Window Dew Point: Why Glass Sweats Indoors

Wet glass starts when indoor air crosses its dew point, not because the window is bad. Learn why a few degrees decide whether your windows stay clear or sweat.

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A wet window is usually a dew point problem, not a mystery. Indoor air can hold only so much moisture at a given temperature; once the glass surface falls below that limit, water vapor turns into liquid. For a broader explanation of the mechanics behind condensation on windows, the whole issue can be traced back to one threshold: the moment your glass gets colder than the air's dew point.

The dew point is the number that matters

Dew point is the temperature at which air becomes saturated and can no longer keep its moisture hidden as vapor. Relative humidity tells you how full the air is at the current temperature; dew point tells you the temperature where droplets start forming. That distinction matters because condensation is not caused by humidity alone. It appears when a surface is cold enough to push that air over the edge.

A simple example makes the point. A room at 72°F and 50% relative humidity has a dew point around 52°F. If the humidity rises to 55%, the dew point climbs to about 55°F. Nothing else in the room has to change for the window to start sweating; the same pane that stayed dry at 50% can fog at 55% if its surface temperature is only a few degrees colder. That small gap is the entire game.

The surface temperature decides the outcome

Two homes can have the same humidity and behave differently because their glass is not the same temperature. A single-pane window on a January night can easily drop into the 30s or low 40s on the room side. A double-pane low-E unit may stay in the 50s or 60s under the same weather conditions. If the dew point is 48°F, the first window sweats and the second stays clear.

This is why the problem often feels inconsistent. The air inside the house may be almost unchanged from one night to the next, but the glass temperature moves with outdoor weather,

frame material, insulation quality, and airflow around the window. A 3°F or 4°F shift in surface temperature can be the difference between a dry pane and a puddled sill when the dew point is right on the edge.

Why the coldest room surfaces win

Condensation shows up first on the parts of the window that lose heat fastest.

- Single-pane glass cools quickly because there is little between the room and the outdoors.
- Bare aluminium frames can become colder than the glass itself and collect moisture along the edges.
- Curtains pulled tight against the window create a stagnant pocket of air that lets the pane behind them fall further below room temperature.
- North-facing or shaded windows get less solar warming, so they spend more hours near the dew point.

That is why one bedroom may have dry glass while another room across the hall looks fogged at dawn. The indoor air is the same; the surface temperatures are not.

Overnight is when the threshold is crossed

Most people notice condensation in the morning because night creates the perfect conditions for the dew point to win. Outdoor temperatures fall, the window loses heat for hours, and indoor air movement drops. The heating system may keep the room comfortable to your body, but comfort for people and warmth for glass are not the same thing.
A bedroom is a good example. Two people sleeping in a closed room add a steady stream of moisture to the air for eight hours straight. If the door stays shut and the curtain stays drawn, that moisture sits near the coldest surface in the room. By sunrise, the air may still feel normal, but the pane has been below the dew point long enough to collect visible droplets.

How to read the problem like a technician

The fastest way to think about condensation is to compare two numbers: indoor dew point and glass temperature. If the glass is warmer than the dew point, no droplets form. If the glass is colder, they do.
That is why a simple hygrometer is so useful. It does not just tell you whether the air feels humid; it gives you the raw data behind the dew point. At 70°F and 45% RH, the dew point is roughly 47°F to 48°F. At the same room temperature and 55% RH, the dew point rises to

about 53°F. If the inner pane is hovering in the high 40s, that second room will sweat while the first one might stay clear.
The practical takeaway is straightforward:

- Lower indoor humidity and the dew point drops.
- Raise the glass surface temperature and condensation gets harder to trigger.
- Do both, and the problem usually disappears.

When the window itself is setting the trap

If you keep indoor humidity under control and still get wet glass, the window assembly may be creating a surface that is too cold. Older single-pane units, weak frame insulation, and failed or underperforming seals all reduce the inner surface temperature. In that case, condensation is not random bad luck; it is the expected result of a cold surface meeting moist indoor air.
That is also why exterior upgrades work so well. Better glazing does not 'remove' moisture from the house. It simply keeps the interior surface warmer, so the air has a harder time reaching the dew point at the glass. The science is less dramatic than the symptom, but the payoff is real: fewer mornings spent wiping down sills, fewer damp curtains, and far less risk of mold at the frame.
For a room-by-room look at how the dew point, humidity, and glazing all interact, the window condensation guide is a useful next reference. The core rule stays the same either way: wet glass means the surface temperature crossed the dew point, and the fix is to change one side of that equation.

The rule to remember

If the window is wet, the air did not 'make' water out of nowhere. The air simply reached a temperature where it could no longer keep its moisture invisible. Once that happens, the glass becomes the collecting surface.
That is the real reason some homes sweat every cold morning while others stay clear in the same weather. The difference is not luck. It is the gap between the dew point and the temperature of the window.

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