Latent vs sensible heat

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Latent heat and sensible heat are two forms of energy transfer during phase changes and temperature changes, respectively1234.

Understanding the differences between latent heat and sensible heat is crucial for applications in meteorology, HVAC systems, and thermodynamics. Latent heat is significant in phase changes and weather phenomena, while sensible heat is essential for temperature regulation and energy transfer in heating and cooling systems1234.

Ever wondered what was the difference between sensible and latent heat? How do we apply these concepts in HVAC?To begin explaining the difference, we must first understand what exactly is heat and how heat transfer and thermal balance works. It is the foundation to a stronger understanding of how heat pumps and refrigeration cycles function.

Heat is a form of energy that spontaneously passes between an object and its surroundings, in some way other than through work or the transfer of matter.Heat is always transferred from a hotter form to a colder one, which will eventually bring the two forms to the same temperature. This phenomenon is called, thermal balance.

We measure heat by registering the object''s temperature - the measurement ofits thermal state. In other words, it is a comparative measurement of how hot or cold the object is. Many scales and units exist for measuring temperature, the most commons are the Fahrenheit (?F), Celsius (?C) and Kelvin(K).

Conduction heat occurs when a warmer object is touching a cooler object. The heat is transferred from the warmer object to the cooler object until they are both the same temperature. For example, a metal bar which is heated at one end. The heat would flow through the media to the other end of the bar.

Convection heat occurs with liquids and gases, and is the more efficient way to transfer heat. The process occurs when less dense warmer areas of water or gas rise to a cooler areasy. This begins a circulation as the cooler areas move to the warmer areas. Ever heard the phrase "hot air rises"? This is due to convection heat. A great example is when water boils. The bubbles formed from heat rise to the top and the cooler water moves to the bottom. Another example is when a pump forces hot water to circulate through a convector which create heat, which is then released into space.

In conduction and convection heat transfer, contact always has to be between the two objects. With radiation, no contact is required between the heat source and the cooler object uses electromagnetic waves to transfer heat.An example of thermal radiation is the sun warming a concrete wall (or our faces). We do not have to touch the sun (ouch!) to feel its warmth HVAC, we find this concept in radiant heating panels which heat the

walls, ceiling, and objects in a room. These objects store the warmth and release it back into the room, slowly and evenly.

Sensible heat is when energy is transferred as heat to an object, changing the temperature but not its state. If you can measure the temperature of the heat, it is sensible. A body (solid, liquid or gas) of mass m and specific heat c is heated to change its temperature from T1 to T2 without changing its state. Indeed, the volume or the pressure of the body is unchanged. The energy received by the body responsible for its risen temperature is given by the relation:

Q=m*c*(T2-T1)1055,06 in BTU

In contrast to sensible heat, latent heat is the energy released or absorbed that changes the state of a body during a constant temperature process. This process leaves temperature unaffected - it won"t get higher or lower. The most common forms of latent heat are fusion and vaporization.

Fusion is the passage of a body from solid state to liquid state. During the process of changing phasis, the temperature stays the same. Energy is supplied to a solid in order to melt it and energy is released from a liquid when it freezes. The best example is an ice cube melting at 32 ?F (0?C).

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