Advisory Note

A Service to A.G. Coombs Group Clients.

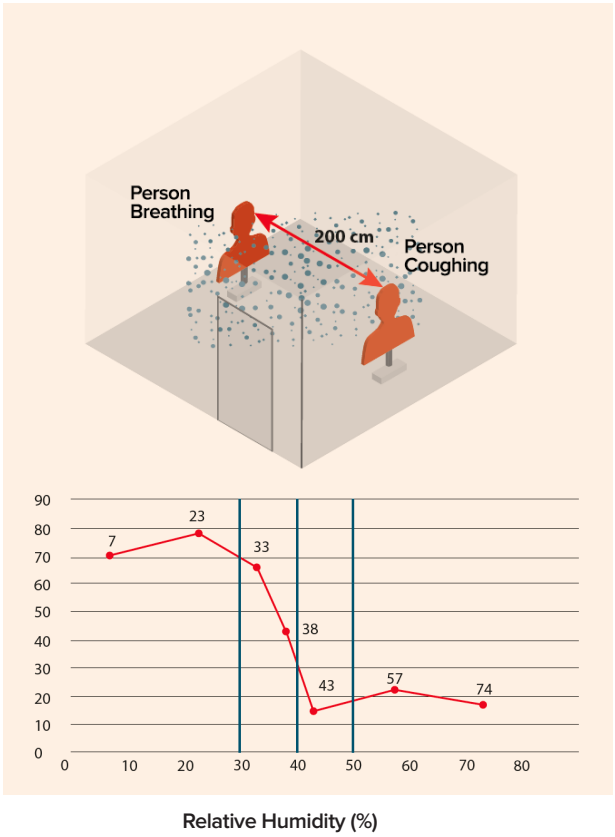
Humidity Control – Using HVAC to Help Reduce Infection Spread

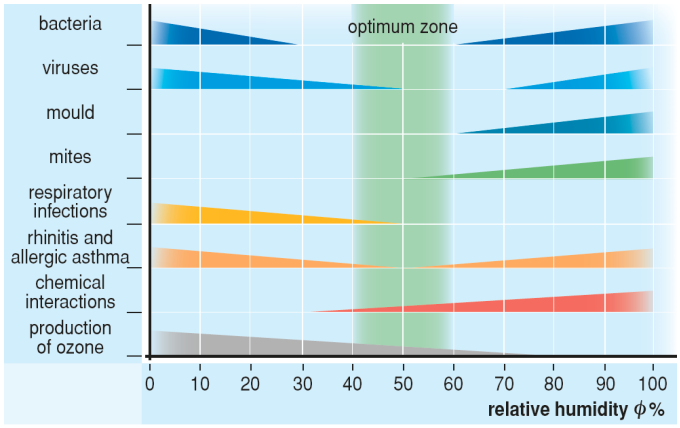
COVID-19's substantial impact on our lives has caused us to reconsider how building HVAC systems can assist reduce airborne transmission of viruses and bacteria. Humidity levels in indoor environments can play a key role in infection control.

A single sneeze injects approximately 40,000 infectious aerosols into the room air. When airborne droplets are introduced into a room with a relative humidity below 40%, they rapidly lose up to 90% of their volume. They shrink and manage to float for a long time, covering considerable distances. This increases the chances of reaching another person.

In studies using mannequins simulating people coughing with influenza and people breathing standing two meters away aerosol samples were collected in proximity of the breathing mannequin's mouth at different moments and their infectiousness was assessed.

Infectivity dropped from 80 to 20% once relative humidity was above 40%RH. This is due to the fact that the influenza virus can no longer remain suspended for a prolonged period of time and to the reduced lifespan of many airborne bacteria and viruses in this relative humidity range.





While higher humidity can reduce the distance that infectious aerosols travel, humidity which is too high is likely to cause increased respiratory infection from mould and bacteria to humans and may even cause damage to buildings themselves.

Most building air conditioning systems are designed and controlled to provide temperature control for human comfort. HVAC systems for many buildings are not always designed to meet specific humidity targets. However, air conditioning systems are used effectively to precisely control humidity in specialist facilities spaces including laboratories and specialist healthcare, museums and art galleries and high technology and pharmaceutical manufacturing. Modifications to existing HVAC systems can be made to improve the ability to regulate the space humidity.

Considerations for improving humidity control are:

1. Keep humidity between 45 and 55 % RH where possible and control temperatures between 21 and 24°C
2. Monitor the humidity in the space and improve control – Building Management and Control Systems can have humidity sensors added to room temperature sensors or return air duct temperature sensors. These inputs can be used in enhanced control algorithms to help control and balance humidity and temperature in existing HVAC configurations.
3. Review the existing Air Handling Unit configuration - Some units equipped with heaters can potentially be modified to easily de-humidity without major equipment upgrades. A control strategy change may be all that is required to de-humidify.

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4. Enhance the existing Air Handing System design - Modular humidification units can be added to help increase humidity. This is particularly important in many Australian climates in winter weather conditions where outside air has very low humidity). Good selection, control and maintenance management of these humidifiers is required to ensure effective operation and system performance.
5. Upgrade and improve ducted fresh air into units:
   + Review the source of outside air (often dusty or damp plantrooms, directly from streets or loading docks), review intakes, filtration and outside air rates.
   + Add or improve outside air filtration. Filter outdoor air near green spaces.
   + Consider outside air pre-cooler units
6. Seal penetrations in the building fabric to reduce moisture ingress.
7. Rebalance air systems where practicable to positively pressurise spaces where possible (unless a specific pressure regime exists).

For more information on humidity control in buildings and advice on the humidity control capability of existing HVAC systems contact:

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References and Resources

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