems to avoid flooding and water incursion). *And*
- Provide adequate ventilation to reduce internal humidity loads.

### **Bacteria and viruses**

*Person-to-person spread of airborne infection:*

- Isolate contaminated persons.
- Increase fresh air exchange rate.

*Growth within building systems*

- Remove source of contamination (e.g., replace system, biocide treatment, etc.).
- Practice routine cleaning of water systems and/or filters. *And*
- Relocate intake vents (in the case of cooling tower contamination).



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