Ventilation

Doing the Math for Proper Attic Ventilation

by Paul Scelsi, Air Vent

(Editor's Note: Paul Scelsi presents Air Vent's "Attic Ventilation: Ask the Expert" seminars to the industry nationwide in the fall and winter. Scelsi may be reached at (800) Air-Vent.)

A few years ago we decided to add a segment to our attic ventilation seminars addressing how to calculate the amount of ventilation needed for a house. We weren't sure how well it would be received. After all, who wants to do math at a seminar? Answer: A lot of the roofing contractors, builders and architects in attendance across the country. Doing the math with the audience has been one of the best-received sections of our seminars. I'd like to share it with you.

Code Requirements

Building Codes set the minimum requirements for attic ventilation. The International Building Code (IBC) states the following requirements for one- and two-family dwellings.

- 1 sq. ft. of Net Free Area for every 300 sq. ft. of attic floor space provided that: the attic ventilation system is balanced with half intake vents and half exhaust vents, or a vapor retarder is installed on the warm side of the ceiling.
- If the attic ventilation system is not balanced, the IBC calls for: 1 sq. ft. of Net Free Area for every 150 sq. ft. of attic floor space.

Keep in mind that most houses built or remolded today are more airtight because of the increased use of insulation and more energy efficient windows, doors and house wraps. Consequently, minimum code requirements for attic ventilation might not be enough. I recommend the 1:150 ratio balanced with half intake vents (in the soffit/under eave) and half exhaust vents (at or near the ridge of the roof).

Grab a Pencil

Here's how the formula translates into real-world numbers. We'll assume the house is 1,500 sq. ft. (length x width footprint of the house). Here's the math using the 1:150 ratio balanced with intake and exhaust vents.

Step 1. 1,500 sq. ft. divided by 150 = 10 sq. ft. of Net Free Area required total.

Step 2. Balance the system by dividing in half: 10 sq. ft. of total

NFA divided by 2 = 5 sq. ft. of intake NFA and 5 sq. ft. of exhaust NFA.

Step 3. Convert to square inches (which is how ventilation products are specified) by multiplying by 144 (the number of square inches in a square foot):

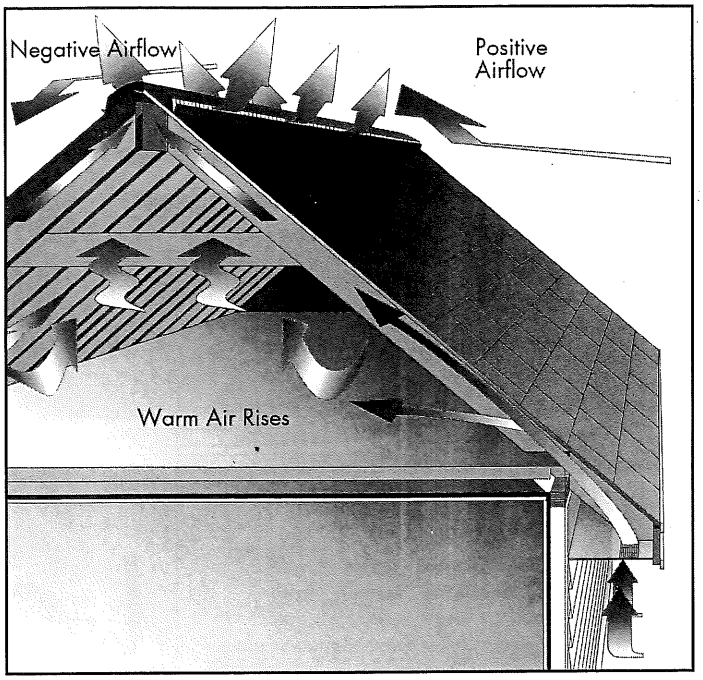
- 5 sq. ft. of intake NFA x 144 = 720 sq. in. intake NFA needed.
- 5 sq. ft of exhaust NFA x 144 = 720 sq. in. exhaust NFA needed.

Step 4. Determine the amount of NFA the manufacturer's attic ventilation system provides and divide that into your requirements. For our example we'll use Air Vent's continuous soffit vents for intake (specified at 9 sq. in. NFA per linear ft.) and ShingleVent™ II ridge vents for exhaust (specified at 18 sq. in. NFA per linear ft.).

- 720 sq. in. intake NFA needed divided by 9 sq. in. NFA = 80 ft. of continuous soffit vents.
- 720 sq. in. exhaust NFA needed divided by 18 sq. in. NFA = 40 ft. of ShingleVent II.

Try a Shortcut

Want a shortcut to doing the math? This method will take you directly to the end of Step 3 above. Some roofing contractors find it especially helpful when estimating the job. Please note that using the shortcut overestimates the ventilation requirement slightly. That's not a problem. The more ventilation the better if it's balanced. Here's the shortcut: Attic sq. ft. divided by 2 = sq. in. of intake NFA needed and the sq. in. of exhaust NFA needed.



You can use the shortcut above for satisfying the 1/150 ratio.

Let's test the shortcut using our 1,500 sq. ft. attic example from above: 1,500 sq. ft. divided by 2 = 750 sq. in. of intake NFA needed and 750 sq. in. of exhaust NFA needed. By comparison, Step 3 above calculated to be 720 sq. in.

To use the shortcut to satisfy the 1/300 ratio, divide by 4.

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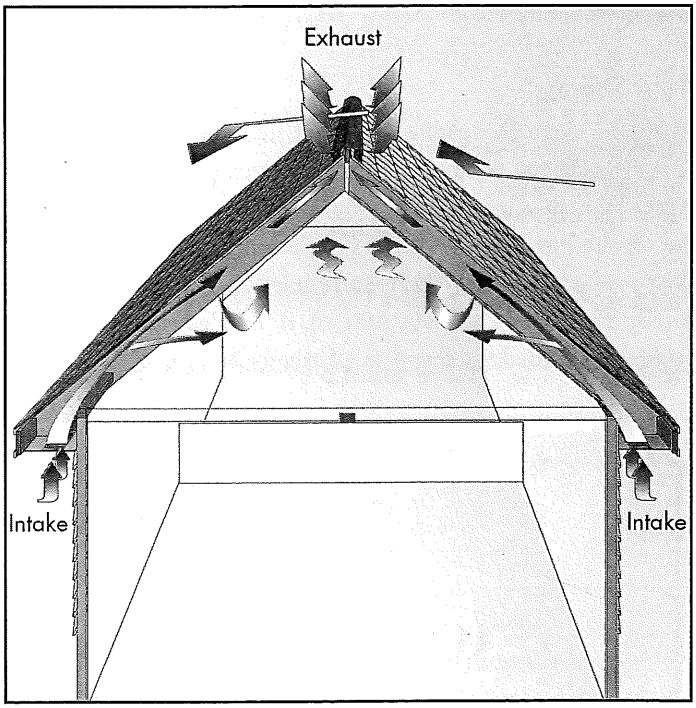
Frequently-Asked Questions

Here are three commonly-asked questions I receive during our attic-ventilation seminars about "doing the math."

Q: What if I cannot balance the system exactly 50% intake and 50% exhaust? If you're going to err, err on the side of more intake ventilation. It's nearly impossible to have too much intake ventilation. In fact, the single biggest cause of most of the attic-ventilation problems I hear about stem from insufficient intake. Aim for at least 50% intake if not more.

Q: What if the math calls for 40′ of ridge vent, but I've got 60′ of available ridge? As long as proper intake ventilation can be provid-



ed to the amount of ridge venting being installed, it's fine to ventilate the entire 60′ of available ridge.

Q: How do I size a power attic ventilator? Power vents are specified in CFM (cubic feet of air moved per minute) instead of Net Free Area. To determine the proper size power vent for a particular size attic, multiply the attic square footage by 0.7 (which is a predetermined calculation that provides 10-12 air exchanges per hour and is recommended by the Home Ventilating Institute). Using the 1,500 sq. ft. attic example from above: 1,500 sq. ft. x 0.7 = a power vent specified at 1,050 CFM.

To calculate proper intake ventilation for the power vent, divide the CFM capacity by 300 and then convert to square inches. For example: 1,050 CFM divided by 300 = 3.5 sq. ft. of intake NFA needed. Now convert to square inches by multiplying by 144: 3.5 sq. ft. x 144 = 504 sq. in. of intake NFA needed.

I hope you find doing the math to be less of a hassle. Good luck out there.