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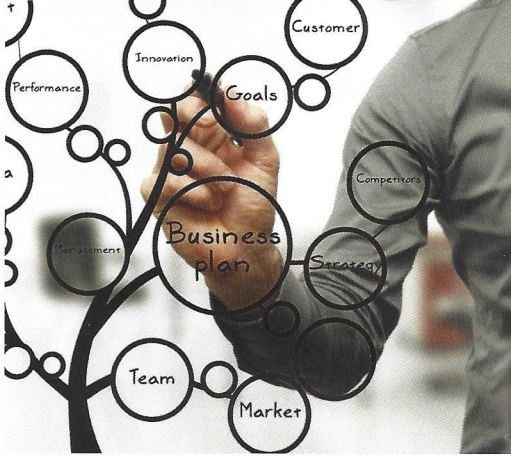

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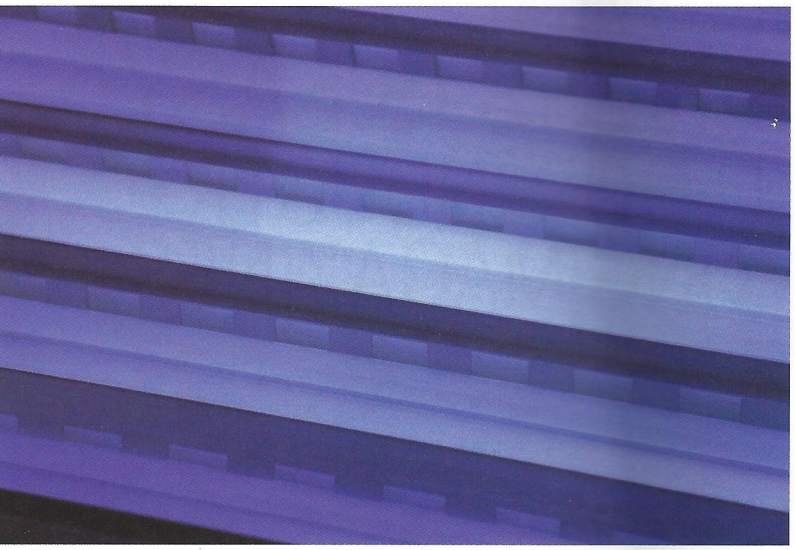

Shining an ultra-violet light on indoor air quality

BY DIGBY HOWSE

Like all new housing, today's condominiums rely heavily on visual aesthetics to sell units. Floor-to-ceiling windows, granite countertops and recessed lighting are the eye candy for prospective buyers, but what prospective buyers can't see is what might make a building's eventual residents sick. Condo air can become contaminated with a variety of volatile organic compounds (VOCs) and biological contaminants, both of which can affect indoor air quality (IAQ) and ultimately occupants' health and well-being.

Indoor air quality challenges

VOCs, such as formaldehyde in carpeting and furniture, acetones in paint and coatings, and sodium hypochlorite in household cleaning chemicals, or simply pets and cigarettes, not only generate offensive odours, they are also airborne contaminants that negatively affect occupant respiratory health. Cooking odours wafting through high-rise condo hallways and infiltrating other units can also be problematic.

Minimum outdoor air standards for commercial buildings, such as the American Society of Air Conditioning, Refrigerating and Heating Engineers (ASHRAE) Standard 62, are designed to dilute all of these indoor air contaminants by adding outdoor air to the HVAC supply air. In high-density metropolitan areas, however, polluted outdoor air can actually add to the mixture of indoor air contaminants.

Another IAQ challenge is combating dangerous biological contaminants, such as mould, mildew, fungi, allergens and any airborne infectious diseases residents have acquired. Although not visible to the eye, these contaminants are commonly found in Canadian households and are well-documented irritants for asthmatics and allergy sufferers.

Ultra-violet germicidal irradiation

Air purification equipment recently developed by the HVAC industry offers a new tool for addressing IAQ challenges: adding (UV-C) ultra-violet germicidal irradiation (UVGI) disinfections to condo HVAC systems.

UV-A, B and C wavelengths are present in sunlight. However, higher frequency UV-C wavelengths are filtered by the Earth's atmosphere; therefore, microorganisms have no defense against it. UV-C light kills microbes by scrambling their DNA, which prevents them from reproducing. For that reason, UV-C light systems are used to sterilize microbes so they can no longer reproduce in HVAC

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systems, their interior surfaces and air conditioning coils, and in the air they re-circulate.

Individual units

UVGI technology is more than a century old; however, HVAC manufacturers have only recently developed smaller UV light systems that can fit the variety of compact HVAC systems commonly used in the individual condo unit market. Condo units typically have fan coils supplied by the building's chilled and hot water pipe loops; packaged terminal air conditioners (PTACs) under windows; individual self-contained split system air handlers; or ductless mini-split heat pumps, which are becoming increasingly popular in North America.

These compact UVGI light systems are designed for installation in close proximity to the cooling coils. Outdoor and indoor humidity produces condensation on cool air conditioning coils, which results in moisture, creating an ideal breeding ground for microbes growing inside the HVAC system. The UV light disinfects the coil, surrounding HVAC unit interior surfaces as well as the airborne mould and other biological contaminants.

UV light systems consist of a power supply and a UV-C lamp that is typically 12 inches or longer, spanning the width of the coil. The UV system works continuously, remaining on during HVAC system idle periods. The system's UV-C lamps need replacement every one or two years.

Common areas

UVGI disinfection for condo buildings' common area air handlers is just as important as disinfecting individual units because residents may be breathing a combination of ex-filtrated air from living units and re-circulated common area air. This air can often contain influenza, tuberculosis or other respiratory infection-causing bacteria and viruses that can potentially be distributed by the common area HVAC system.

Gas-phase air purification and photo catalytic oxidation (PCO)

While UV light is only effective against biological contaminants, manufacturers are combining new technologies called gas-phase air purification and photocatalytic oxidation (PCO) with UVGI in one unit to combat microbial and VOC contaminants.

Gas-phase air purification uses activated carbon-based media to adsorb and hold VOCs through a chemi-sorption process. The PCO process uses the chemical reaction of UV-C light shone on titanium dioxide-infused carbon media, which captures and holds the contaminants and allows the PCO process to convert them into harmless carbon dioxide and water vapour. The same UV light that disinfects microbes also regenerates the media through the PCO process, eliminating the need for media replacements.

Visual aesthetics are important, but condo corporations, developers and owners should also pay attention to invisible health hazards, such as VOCs and biological contaminants. And taking advantage of new technologies to improve indoor air quality may even offer an edge in today's highly competitive real estate market. □

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