Who are the moisture producers?

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The first in a 2-part series explaining the difference between absolute and relative humidity and what this means for dampness in our homes

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How do we quantify the level of dryness and dampness in our homes? And how is an occupancy classed as dry, moist or wet?

I have previously discussed the effects of design, construction and retrofits, and their impact on raised moisture levels in habitable spaces. However, use and occupation of a dwelling is often the most crucial aspect of determining whether we live in a dry, warm home with adequate ventilation, or a wet, cold one with poor ventilation that contains harmful mould.

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BS 5250: 2002 Code of practice for control of condensation in buildings is the main guidance to help classify a home as dry, moist or wet, and how to measure these conditions. Table 1 defines the moisture content of air; for example, a sole occupancy is wet if the internal air moisture content hits 9kg/m3.

Number of persons in household	Daily moisture generation rates (kg)		
	Dry occupancy[1]	Moist occupancy[2]	Wet occupancy[3]
1	3.5	6	9
2	4	8	11
3	4	9	12
4	5	10	14

1 There is proper use of ventilation and heating, including in buildings unoccupied during the day, and the number of occupiers is appropriate to the size. It results in an internal pressure of up to 0.3kPa more than the internal vapour pressure.
2 Internal humidities will be above normal and ventilation is likely to be poor. Occupants will possibly be a family with children. Water vapour excess is between 0.3kPa and 0.6kPa.
3 Ventilation is hardly ever used and there is a high level of moisture generation. Occupants are probably a family with young children. Water vapour pressure excess is greater than 0.6kPa.

In each of the three examples, the water vapour pressure is increasing above normal and therefore the dwelling is getting wetter as the excess of water vapour pressure increases.

SOURCE: BS 5250: 2002 TABLE B.3

Table 1: Daily moisture generation rates for households

Sections 325 and 326 of the Housing Act 1985 set out two important standards. The former, the room standard, is contravened when the number of people sleeping in a dwelling is too great and 2 people of opposite sexes who are not living together as husband and wife must sleep in the same room. The standard does not count children under the age of 10, but states that a room is available as sleeping accommodation if it is normally used in the locality either as a bedroom or a living room.

Section 326, the space standard, is contravened when more than the permitted number of people sleep in a dwelling, having regard to the number and floor area of the rooms available as sleeping accommodation. The standard does not count a child under the age of 1, while a child aged between 2 and 9 is counted as half a unit. Children aged 10 or more and adults are counted as 1 unit.

It also states that a room is available as sleeping accommodation if it is of a type normally used in the locality either as a living room or a bedroom. Rooms of less than 4.65m2 are not considered. The permitted number of persons in a dwelling is the lower of:

- the number specified in Table 2, in relation to the number of rooms available as

sleeping accommodation;

- the aggregate for all such rooms of the numbers specified in the second column of Table 3 in relation to each room of the floor area specified in the first column.

Number of rooms	Number of people
1	2
2	3
3	5
4	7.5
5 or more	2 for each room

Table 2: Permissable number of occupants

Floor area of room	Number of people
10.2m² or more	2
8.3–10.2m²	1.5
6.5–8.3m²	1
4.6–6.5m²	0.5

Table 3: Ratio of floor area of room to number of people

If these criteria are not met it can lead to overcrowding, and an increased risk of condensation when occupiers produce higher amounts of moisture, especially in smaller rooms. An underoccupied property, where unused rooms are rarely heated and moisture migrates into the cooler rooms, is also at risk.

Typically, a moist or wet home would be underheated, inadequately ventilated and possibly house younger children; it could also be statutorily overcrowded. The occupiers could well be on low incomes and, due to its poor thermal performance, the dwelling could be difficult to heat. This may place the occupiers in fuel poverty, which occurs when they spend more than 10% of their disposable income on heating the home.

Other moisture risks include:

- the internal kitchen door is rarely closed, and pans are uncovered during cooking;
- any excess moisture ? condensate ? around windows is rarely wiped away;

- poorly vented tumble dryers are used;
- damp or wet laundry is usually dried over radiators, especially in bedrooms and during the cooler months;
- internal spaces are cluttered with furnishings and possessions, trapping water-vapour-laden air against cooler external wall surfaces.

These factors result in mould forming on walls, windows and ceilings. Mould growth indicates that internal humidity relative to internal temperature exceeds 70% relative humidity, and there is too much water vapour in the internal air.

Table 4 provides the typical moisture output from normal daily household activities. We can see from Table 1 that the moisture from even a sole occupant can quickly add up to 9kg/m3 to classify a building as a wet occupancy.

Activity		Moisture generation rate
People	Sleeping	40g/h per person
	Active	55g/h per person
Cooking	Electric	2kg/day
	Gas	3kg/day
Dishwashing		400g/day
Bathing/washing		200g/day per person
Laundry		500g/day
Drying clothes indoors (e.g. in unventilated tumble dryer)		1.5kg/day per person

SOURCE: BASED ON BS 5250: 2002 TABLE B.1

Table 4: Typical mositure generation rates for household activities

Table 5 explains the saturation levels of 1m3 of air at different temperatures, together with the indicative vapour pressure. At 25?C, 1m3 of air can hold around 20g of water vapour with a vapour pressure of 32mb. But if the temperature drops by 10?C, which could happen in a home overnight, then the amount of water vapour held in the same 1m3 of air almost halves, as does its vapour pressure. As air cools, any excess vapour-laden air forms a condensate as the moisture in the air changes from a gas into liquid at the dew point ? the temperature at

which air becomes saturated with water vapour.

Air temperature (°C)	Water vapour in the air (kg/m³)	Vapour pressure (mb)
25	20	32
20	15	23
15	11	17

Table 5: Saturation levels of 1m3 of air at different temperatures

The warmer the air, the more moisture it can hold, and so it expands, meaning it effectively migrates from a wet room into the other habitable, colder spaces. This usually occurs during the winter, when water collects on bedroom windowsills ? often because vapour-laden air has not escaped from the poorly ventilated buildings and stays in the dwelling to condense on surfaces below the dew point.

In the next issue, we will look at how to measure these internal conditions, consider a case study of a flat with significant mould, and ask what this means for surveyors.

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Further information

- Related competencies include: Housing maintenance, repairs and improvements , Housing management and policy
- This article is taken from the RICS Property Journal (January-February 2020)
- Related categories: Damp , Indoor air quality