

Comparative Analysis – System Technologies

	DOAS-QLCI	AHU-VAV	Explanation
IAQ – related to Ventilation Effectiveness (Ez) <ul style="list-style-type: none"> Cooling Mode Heating Mode 	Displacement Ventilation: “purges” the occupied space 1.2 1.0-1.2	Mixed air ventilation: dilutes but forces dirty air into occupied space 1.0 at best 0.8	True measure of contaminant removal effectiveness; Ez > 1.0 => better IAQ (lower CO2) in room; DIV lifts contaminants up & away
Acoustics <ul style="list-style-type: none"> Why Why 	<35 dBA No fan, motor, damper or compressor in room Low Velocity	>35 dBA Increased Air CFM Higher Air Velocity Noise potential in duct & at diffuser	DOAS delivers code minimum OA to space AHU-VAV delivers OA PLUS high % of return air for clg & htg
Maintenance	Vacuum coil 1x/yr	Change filters Fan bearings Motors Belts Controls	AHU uses 2/3 RA; better filtration needed. DCV necessary for limiting energy use; control points are expensive
System Efficiency <ul style="list-style-type: none"> Why Why 	High Hydronic heat transfer Displacement Ventilation Reduced chiller capacity	Medium Air heat transfer Mixed air ventilation Large air handler	DOAS unit is ~1/3 CFM of AHU=>smaller ducts, coils, fans, bhp, fla, mca Reduced fan energy More efficient chiller

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	DOAS-QLCI	AHU-VAV	Explanation
Room to Room air contamination risk	None	High % of air pulled from all rooms, mixed at air handler and returned as supply air to all rooms	DOAS-QLCI has dedicated EA pulled from room & exhausted at DOAS, no recirculation during occupied hours
Installed Costs	1.0	0.95-1.0-1.05	Recent feedback; DOAS-QLCI inline w/ well-designed AHU-VAV
Life Cycle Duration	30+ years	20+ years	Better practices req'd for AHU-VAV due to more moving parts
Installation Considerations or Risks	Low	Medium	AHU-VAV: needs considerable ceiling space for large ducts & high voltage power in rooms
Proprietary Technology	No	No	Hydronics piping, ducting
Physical Space Impact	Minimal	Minimal	
Occupant Comfort	High	Medium	QLCI has lower air velocities & moderate temps delivered from full-wall array. AHU-VAV can have localized drafts

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	DOAS-QLCI	DOAS-FCU	Explanation
IAQ – related to Ventilation Effectiveness (Ez) <ul style="list-style-type: none"> Cooling Mode Heating Mode 	Displacement Ventilation: “purges” the occupied space 1.2 1.0-1.2	Mixed air ventilation: dilutes but forces dirty air into occupied space 1.0 at best 0.8	True measure of contaminant removal effectiveness; Ez > 1.0 => better IAQ (lower CO2) in room; DIV lifts contaminants up & away
Acoustics <ul style="list-style-type: none"> Why Why 	<35 dBA No fan, motor, damper or compressor in room Low Velocity	≥35 dBA Single-Point HVAC device needs higher supply air velocity; Noise potential in duct & at diffuser	No moving parts in QLCI plus full-wall air delivery method allows for lower air velocity resulting quieter airflow
Maintenance	Vacuum coil 1x/yr	Change filters Fan bearings Motors Belts Controls	Filtration localized at DOAS unit with QLCI. Filtration needed at FCU terminal devices with FCU and VRF. Moving parts in FCU require service.
System Efficiency <ul style="list-style-type: none"> Why Why 	High Hydronic heat transfer Displacement Ventilation Reduced chiller capacity	Medium Plus Air heat transfer Mixed air ventilation Larger DOAS	Higher Ez, results in smaller DOAS with DIV. No fan energy at terminal with QLCI

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	DOAS-QLCI	DOAS-FCU	Explanation
Room to Room air contamination risk	None	None	DOAS-QLCI and DOAS-FCU operate in similar manner for room-to-room contaminants
Installed Costs	1.0	1.05-1.1	High-voltage electrical requirements for FCU is considerable
Life Cycle Duration	30+ years	20+ years	Better maintenance practices req'd for DOAS-FCU due to more moving parts at FCU
Installation Considerations or Risks	Low	Medium	Similar ductwork but high voltage power req'd for FCU
Proprietary Technology	No	No	Hydronics piping, ducting
Physical Space Impact	Minimal	Minimal	
Occupant Comfort	High	Medium	QLCI has lower air velocities & moderate temps delivered from full-wall array. DOAS-FCU can have localized drafts

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	DOAS-QLCI	DOAS-VRF	Explanation
IAQ – related to Ventilation Effectiveness (Ez) <ul style="list-style-type: none"> Cooling Mode Heating Mode 	Displacement Ventilation: “purges” the occupied space 1.2 1.0-1.2	Mixed air ventilation: dilutes but forces dirty air into occupied space 1.0 at best 0.8	True measure of contaminant removal effectiveness; Ez > 1.0 => better IAQ (lower CO2) in room; DIV lifts contaminants up & away
Acoustics <ul style="list-style-type: none"> Why Why 	<35 dBA No fan, motor, damper or compressor in room Low Velocity	≥35 dBA Single-Point HVAC device needs higher supply air velocity; Noise potential in duct & at diffuser	No moving parts in QLCI plus full-wall air delivery method allows for lower air velocity resulting quieter airflow
Maintenance	Vacuum coil 1x/yr	Change filters Refrigerant concerns Refrigerant growing obsolete Complexity in operating controls	Filtration localized at DOAS unit with QLCI. Filtration needed at terminal devices VRF. VRF complexity & refrigerants a service concern.
System Efficiency <ul style="list-style-type: none"> Why Why 	High Hydronic heat transfer Displacement Ventilation Reduced chiller capacity	High Refrigerant heat transfer Ability to heat and cool in varied spaces	Higher Ez, results in smaller DOAS with DIV. No fan energy at terminal with QLCI. Refrigerant has high BTU capacity

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	DOAS-QLCI	DOAS-VRF	Explanation
Room to Room air contamination risk	None	None	DOAS-QLCI and DOAS-VRF operate in similar manner for room-to-room contaminants
Installed Costs	1.0	1.0-1.05	Recent feedback; DOAS-QLCI inline w/ DOAS-VRF, high voltage power req'd for VRF
Life Cycle Duration	30+ years	20+ years	Better practices req'd for DOAS-VRF due to more moving parts & refrigerant
Installation Considerations or Risks	Low	Medium	VRF: need good piping practices & high voltage power in rooms
Proprietary Technology	No	Yes	VRF has complex controls
Physical Space Impact	Minimal	Minimal	
Occupant Comfort	High	Medium Plus	QLCI has lower air velocities & moderate temps delivered from full-wall array. DOAS-VRF can have localized drafts

Comparative Analysis – System Technologies

	DOAS-QLCI	Unit Vent	Explanation
IAQ – related to Ventilation Effectiveness (Ez) <ul style="list-style-type: none"> Cooling Mode Heating Mode 	Displacement Ventilation: “purges” the occupied space 1.2 1.0-1.2	Mixed air ventilation: dilutes but forces dirty air into occupied space 1.0 at best 0.8	True measure of contaminant removal effectiveness; Ez > 1.0 => better IAQ (lower CO2) in room; DIV lifts contaminants up & away
Acoustics <ul style="list-style-type: none"> Why Why 	<35 dBA No fan, motor, damper or compressor in room Low Velocity	≥ 40 dBA, when new; Increased Air CFM Higher Air Velocity Noise potential in terminal device	DOAS delivers verifiable code minimum OA to space. UV has limited ability to prove OA %
Maintenance	Vacuum coil 1x/yr	Change filters Fan bearings Motors Belts Controls	Filter change outs req’d in every room; w/possible varied sizes across bldg. Poor maintenance results in shorter life span and noise
System Efficiency <ul style="list-style-type: none"> Why Why 	High Hydronic heat transfer Displacement Ventilation Reduced chiller capacity	Medium to Low Air heat transfer Mixed air ventilation	Large fan power energy consumption with UV; data indicates UV can consume 30% more energy

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	DOAS-QLCI	Unit Vent	Explanation
Room to Room air contamination risk	None	Some, depends on bldg. practices. More concern with dust, debris and fumes from outside louver	DOAS-QLCI has dedicated EA pulled from room & exhausted at DOAS, no recirculation during occupied hours
Installed Costs	1.0	0.75-1.0	Depending upon type of UV; some self-contained UVs are impactful
Life Cycle Duration	30+ years	20+ years	Better practices req'd for UVs due moving parts
Installation Considerations or Risks	Low	Medium	UVs require high voltage power; proper positioning of desks
Proprietary Technology	No	No	
Physical Space Impact	Minimal	Medium Plus	Similar UV protrude into room; cannot place books on top: blocks UV outlet
Occupant Comfort	High	Medium Plus	QLCI has lower air velocities & moderate temps delivered from full-wall array. UV can have localized drafts & noise