

TECH TALK

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Sweating of T-Bar Ceiling Diffusers

by Dave Fetters

Each year during the summer season, we receive a number of calls about moisture forming on the faces of our T-bar diffusers or on adjacent T-bars and dripping into the space below. In the industry this is commonly called “sweating.” Moisture that drips into an occupied space is annoying, and will eventually cause rust to form on steel diffuser faces and adjacent T-bars. Sweating occurs more in southern states that border the coasts or in parts of the country that experience high humidity levels as a regular occurrence. Business activities that rely on people coming and going, like fast-food restaurants, seem to be the most susceptible. The doors are regularly opened,

allowing the hot, humid outside air to sneak in. This begs for the air-conditioning system to run longer and colder, trying to maintain a reasonable inside temperature.

Sweating occurs on diffusers when warm, moist room air contacts the cold diffuser face through aspiration (drawn by suction) when the supply air temperature is at or below the dew point temperature. Dew point is the temperature at which condensation (moisture formation) begins to take place. Most of us have walked outdoors on a warm and humid summer day carrying a cold drink. It doesn't take long before the outside of the glass becomes wet. Moisture is

condensing from the air onto the colder surface of the glass. The same thing is happening at the ceiling diffuser.

Moisture can also form on the cold back panel of a T-bar diffuser if the temperature in the ceiling space is hot and humid. This moisture often runs down to the T-bar edges and drips from there.

In an HVAC system, the occurrence of sweating on a diffuser or T-bar is the symptom of a system problem. Removing a rusty, dripping diffuser and replacing it with an aluminum model will not make the problem go away. The aluminum diffuser will sweat; it just won't rust. The problem is that the supply air temperature is lower than it should be for the current conditions of temperature and humidity. Banks and similar public buildings are other examples of spaces where sweating occurs because of the high volume of walk-in traffic and the number of times the door opens, letting in hot, humid outside air.

What can be done to minimize sweating in an existing system?

One of the keys is to decrease ΔT – the difference between room

temperature and the supply air temperature. Doing this while still meeting the load requirements demands an increase in CFM. If the air-conditioning unit is cycling, switch to constant running. Look for restricted return airflow because of undersized returns or dirty filters. Are the coils clean? If the unit is shut down at night, consider running at partial load to prevent high humidity and room temperatures at start-up. Is there excess outside air mixing with the return air?

We don't claim to be experts in system troubleshooting and problem solving; therefore, we recommend seeking guidance from a qualified HVAC contractor to solve a sweating problem. We address the issue because the sweating manifests itself first on our diffusers, giving a false impression that the diffuser is at fault.



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