

## Dedicated Outdoor Air Systems

### MESCA – Energy Recovery and Ventilation

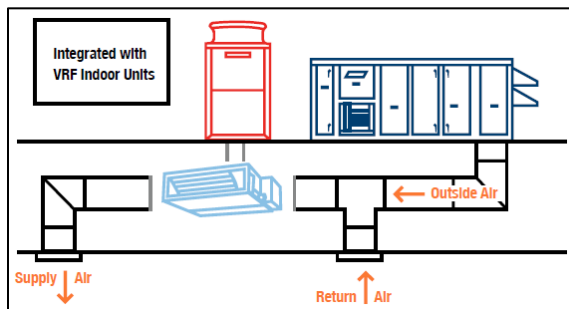
# HOW IT WORKS



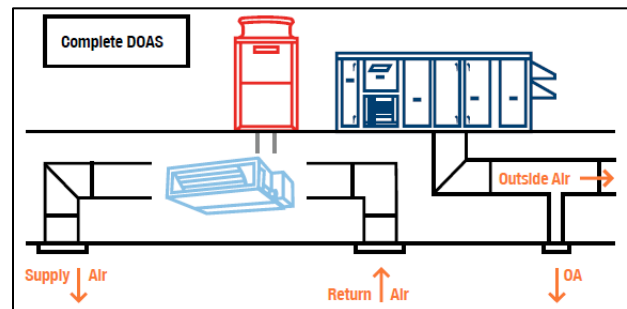
In all buildings, the mechanical ventilation equipment is a core part of the overall HVAC system and are growing in sophistication and importance. It is considered as the “lungs”, in allowing the building to “breathe”. Essentially, mechanical ventilation introduces fresh, outside air into a space. While cooling and heating systems are regulated by energy codes concerned with efficiency and occupant comfort, ventilation systems are regulated under mechanical codes, which concern occupant safety. In Canada, ventilation systems for commercial buildings must comply with state and local codes based upon ASHRAE 62.1. ASHRAE 62.1 uses calculations to arrive at the amount of ventilation required by a building.

Dedicated Outdoor Air Systems (DOAS) is a common method for ventilating commercial spaces. They are designed to condition outdoor air during ventilation to room neutral temperature – typically in the range of 70-72F. No matter what the ambient temperature may be, the DOAS will work to heat or cool, and dehumidify the air in order to achieve supplying comfortable room neutral temperature air. Also, depending on the application, a DOAS may be equipped with an energy recovery ventilator (ERV) device. Sophistication of the DOAS is largely defined through demand control strategy options. This allows the equipment to perform efficiently by reducing energy use by only providing fresh air when actually required. Such strategies include CO2 control, occupied/unoccupied mode through scheduling, static pressure control, and other IAQ sensing methods. These control methods ultimately dictate the speed of the VFD for the supply fan. Typical air flow range is 50 – 100% of total rated air flow. For example, if 100% air flow is supplied during unoccupied times, this may be considered an excess of energy use by the DOAS.

DOAS may be integrated with the heating/cooling system such as a VRF system (see *Fig. 1*). It’s a design where the supply duct of the DOAS is connected directly to the VRF indoor units. Each fan coil would be equipped with a cut-out to allow about 15-20% fresh air to enter through it, mixing with return air from the space. This approach requires additional design considerations when both the DOAS and VRF system use variable speed fans.



*Fig. 1 – Integrated System*



*Fig. 2 – Decoupled System*

In decoupled designs (shown in *Fig. 2* above), the DOAS handles ventilation through separate ducting than the VRF system. The DOAS supplies fresh tempered air directly into the space through its dedicated supply air diffuser, while the VRF system heats or cools the air based on the zone’s setpoint. This approach makes it easier to complete fan balancing, verify proper ventilation rates and prove compliance with ASHRAE 62.1.