



Sick Building Syndrome

What Is Sick Building Syndrome?

Sick building syndrome (SBS) is a situation in which occupants of a building experience acute health effects that seem to be linked to time spent in a building, but no specific illness or cause can be identified. The complaints may be localized in a particular room or zone, or may be widespread throughout the building.

Frequently, problems result when a building is operated or maintained in a manner that is inconsistent with its original design or prescribed operating procedures. Sometimes indoor air problems are a result of poor building design or occupant activities.

What Are the Symptoms of SBS?

Building occupants complain of symptoms associated with acute discomfort. These symptoms include headaches; eye, nose, and throat irritation; a dry cough; dry or itchy skin; dizziness and nausea; difficulty in concentrating; fatigue; and sensitivity to odors. With SBS, no clinically defined disease or specific chemical or biological contaminant can be determined as the cause of the symptoms. Most of the complainants feel relief soon after leaving the building.

SBS reduces worker productivity and may also increase absenteeism.

What Causes SBS?

While specific causes of SBS remain unknown, the following have been cited as contributing factors to sick building syndrome. These elements may act in combination or may supplement other complaints such as inadequate temperature, humidity, or lighting.

- Chemical contaminants from outdoor sources: Outdoor air that enters a building can also be a source of indoor pollution. Pollutants from motor vehicle exhausts, plumbing vents, and building exhausts (bathrooms and kitchens) can enter the building through poorly located air intake vents, windows, and other openings. Combustion byproducts can also enter a building from a nearby garage.
- Chemical contaminants from indoor sources: Most indoor air pollution comes from sources inside the building. For example, adhesives, upholstery, carpeting, copy machines, manufactured wood products, cleaning agents and pesticides may emit volatile organic compounds (VOCs) including **formaldehyde**. Research shows that some VOCs can cause chronic and acute health effects at high concentrations, and some are known carcinogens. Low to moderate levels of multiple VOCs may also produce acute reactions in some individuals. **Environmental tobacco smoke** and **combustion products** from stoves,

fireplaces, and unvented space heaters all can put chemical contaminants into the air.

- **Biological contaminants:** Biological contaminants include pollen, bacteria, viruses, and molds. These contaminants can breed in stagnant water that has accumulated in humidifiers, drain pans, and ducts, or where water has collected on ceiling tiles, insulation, or carpet. Biological contaminants can cause fever, chills, cough, chest tightness, muscle aches, and allergic reactions. One indoor air bacterium, *Legionella*, has caused both Pontiac Fever and Legionnaire's Disease.
- Inadequate ventilation: In the 1970s the oil embargo led building designers to make buildings more airtight, with less outdoor air ventilation, in order to improve energy efficiency. These reduced ventilation rates have been found to be, in many cases, inadequate to maintain the health and comfort of building occupants.

What Are the Solutions to Sick Building Syndrome?

Solutions to SBS problems usually include combinations of the following measures:

- Increasing the ventilation rates and air distribution is often a cost-effective means of reducing indoor pollutant levels. At a minimum, heating, ventilating, and air conditioning (HVAC) systems should be designed to meet ventilation standards in local building codes. Make sure that the system is operated and maintained to ensure that the design ventilation rates are attained. If possible, the HVAC system should be operated to the **American Society of Heating, Refrigerating and Air-Conditioning Engineers** (ASHRAE) Standard 62-1989. If there are strong pollutant sources, air may need to be vented directly to the outside. This method is especially recommended to remove pollutants that accumulate in specific areas such as restrooms, copy rooms, and printing facilities.
- Removal or modification of the pollutant source is the most effective approach to solving a known source of an indoor air quality problem when this solution is practicable. Ways to do this include routine maintenance of HVAC systems; replacing water-stained ceiling tiles and carpets; banning smoking or providing a separately ventilated room; venting contaminant source emissions to the outdoors; using and storing paints, solvents, pesticides, and adhesives in closed containers in well-ventilated areas; using those pollutant sources in periods of low or no occupancy; and allowing time for building materials in new or remodeled areas to off-gas pollutants before occupancy.
- Air cleaning has some limitations, but it can be a useful addition to source control and ventilation. Air filters are only effective at removing some, not all, of the pollution.
- Education and communication are important parts of any air quality management program. When everyone associated with the building, from occupants to maintenance, fully understands the issues and communicates with each other they can work more effectively together to prevent and solve problems.

