FOCUS on FACILITIES
Diocese of Cleveland Facilities Services Corporation

Space Comfort versus Occupant Comfort

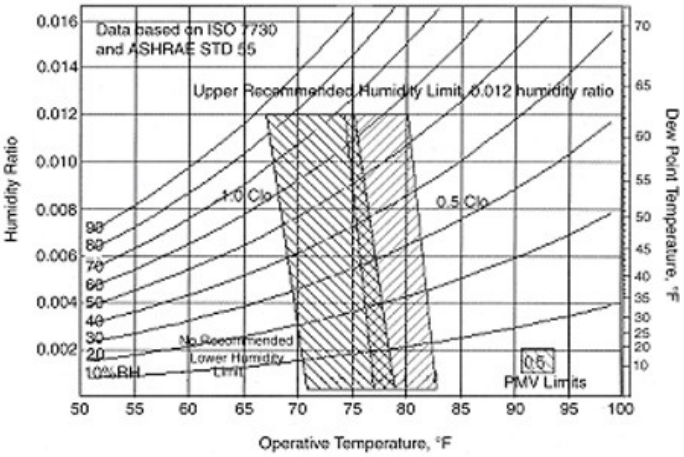
This month the topic is differentiating space comfort from occupant comfort. Design engineers focus on noting "space conditions" and "room design" as well as stating the established "design criteria" when producing construction documents but these are not the correct phrases to be used when you think about it. What are important are the HVAC "occupant" space comfort conditions, "occupant" room comfort design conditions, and "occupant" design criteria.

Seems like one is splitting hairs when it comes to setting the requirements but there is a significant difference. For example the connotation to satisfy space/room conditions is not exactly the same as satisfying the occupant's comfort requirements. Space conditions may be determined on a temperature range specified by a state energy code requirement, but what about the occupant comfort within these areas because the relative humidity has been omitted? The same goes for indoor air quality (IAQ). The quality of the air within a room may not be specified at all unless it is critical to the purpose of the room.

More often than not, humidification is not considered for the project because of up-front investment cost and operating cost. Furnishing and installing a humidification system within a building is value-engineered out if it was even a consideration in the first place. Humidity systems for the drier seasons will require additional funding not planned for in the building program budget. Then the annual operating cost to operate and maintain humidification systems is often shut off when a system has been installed so that the operating budget will be reduced.

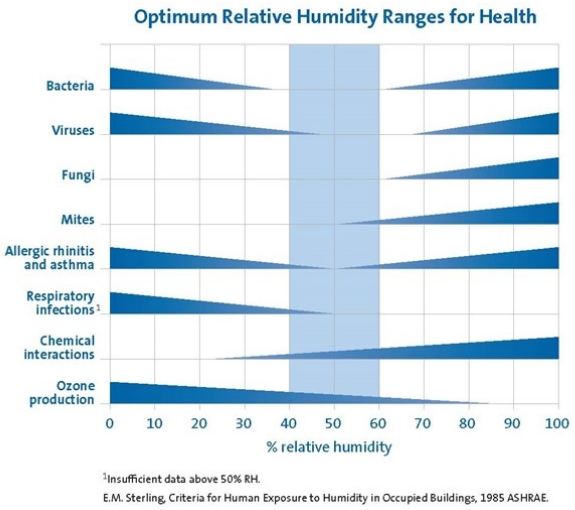
The American Society or Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) has an operating temperature and humidity chart (figure 5 ASHRAE Summer and Winter Comfort Zones, 2017 ASHRAE Handbook-Fundamentals, page 9.12) stating a very wide range for acceptable operating temperature range of 68F to 83F and humidity level as low as 5% to as high as

85% relative humidity based on occupants who are sedentary to occupants being very active within the space and based on the clothing worn.



ASHRAE Summer and Winter Comfort Zones

While this chart is useful it leaves out what is the optimum relative humidity for occupant health. ASHRAE's optimum humidity range for human comfort and health chart can be found in chapter 22, page 22.1 of the 2016 ASHRAE Handbook-HVAC Systems and Equipment showing the optimum humidity range is 30% to 60%.



Conair Ltd. The Sterling Chart - Relative Humidity Chart

Optimum Relative Humidity for Health

The Sterling Chart illustrates how RH affects health and well-being.

Colds, flu, sore throat, dry eyes, itchy and cracked skin are all symptoms that are usually prevalent in the cold dry months of the winter when the indoor RH is at its lowest.

The increase in bacteria, viruses and ozone production (caused by static electricity) in low RH levels all have an adverse affect on health.

This is a tighter differential in this this chart when compared to the other chart. More can be read on the topic of human comfort when referring to ASHRAE Standard 55, Thermal Environmental Conditions for Human Occupancy.

Dr. Stephanie Taylor, MD, M.Arch, CIC and ASHRAE Distinguished Lecturer and columnist for Engineered Systems magazine wrote in her column, IAQ: A Physician's View August 2017, *"I was dismayed to see that the goal of almost all projects was to decrease operating cost through energy savings. While this is clearly important, as a physician I was hoping to find that more retrofits were being done to improve indoor air quality (IAQ) for the health of building occupants."*

In Dr. Taylor's April 2016 column when discussing healthcare facilities she noted, "*One might reasonably ask, for whom is this environment healing? Revenue-driven energy conservation and building values seem to be the metric driving Evidence-Based Design. These are important metrics; however, a very important data category is sadly missing. Where is a focus on the wellbeing of building occupants?"*

These observations confirm that buildings are designed for space comfort and not necessarily for "occupant" comfort. Progress through research and lectures are slowly raising awareness that it's a fine line between the two but that occupant comfort must be incorporated into new building HVAC designs and the renovation/ retrofit of HVAC systems to further improve the quality of the human environment within buildings.

So what is needed to transition for simply providing space comfort to providing occupant comfort? A review of existing building HVAC systems to determine the ability of these systems to provide the optimum space temperature and humidity conditions is a start. In addition, systems need to be assessed if they meet the optimum IAQ standards with sufficient air changes within rooms. Air filtration of these buildings should be considered to determine whether these systems have the ability to tighten up those design parameters shown above in the summer and winter comfort zones chart above.

Certainly, the operating cost must be considered and there is a popular initiative to have a "green" environmentally correct building. Some design teams go so far as to strive for a Zero Energy Building. All this is great for the environment but we must not forget the occupants who live and work in this environment. Contact the Diocese of Cleveland Facilities Services Corporation for more information if interested in assessing your building.

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