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# ODORS:

## If I Am Not Invited to Dinner; I Don't Want to SMELL My Neighbors Cooking

One common issue in residential properties is the transmission of odor from neighboring units. Most frequently this issue occurs at multifamily structures with shared party walls and common corridors such as midrise and high-rise structures. The complaint is usually, "I can smell the cooking from my neighbors" or "my neighbor is smoking, and I can smell it in my unit."

The science behind the movement of air involves several factors. However, just like the meteorologist tells us every morning, the primary driving force behind the movement of air from one area to another is primarily a difference in pressure. Just like it occurs external to our built environment, pressure fields exist in our buildings as well. Air moves from a high-pressure area to a low-pressure area, and these pressure differentials can be caused by rising or falling pressures related to heat, barometric changes, wind, etc. Also, buildings have mechanical systems that move air from one location

to another using ducts and fans. While the driving forces are important another factor in buildings that needs consideration is the communication between the two spaces such as holes, gaps, joints, and openings that connect or allow communication between the two spaces.

I am sure most of you are saying "well that's great and all, but how are my neighbors cooking smells getting into my unit." Well, the quick answer is that the supply and demand are not balanced. As an example, let us say resident A is running the dryer which exhausts air out of the unit at a high rate, this creates a demand for fresh air.

Where does the fresh air come from? Well, the "good" fresh air comes from a "make up" air source built into the building's enclosure and or mechanical systems. In modern buildings, these may include but are not limited to the following:

- duct systems that direct air from the exterior directly to the unit;

- duct systems that direct air from the roof to the hallway and from the hallways to the unit through the hallway door undercut (gap between the door and threshold).
- From an open window in resident A's unit.

The "bad" make up air sources on the other hand include but are not limited to the following:

- Neighbors unit allowing "horizontal" air flow in, though, or around unsealed party walls;
- Air from leaky ducts or duct chases adjacent to unit A;
- Breaches in the floor slab allowing "vertical" airflow from spaces above or below.
- Leaky window or door assemblies
- Leaky building enclosures

When make up air is sourced from the "bad" make up air sources, it comes with all the odors of the area it is sourced from. So, if resident A's make up air is sourced from the neighbor B, and neighbor B is a smoker and/or is cooking, the odor can migrate into resident A's unit which has a lower pressure environment than the one immediately adjacent.


In the above example, we have stated that negative pressure is caused by resident A's utilization an exhaust system. However, that

is not necessarily always the cause. Some buildings utilize exhausts on rooftops that are constantly pulling air from the space which in turn puts a constant demand for make up air to replace the exhaust leaving the space. So if the “good” make up air supply and the demand is not well balanced, then naturally the bad make up air will make up the difference.

Another common practice by building occupants that creates an imbalance between the supply and demand is sealing door thresholds due to drafts, noise or odors from the common corridor. If the building was designed to provide supply air to the unit from the door threshold undercut, then placing any type of seal at the door threshold cuts off the supply of “good” make up air, therefore precipitating the demand for the “bad” make up air.

In addition to the supply and demand imbalance caused by actions of residents as described above, imbalance could occur due to poor mechanical system design, old equipment, renovations that change the behavior of the building such as replacement of windows, interior finishes renovations, and additions or modifications to a unit such as a new kitchen hood, cloth dryer, bathroom fan replacement, etc.

**Addressing the problem requires educating the residents about how their system works so that if their actions are causing the problem, it can be corrected.**

For issues beyond the actions of the resident, then a balanced approach to understanding the source of the imbalance between supply and demand as well as sealing the holes that allow “bad” supply air to communicate to the adjacent living spaces is required. A good understanding of building construction, mechanical system, diagnostics through testing and corrective actions that forecast a realistic view of how residents will utilize their systems are all key to a successful remedy to address odor problems in a building. 



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