IEQ: THERMAL COMFORT

Simple Answers to Common Questions

1. **Is 72° F the best and correct temperature to set my thermostat?**
   No. There are many factors to consider. Building codes as an example require occupied spaces to hold temperatures between 68°F (in the USA) and 72°F (in Canada). However, it is important to understand building code requirements do not represent the conditions for most people to perceive thermal comfort unless the building code required at the time of construction compliance with ASHRAE Standard 55—*Thermal Environmental Conditions for Human Occupancy*.

2. **If not, what is or what else should I consider?**
   ASHRAE Standard 55 defines several factors and combinations of ranges with those factors. As much as people want there to be one single point of consideration, such as a building code thermostat setting, this would ignore the very fundamentals of thermal comfort. Ignoring the fundamentals is what contributes to most people's discomfort.

   ASHRAE Standard 55 looks at what are people doing, what are they wearing, the surface temperatures surrounding them, and the air velocity and humidity around them. All of these are taken into consideration in addition to the air temperature. In addition, when people wear light clothing (short sleeves, light slacks or shorts) and are engaged in light activities such as reading, filing, or typing then other considerations come into play. These include the change in temperature between the ankle and head, general and ankle drafts, differences in surface temperatures and floor surface temperatures.

   Also of great importance is personal control over one's space. If a space is being controlled by an access-restricted thermostat and a person is still uncomfortable then having the ability to control one's space is a practical solution. This includes access to personal heaters, desk, floor mount or ceiling fans, or relocating to a different space. Additionally, having the ability to adjust clothing and activity will also help reduce discomfort.

3. **Does ASHRAE provide guidance on the best temperature for all people? For example, in my office I'm always cold but my colleagues are hot. I'd love to be able to simply set the temperature to what ASHRAE's guideline says.**
   The objective of ASHRAE Standard 55 is to satisfy most people by using a representative occupant, considering all the factors. However, many building types have multiple representative occupant types and these require different conditions for different people. In these cases, having the ability to adjust/adapt as noted above is one solution. Other solutions are possible with the help of a practitioner skilled in ASHRAE Standard 55.

4. **How can I, as a building owner, ensure the best thermal comfort for my occupants?**
   Buildings under design should be required to comply with ASHRAE Standard 55. It is important to understand that the condition for thermal comfort starts with the architecture, followed by the enclosure performance, interior systems and then the HVAC systems. For owners of existing buildings, see below.

5. **How can I, as a building operator, ensure the best thermal comfort for the occupants of the building?**
   For existing buildings, setting the thermostats to meet or exceed code requirements, then encouraging adaptation by offering personal heaters, cooling devices such as desk fans, along with freedom for clothing choices is something to be considered. Other solutions include modifications to the architecture, enclosure and interior systems. Modifications to the HVAC systems may also be possible.

6. **I'm a lawmaker and want to ensure codes in my jurisdiction provide for the best thermal comfort for my constituents, both in new buildings and existing stock. What are three ways I can do that?**
   1. Require building codes to enforce compliance with the most current version of ASHRAE Standard 55–*Thermal Environmental Conditions for Human Occupancy* as they already do for other ASHRAE Standards.
   2. Require buildings to be assessed using surveys as described in the Standard.
   3. Require mediation work to bring the buildings into compliance or alternative paths as described above.

7. **Is it true that ASHRAE's Standard 55 is biased towards men?**
   No. This is a long-standing myth refuted by previous leadership in ASHRAE. The Standard is based on the International Standards Organization publication ISO 7730, which is based on studies using both genders of various ages. The result of that work is also found in Standard 55.

8. **What role do fans have in maintaining comfort?**
   Elevated air speeds are an effective cooling solution in many situations. However, it does have limitations with higher room temperatures and those who may have certain physiological challenges. These should be discussed with a skilled thermal comfort practitioner.

9. **Can open windows or personal heaters mess with the building's HVAC system?**
   They can, and their use should be coordinated with the building's control system.

10. **How can we balance comfort with energy efficiency and sustainability?**
    This is addressed through integrated design protocols. It is incorrect to assume energy efficiency leads to thermal comfort as there are many examples where this is not true. Preserving and conserving energy through architecture and enclosure performance is the first passive step. Interior system, which includes shading, texture and colors also plays a role on controlling solar gains and radiant transfer, a leading cause of discomfort. When these passive solutions are optimized, lower temperatures can be used in heating, and higher temperatures used in cooling. Both enable energy efficiency in the HVAC systems. They also promote the use of renewable energy sources. Ultimately, energy preservation and conservation (goals within sustainability) and efficiency should be a byproduct of achieving the desired indoor climate.

11. **Do things like carpets, curtains, or furniture placement affect room temperature?**
    All interior systems interact with the movement of moisture and heat. Consider these items as sponges, filters and capacitors as they absorb, store, clean and release moisture and heat. In this regard they have an impact on thermal comfort and indoor air quality.

12. **What upgrades could improve comfort without major renovations?**
    A survey of the occupants and the building would help make this decision. It might be as simple as adding external shading to the property or building, changing from dark to light colors on exterior surfaces or installing ceiling fans. A qualified engineer in buildings and indoor environments is invaluable in these assessments.

13. **Mention the Thermal Comfort tool (CBE) with a link for users to easily access this tool.**
    Those who want to learn more can visit ASHRAE's partner, The Center for the Built Environment, Berkeley, who hosts an ASHRAE Standard 55 online assessment tool.
    - **https://comfort.cbe.berkeley.edu/**

For in-depth information on these common questions and more, please visit the Thermal Comfort section at ashrae.org/IEQResources.