NFRC 401 Ventilation Rating Update
Why have we decided to calculate ventilation
- to expand NFRC reach (open vs sealed)
- to standardize measures
- to place NFRC as authority on Green Ventilation
- to allow comparison for consumers
- to give manufacturers more to sell
- multiple manufacturers ready
- States considering use
Two motions were pending:

MOTION: J. Hayden/K. Haglund move that the Technical Committee be directed to reconsider and re-evaluate the appropriateness of both the Ventilation Area (VA) calculation and the Ventilation Rating (VR) defined in NFRC 401, and bring a subsequent recommendation to the BOD. Motion passes by VV with 3 abstentions.

The most recent Ventilation Task Group call resulted in the following motion:

MOTION: M. Mikkelson / J. Hayden move to recommend to the Ventilation Subcommittee that the task group no longer pursue a certified and labeled Ventilation Rating, but rather pursue only a standardized ventilation area calculation procedure. Motion passes: 6 Y, 2 N, 1 abstention.
Current status;

The VR TG will schedule another call when the Velux concern has been tested in the MI chamber. The results of this test will determine if we need to add a third category for high aspect ratio projecting products.

As you may have heard, the Board unanimously voted to kill the Rating part of this standard citing the reasoning that there is no need in the market for it. Due to this we will need to remove parts of the ballot relating to Rating and just leave the calculation sections. The 401 will be stricken from available standards and removed from the CPD.
My apologies to those of you who worked hard for the last few years to make this a new "green" rating for open products. As this standard is completed, other organizations will be able to create their own rating systems to 401 (or the new designation), so our work must be completed. We have learned many things about screen effects, 3-dimensional calculations and airflow/aerodynamics with your help and guidance. This is not lost work and will be in our new standard, 

     Thanks for all your help

-Ray
Board member statement
So now what...

1. Complete third test of Velux high ratio products
2. Determine if third category of calculations are needed
3. Re-write rating into calculation only standard
4. Reballot standard
5. Reissue
Ventilation Research Device

- **Fan**: creates flow through the test window
- **Data Collection**: 600 collected data points over a min time period per iteration up to 75Pa pressure drop
- **Test Window**: Different windows with 5-10 iterations to each variance of the window
Schematic of Ventilation Device

Flow Diverter Wall: is added to straighten air flow into the orifice

Fan speed is set to create pressure differential between atmospheric pressure (P1) and internal box pressure (P3).

Pressure differential between static pressure pitot tube (P2) above orifice and (P3) is data logged and used to determine volumetric air flow
Data Collection instrumentation

Box Internal Pressure (P3): Probe is covered to create static pressure

Orifice Plate

Flow diverter wall

Sealed box except window opening
Test results-Awning Window

![Graph showing volumetric flowrate vs. angle of opening for awning windows with and without screens. The graph compares flowrate with and without screens at various angles of opening.]
Test results-Casement: Fixed Hinge

Yellow curve is a plot eliminating the triangular area of the existing calculations
Test results-Casement: Washability Hinge

![Graph showing washability of casement hinges with and without screens at 75 Pa.]
Double Hung: Air Velocities

Double Hung: Air Velocities with Fully Open Bottom Sash

Air Velocity (mph) vs. Pressure Drop across the window (Pa)

- w/o Screen
- w/ HP Screen
Key understandings

• Ventilation area of a product produces massive air flow at standard pressures (up to 12000 CFM!)
• Partially open products produce more than enough air flow
• Screens have a smaller effect at lower pressures and smaller openings
• Projecting products have complex air flows
• Core calculations need update
Key Findings

- Casement top and bottom triangular area does not have a significant affect on the air flow
- Relationship between Casement Vent Area and Volumetric Flow Rate (VFR) is proportional until a particular angle, after that, VFR does not significantly increase.
- Double Hung: Top sash and Bottom sash results are similar to each other.
- Casement hinge style variations have different flow properties. Proposed VA calculation is a conservative average of these variations.
Summary review of ballot
Thank you! - Questions?