



## **FIXING RELATIONSHIP PROBLEMS IN BUILDINGS | DEC 2022**

The building envelope includes all the building components that separate the indoors from the outdoors. Building envelopes include the exterior walls, foundations, roof, windows, and doors.

Should property managers know about the relationships going on in their buildings? Yes, when they can affect indoor air quality, occupant comfort and energy costs, says Steven Tratt, National Sales Manager of Canam Building Envelope Specialists. How your HVAC system and building envelope relate to each other is critical.

The performance of the building envelope is impacted by several sub-systems, such as heating, cooling and ventilating equipment, plumbing and electrical systems. The interaction of the sub-systems with the components of the building envelope, as well as certain activities of the occupants, can affect the performance of the building envelope.

Failure to understand the relationship between mechanical systems and the building envelope causes other indoor air quality and comfort issues. When owners and tenants complain of dry indoor conditions, annoying static electricity and poor indoor air temperature control in winter, the building is leaking too much air. When indoor humidity and temperature are not comfortable during warm summer days, this is generally because excessive heat and moisture loads represent too great a load for the cooling equipment. Again, leaking air causes this excess heat and moisture. The interaction between a heating, ventilation and air conditioning system and the building envelope directly affects the health, safety, durability, comfort, and energy efficiency of the building.

Air leakage through the building envelope can lead to condensation and moisture damage in hidden cavities, rain penetration, poor indoor temperature and humidity control, unnecessary heat loss in winter or heat gain in summer. Air leaks directly through roofs and exterior walls, but most often it travels through the joints of assemblies such as roof/wall junctions, parapets, low-level soffits, the intersections of different cladding systems, and through numerous internal vertical and horizontal pathways.

**Two conditions are needed for air to leak:**

- First, there must be a hole, gap, crack, or leak from one side of the envelope to the other.
- Second, there must be an air pressure difference.

There are three principal causes of air pressure difference: wind, stack effect and the HVAC system:

Wind pressurizes the windward side of the building and depressurizes the back, sides, and roof. It can account for up to 25% of total leakage...and it cannot be controlled, only reduced by plugging the holes in the envelope.

The stack or chimney effect is a buoyancy phenomenon where warm inside air rises through the building and exerts continuous pressure against the roof and upper parts of the exterior walls. The resulting lower pressure at the bottom of the building sucks in air.

**Build tight; ventilate right.**

The third pressure comes from the mechanical system itself. Mechanical engineers, and on-site managers, often choose to bring in makeup air to increase pressure and overcome this infiltration at the base of the building. Unfortunately, this increases pressure at the top, causing more greater exfiltration problems in that area. This over-pressurization at the top of the building cannot be controlled at the same time as controlling infiltration at the base of the building. The only solution is to seal air leaks at the top and the bottom of the building.

Better building techniques, especially tighter building envelopes, play an important role in improving health, safety, durability, comfort, and energy efficiency. These techniques can only achieve the desired goal if they are accompanied by new approaches to ventilation. Think of it this way: 'Build tight; ventilate right'.

The concept is: If 'the envelope is tight and the ventilation right', the heating and cooling systems can be downsized, and the control system can do its job more efficiently.

A high-performance, functioning building envelope is vital to the effective, efficient operation of an HVAC system. The success of both is vital to the health, safety, durability and energy cost-efficiency of the building and the comfort of its occupants.

Canam Building Envelope is a part of TremcoCPG

Article by Tremco Roofing and Building Maintenance and Canam

Need to book an assessment? Contact Kathy Hearn, [khearn@tremco.ca](mailto:khearn@tremco.ca)