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## Roof Ventilation: Concepts and Advantages



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## Ventilation

For ventilation to work properly you need:

- A *Balanced System*
- Wind blows over roof
- Creates negative pressure that draws warmer air out
- Replacement air enters through soffit vents
- Natural convection of warm maintains air flow year round

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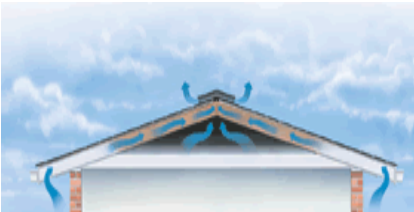
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## Balanced System

- 1: 1 Ratio – Net Free Area determines correct amount of venting



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### Benefits of Ventilation

- Air flows naturally up and out attic
- Promotes a cooler, drier attic
- Prevents moisture trapped in insulation
- Prevents mildew, rotting, drywall damage
- Consistent ventilation w/o energy consumption

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### Benefits of Ventilation Products

- Reduces or eliminates condensation
- Provides weather barrier - prevents rain and snow infiltration
- Prevents insects from entering building
- Extends service life of the building materials

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### Ventilation Concepts

**Net Free Area**

- What does it mean?
- It's a mathematical calculation that determines the amount of air or water that can flow freely through an open space without resistance.

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### Net Free Area Formula

$$NFVA = \frac{Q/60}{a \times \sqrt{2 \times \Delta p} \times g}$$

Where Q= average air flow for the vent component, CFM  
 a= 0.6  
 Δp= average pressure differential for the tested vent component, psf  
 g= acceleration due to gravity 32.2 ft/s<sup>2</sup>  
 ρ= mass density of air 0.0765 lbm/ft<sup>3</sup>

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### How Much Venting?

- Follow these simple guidelines to determine how much venting is needed.  
 (a) attic length = \_\_\_\_\_ ft. x (b) attic width = \_\_\_\_\_ ft.
- Multiply: (a) x (b) = \_\_\_\_\_ ft. (c)
- Divide (c) ÷ 300 = \_\_\_\_\_ ft. (d)
- Multiply (d) x 144 = \_\_\_\_\_ ft. (e)
- Divide (e) ÷ 2 = \_\_\_\_\_ ft. (f)
- Min. length of vent material required. Divide (f) ÷ 17 = \_\_\_\_\_ min. ft.
- Even if result exceeds minimum required, run vent material from gable to gable for best appearance.
- Standard ventilation requirements: 1/300 net free area to attic floor, 50% net free area in soffits.

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### Ventilation Concepts

**Air Permeability - ASTM D737-96**

- What is it ?  
 Rate of air flow passing through a known area under a prescribed air pressure differential between two surfaces of material.
- How is it measured ?  
 Test clamps material and uses vacuum to create pressure. Air flow occurs from side with higher air pressure. From this air flow, permeability of product is determined. Expressed in cubic feet per minute.

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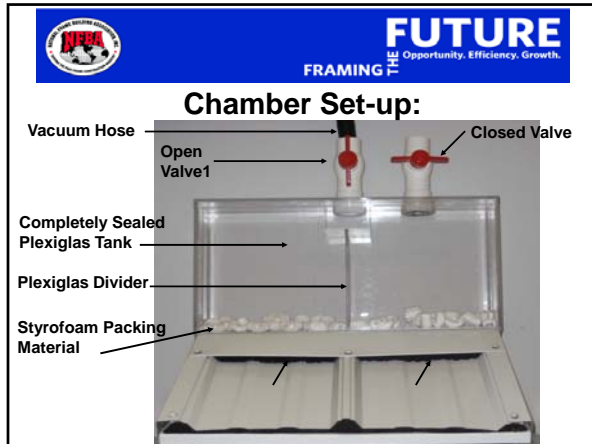
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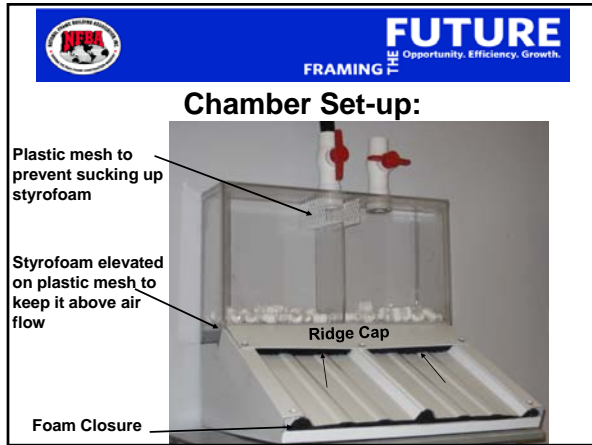
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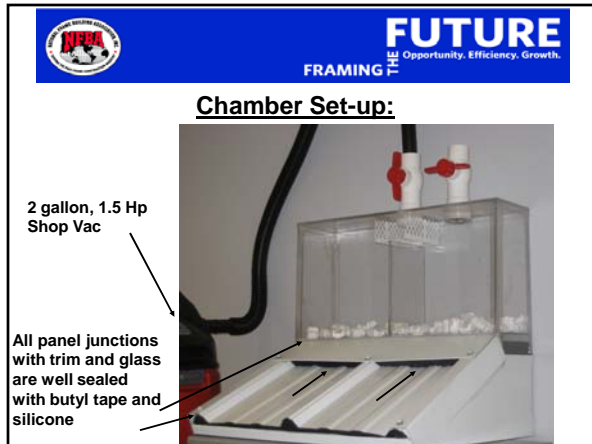
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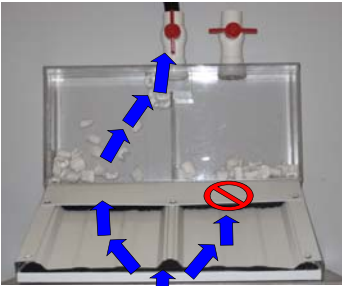
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**Airflow Results from Center Valve:**



**AIRFLOW**

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**Airflow Results from Center Valve:**



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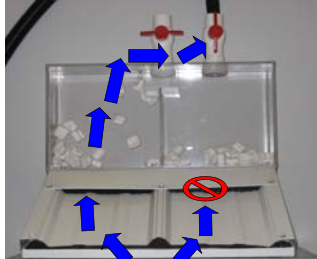
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**Airflow Results from Right Valve:**



**AIRFLOW**

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**Airflow Results from Right Valve:**



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**More Tests**

**Air and Water Infiltration**

- 100 mile per hour wind - independent labs
- Miami Dade County approved
- Miami Dade County - NOA number
- Vent products with 120 mile/hr rating & NOA #
- Cold crack, snow infiltration, tear and tensile strength, compression strength, UV stability

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**Ventilation Materials**

- Foams
- Polyester fiber
- Combinations of closure and fiber
- Non-woven fiber
- Molded plastic and metal baffles
- Metal and baffles

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**Advantages - Disadvantages**

**Foams**

- Typically not cut to fit profile. Rely on pressure to fill in voids
- Low cost
- Treated with chemicals for UV and water resistance

**Polyester Fibers**

- Treated with chemicals to help with fire/flame spread
- Treated with chemicals for UV and weather resistance

**Combination - Foam and Fiber**

- Smaller venting material area with foam
- Cut to fit; installs like closure

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**Advantages - Disadvantages**

**Non-Woven Fiber**

- Cut to fit the profile
- Easy to install rolls or 3' pieces
- Ten+ years of field performance

**Plastic and Metal Combinations**

- Higher profile above roof panels
- Extra materials
- Time to install

**All Metal Vents**

- Higher profile
- Extra materials
- Time to install

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**Ventilation Decision**

**What do you base decision on?**

- Suppliers - product information, test data
- Field experience - how long, any field testing?
- Performance - how do you measure?
- Price, test data, performance, experience?

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**Insidious**

Insidious - proceeding in a gradual, subtle, but harmful, way

- Do not select a ventilation product based solely on one factor. I suggest you....
- Carefully examine manufacturers' test results
- Investigate, ask questions, experiment for yourself
- Protect your investment, reputation
- Minimize the potential for a claim, due to insufficient ventilation.

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**Anemometer / Dan Scheerer**

**Measurement of Air Flow**

**Demonstration**

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