

# Ventless Clothes Dryer Case Study

By: James Higgins, CTO VanAir Design

## Summary

VanAir collaborated with RDH Building Science to confirm that VanAir Doors are a viable and effective solution for providing ventless clothes dryers installed in laundry closets with sufficient air transfer. In the laboratory, three closet doors each with two ventless dryers were tested in a purpose-built test closet with temperature and humidity sensors. The test enclosure and methodology were in general conformance with UL 2158 *Standard for Safety for Electric Clothes Dryers*<sup>1</sup>.

### Test doors

#### Door Without Vents

2 Door Grilles (installed top/bottom, each 6x10")

#### VanAir Door

Note: sides, top, and 1/2" undercut were unsealed for all test doors

Test dryers	Required Top/Bottom Vent
Bosch 24" Condensation WTG86400UC	63 in <sup>2</sup> / 63 in <sup>2</sup>
Blomberg 24" Heat Pump DHP24400W	46 in <sup>2</sup> / 16 in <sup>2</sup>

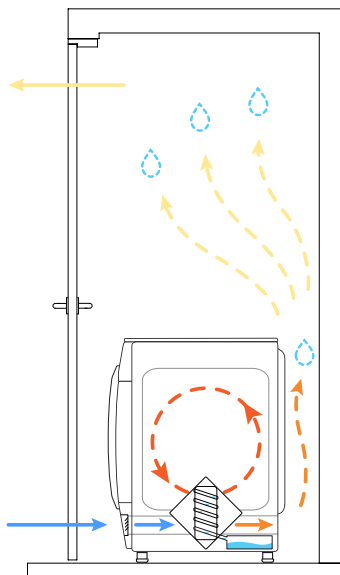


Figure 1 - Schematic of Airflow through a Ventless Dryer and Laundry Closet

## Laundry Closet Ventilation

Unlike conventional clothes dryers, ventless dryers (i.e., condensation or heat pump dryers) are not exhausted to the outdoors. However, they do still require a supply of room air. Ventless dryers use ambient air to cool the dryer's process air in a heat exchanger, where moisture extracted from the load is condensed and drained away. A small amount of this moisture evaporates into the room air and increases the humidity.

High humidity can cause condensation to form, creating conditions for mold to grow. Large cyclic variations in humidity can cause drywall and casing to warp and crack over time. To limit the rise in heat and humidity, appliance manufacturers require ventilation openings in the top and bottom of the laundry closet door. Thermal buoyancy drives warm air out the top and pulls room temperature air in through the bottom vent. In addition, the International Mechanical Code<sup>2</sup> also requires laundry closets to be vented.

## Highlighted Results

The results of this testing show that both the use of the VanAir Standard and VanAir Sound Option doors as laundry closet doors results in similar performance to that of a hollow core door with grilles as specified by the manufacturer for a heat pump condensing dryer and a condensing dryer based on measured drying efficacy as well as temperature and humidity accumulation within the laundry closet.<sup>3</sup>

- For the VanAir Door and 2 Door Grilles, the closet humidity through the cycle was practically equivalent.
- For the Door Without Vents, closet humidity reached 93% and 97% for the Bosch and Blomberg dryers respectively.
- Temperature rise was practically equivalent for all doors.
- The Blomberg heat pump dryer extracted approximately 65% more water than the Bosch condensation dryer.
- Test door ventilation had minimal effect on the amount of water extracted.

Testing Completed by:



<sup>1</sup> Underwriters Laboratory Inc., Canadian Standards Association, "UL-2158 (CSA C22.2 No. 112-18) – Standard for Safety for Electric Clothes Dryers," ANSI/UL/CSA (2018)

<sup>2</sup> International Code Council, "International Mechanical Code," 504.6 Clothes Dryer Makeup Air, ICC (2018)

<sup>3</sup> L. Ricketts, M. Lisi, J. Tatara, "Testing of VanAir Doors for Laundry Closet Applications with Ventless Dryers," RDH Building Science, Burnaby, British Columbia (2020)  
\* full report available upon request

### Test Results

Performance metrics:

- Humidity rise in the test closet over an 80-minute cycle.
- Temperature rise in the test closet over an 80-minute cycle.
- Mass of water extracted from the test load.

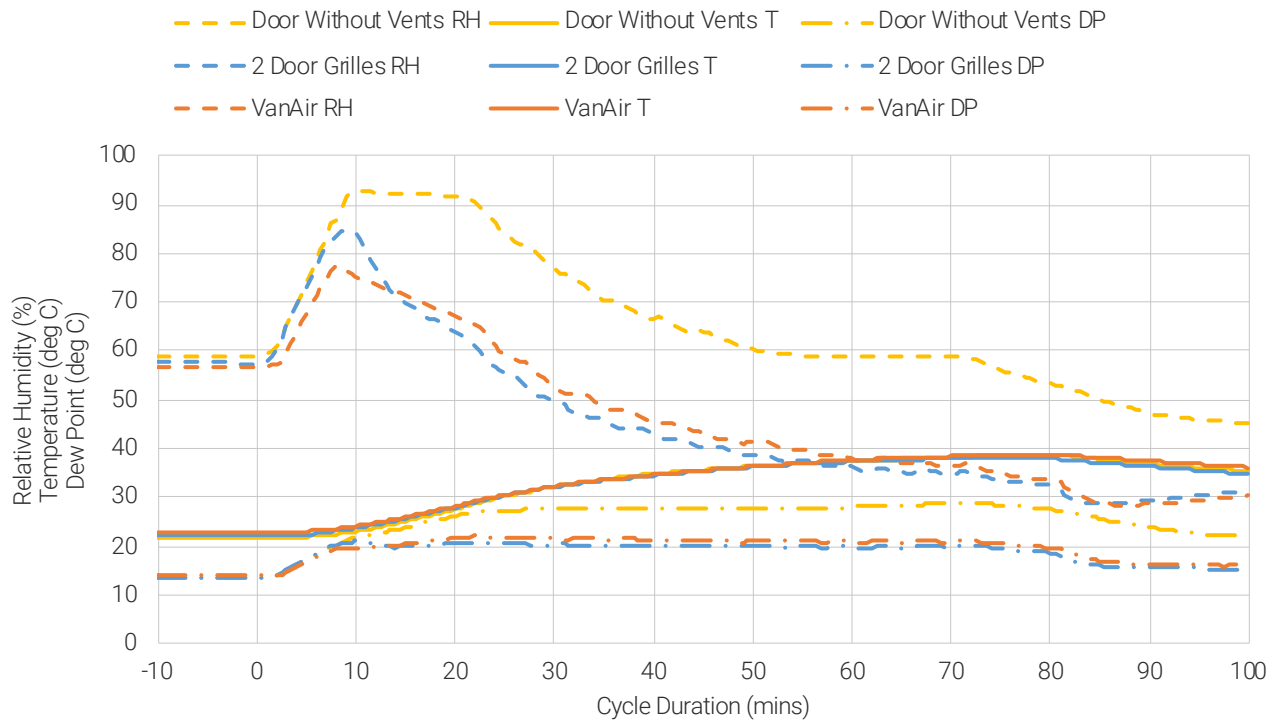


Figure 2 - Bosch Condensation Dryer: Relative Humidity, Temperature, and Dew Point in the Test Closet over an 80min Cycle

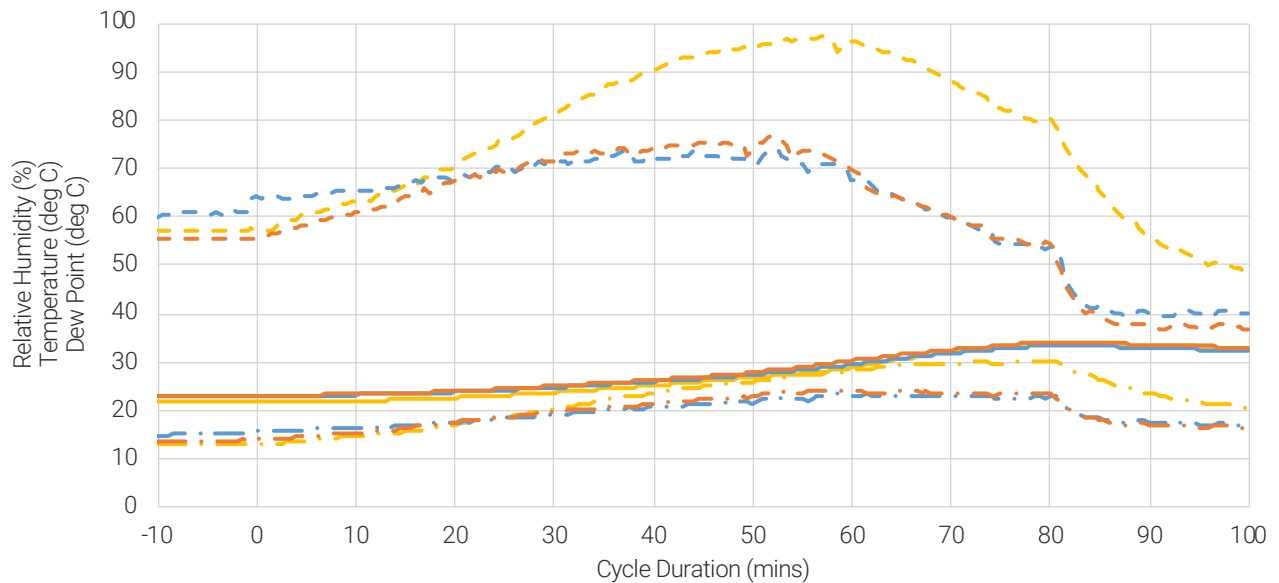


Figure 3 - Blomberg Heat Pump Dryer: Relative Humidity, Temperature, and Dew Point in the Test Closet over an 80min Cycle

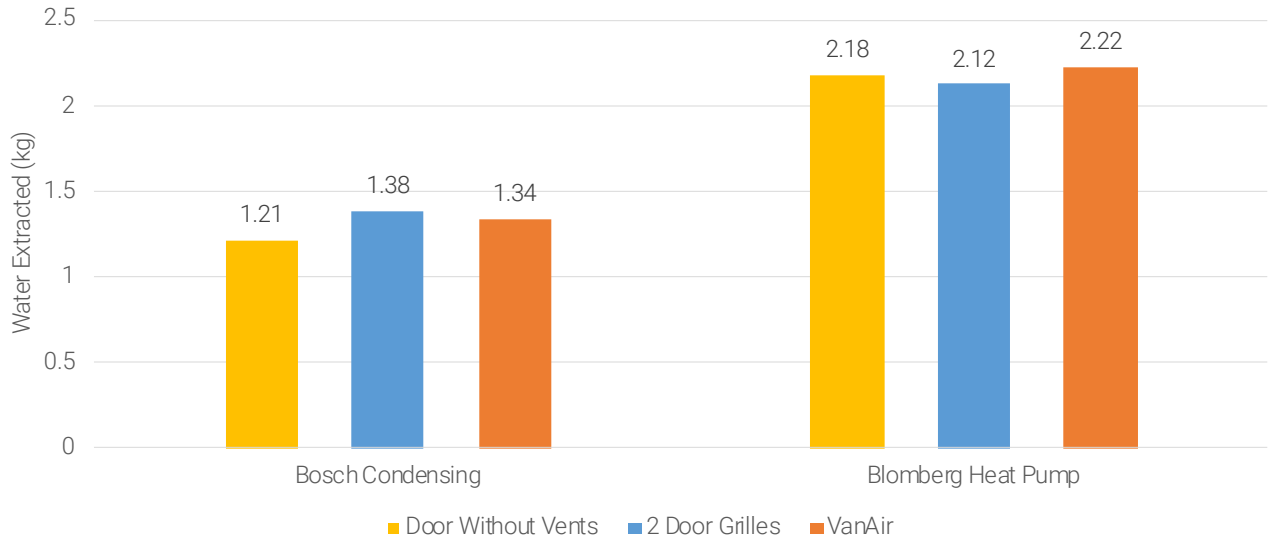


Figure 4 - Water Extracted from Standardized Test Loads (kg)

Test Closet

Interior dimensions:  
 31 1/2" (width) x 37 1/2" (depth) x 82 1/4" (height)



Figure 5 - Test Closet and Samples: VanAir Door, 2 Door Grilles, and Door Without Vents

Door samples generously provided by:



Appliances generously provided by:



Testing completed by:

