

## PURDUE SUBSTANTIATES QLCI OPERATION OF YEAR-ROUND DISPLACEMENT VENTILATION

Questions continue to arise surrounding the correct value to apply for ventilation effectiveness,  $E_z$ , when determining code required minimum outside air per Table 6-4, ASHRAE 62.1-2019. In Table 6-4, ASHRAE outlined default values based upon distinct ventilation type and finite operational characteristics.

“The committee is considering an addendum which would permit calculation of  $E_z$  for more complicated systems and control strategies.”

- Excerpt from ASHRAE interpretation response 2/14/19

ASHRAE recognized the default values in Table 6-4 could not capture the myriad of ventilation and equipment designs, not to mention the enhanced control strategies, applied in industry practice.

Normative Appendix C defines the procedure for determining zone distribution

effectiveness through the following measures: (1) CFD modeling coupled with supporting lab validated testing and (2) operational performance must be measured in BOTH cooling and heating modes.

In Table 6-4, for Stratified Air Distribution Systems, (Displacement Ventilation) the  $E_z$  default values were only defined for cooling mode operation. Now with the defined procedures per Normative Appendix C, the ability to establish  $E_z$  values for Displacement Ventilation during heating modes can now be applied.

Purdue University tested the QLCI per the Normative Appendix C procedures. The static CFD models, Figure 1 (Heating Mode) and Figure 2 (Cooling Mode), clearly show and prove Carson Solutions QLCI delivered stratified room conditions in both cooling and heating modes. With this validated testing, unique only to Carson Solutions' QLCI, designers can confidently apply  $E_z$  values greater than unity year-round.

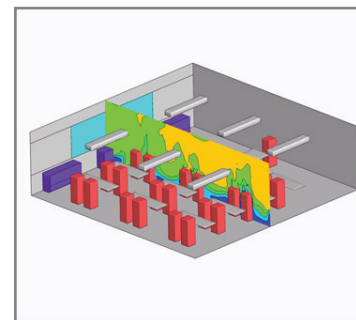


Figure 1: Simulation of QLCI Displacement Ventilation in HEATING mode.

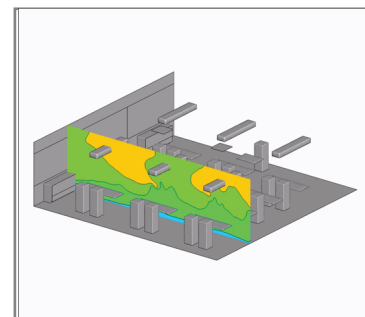


Figure 2: Simulation of QLCI Displacement Ventilation in COOLING mode.

### DISPLACEMENT OUT PERFORMS MIXED AIR VENTILATION FOR CONTAMINANT REMOVAL:

“Designers should investigate a method called vertical displacement ventilation or thermal displacement ventilation. This approach successfully uses natural convection forces to reduce fan energy and carefully lift air contaminants up and away from the breathing zone”

– EPA, Tools for Schools

Schools receive better IAQ, improved thermal comfort, improved acoustics for learning, and decreased maintenance with no moving parts.

### NOT ALL DISPLACEMENT VENTILATION IS CREATED EQUAL:

Go with a tested, validated and proven leader:

- Hundreds of school buildings with QLCI installed over decades
- Many school districts have installed QLCI equipment repeatedly based upon delivered performance.
- Fully customizable equipment and accessories
- Only DIV manufacturer to have 3rd party independent data per Normative Appendix C
- Validated stratified displacement operation in BOTH cooling and heating

# CARSON SOLUTIONS TIMELINE

There is a lot that has happened over the years, let's catch up!

**2005**

First QLCI installed

**2005-2015**

A decade of success with hundreds of schools implementing DIV technology.

Lab testing and smoke videos produced proving DIV operation.

**2018**

Carson Solutions acquires QLCI technology from TROX

**2019**

ASHRAE interpretation document identifies need for path to empirically test those ventilation systems not specifically listed in Table 6-4.

**JUNE 2019**

ASHRAE introduces latest version of 62.1 with Normative Appendix procedure for testing enhanced design and control strategies not listed in T6-4.

**DECEMBER 2019**

Purdue University begins testing QLCI equipment in IAQ lab per Normative Appendix C.

**AUGUST 2020**

Purdue University shares validated testing proving stratified operation in BOTH cooling and heating modes.

Carson Solutions announces engineered solutions integrated various types of sanitizing methods in response to COVID-19