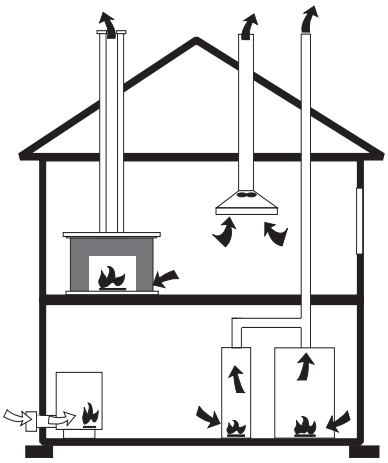
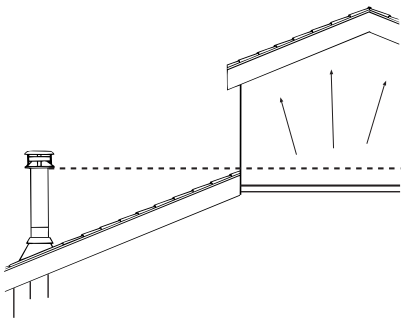
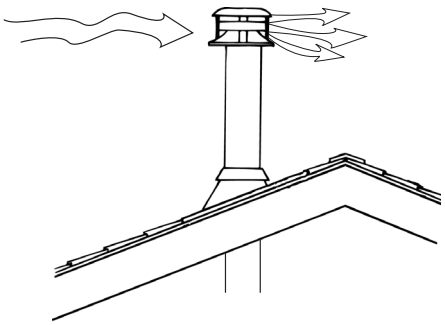


Source of Negative House Pressure



House Stack Effect: Heating area of house higher than chimney may compete with chimney.



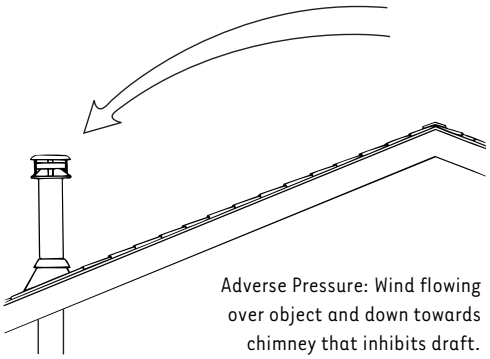
Effects of Wind on Venting: Driving Pressure

Factors that indicate the close relationship between draft and flow include:

1. ***Restrictions to flow.*** Any restrictions that slow gas flow, such as undersized vents, changes in venting directions (elbows, tees, bends), obstructions or blockage, can affect draft adversely by affecting the combustion process and resulting lower flue gas temperatures.
2. ***Pressure conditions in the house.*** Tight house construction for energy conservation reduces the exchange rate of outside air into the house and the available supply of combustion air. Woodburning systems are in competition for the limited air supply. If there is a force within the house that creates stronger negative pressure than the woodburning appliance venting system can produce, flow is reduced and draft may be compromised or overcome. Results can include incomplete combustion resulting in increased creosote buildup and spillage of combustion by-products into the home. Competing sources of negative pressure include:
    - exhaust devices such as bathroom and/or kitchen range exhaust fans (particularly downdraft kitchen range exhausts)
    - appliances such as clothes dryers and central vacuum units
    - combustion appliances such as gas furnaces and water heaters
    - leaking furnace ductwork
    - additional hearth appliances, particularly an upstairs solid fuel open fireplace (or one with a gas log set).
    - house stack effect: heated portion of the house taller than the vent termination (leaks or open window in upper portion of house create chimney effect greater than that of venting system)
3. ***Wind.*** Wind blowing over the top of a vent can assist draft (and possibly cause overdrafting) in a fashion similar to that of air flowing over an airplane wing. When this occurs, the wind acts as a motivating force and "lifts" the products of combustion by causing a greater negative pressure at the termination than that existing in the vent stack. This action temporarily increases draft in the venting system.

On the other hand, wind blowing into the vent can adversely affect draft. Wind blowing against a nearby structure taller than the vent can create a positive pressure zone that increases resistance to flow.

4. *Appliance Operation.* The operator can take a number of actions that reduce or increase available heat for the chimney (amount of fuel, air, startup technique) or that play into the hands of external forces (operation during warm weather, operating powerful exhaust devices, opening windows that affect house pressure).

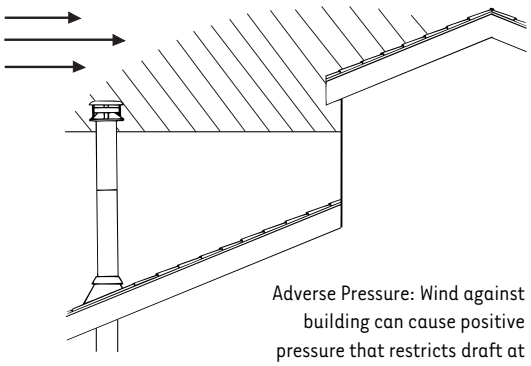


Effects of Wind on Venting: Adverse Pressure

4. VENTILATION: COMBUSTION AIR SUPPLY

The woodburning venting system may incorporate all the design considerations that promote good draft, and yet the system may not function properly. The problem may be one of inadequate combustion air supply, caused by lack of adequate air exchange rate in a tightly constructed house and/or competing sources for the limited combustion air supply.

Ventilation is the term that describes the movement of air from outside into the house. NFPA 211 9-3 (2000 Edition) calls for solid fuel appliances to be installed "in a location and manner so as to provide adequate ventilation and combustion air supply to allow satisfactory combustion of fuel, proper chimney draft, and maintenance of safe temperatures." It also requires that "Where buildings are so tight that normal infiltration does not provide the necessary air, outside air shall be introduced." We look now at the factors that affect ventilation and actions that can be taken to ensure adequate ventilation and combustion air.



4.1 TIGHTNESS OF HOUSE CONSTRUCTION

Tight construction for energy efficiency reduces the outside air exchange rate and the available supply of combustion air. Difficult start-up, poor performance, and smoke spillage can result from inadequate combustion air supply. Planning should include attention to house construction characteristics, competition for air supply, and effective provisions for a source of combustion air (see below).

4.2 PRESSURE CONDITIONS IN THE HOUSE

If there is a force within the house that creates stronger negative pressure than the fireplace or woodstove venting system produces, chimney draft may be overcome and spillage may occur. Planning