HOW VACU-STACK® WORKS - BERNOULLI'S PRINCIPLE

Understanding Bernoulli's Principle is key to understanding why Vacu-Stack® chimney caps are so effective in reducing wind-related downdraft problems.

The Vacu-Stack® chimney cap's ability to prevent wind-induced downdraft -- and the resulting infiltration of smoke, odor, and flue gas into living spaces -- is based on Bernoulli's Principle:

- Total atmospheric pressure is constant at any one time and location and is the sum of its dynamic and static components.

- Static pressure is the driving force for air in motion. Static pressure differences between different locations are the forces that cause air to flow from high to low pressure regions, like the wind.

- Dynamic pressure is proportional to wind speed. In the absence of wind, dynamic pressure is zero. At the onset of wind, it becomes a component of the total atmospheric pressure.

When wind flows around a Vacu-Stack® **(See Figure 1)**, its velocity increases, increasing **(+)** the dynamic pressure in the area. Since the sum of the static and dynamic pressures must remain constant **(See Figure 2)**, there is an identical decrease **(-)** in the static pressure. The result is a partial vacuum in the vicinity of the Vacu-Stack® where flue gases at slightly higher pressure must flow to the lower pressure Vacu-Stack® region -- and up and out of the chimney without blowback.

HELPFUL DEFINITION:
Atmospheric pressure is the weight of the air on the earth. At sea level, atmospheric air pressure is 14.7 pounds per square inch or 2,117 pounds per square foot. A column of mercury one square foot by thirty inches (30") high also weighs 2,117 pounds and is used in barometers for expressing atmospheric pressure (just like in weather forecasts). Similarly, a square foot of water 408" high weighs 2,117 pounds and is used in instruments that quantify draft in heating appliances. Draft problems may occur with pressure variations as small as 0.05" water... about one part in 10,000. No wonder draft problems are elusive and difficult to solve.

Figure 1: Compressed streamlines showing increased air flow around a Vacu-Stack®

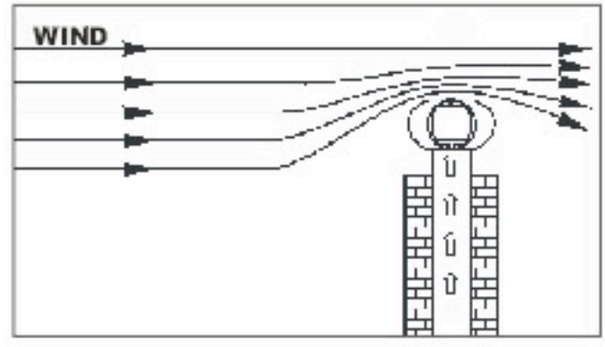
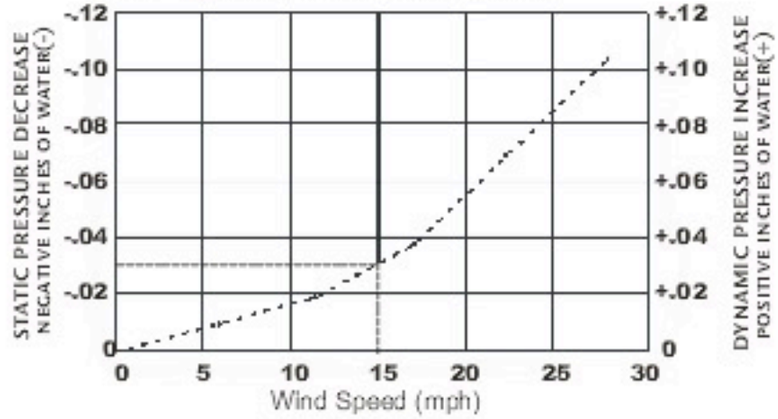


Figure 2: Pressure distribution for an 8" Vacu-Stack® installation



Example: A 15 mph wind reduces static pressure by .03" H2O, from 408" H2O to 407.97" H2O.

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