



ASHRAE Position Document on Filtration and Air Cleaning

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EXECUTIVE SUMMARY

ASHRAE needs to address heating-, ventilation-, and air-conditioning- (HVAC) related technologies that change exposures to airborne contaminants harmful for humans. As part of ASHRAE's mission, it is imperative to assess the effectiveness of HVAC technologies in reducing exposures so that the risks for harmful effects on health and comfort are minimized and to establish and promote the Society's positions that will guide ASHRAE membership and the public in technology selection and use. This need applies to filtration and air-cleaning technologies because they traditionally are part of the HVAC system, their use is included and/or required in many guidelines and ventilation standards published by ASHRAE, and they are addressed by technical committees within ASHRAE. Evaluation and guidance are also needed because of the increasing number and variety of filtration and air-cleaning alternatives available on the market and because filtration and air cleaning are considered attractive alternatives to outdoor air ventilation by providing exposure control with less energy use.

Various filtration and air-cleaning technologies are available, depending on the type of contaminants removed and the principle of contaminant removal. This Position Document briefly characterizes these technologies and their applications. The focus is to summarize and examine the existing archival literature describing the direct effects of application of these technologies in public and residential buildings (excluding health-care facilities) on the health of building occupants. Based on the accumulated information, statements on the effectiveness and use of different technologies are proposed and are briefly summarized as follows:

- Mechanical filters have been shown to reduce significantly indoor concentrations of airborne particles. Modest empirical evidence shows that their use will have positive effects on health.
- Electronic filters have been shown to range from being relatively ineffective to very effective at removing indoor airborne particles. **Studies of ionizers have shown results ranging from no benefit to some benefit for acute health symptoms.**
- There are some sorbent air cleaners that have been shown to substantially reduce the concentrations of gaseous contaminants. There are minimal empirical data that indicate the effects of sorbent air cleaners on health.
- **Photocatalytic oxidation technologies** have been shown to remove harmful contaminants, **to be ineffective in removing contaminants, and/or to generate harmful contaminants during the air-cleaning process.** There are no data on how their use affects health.
- Ultraviolet germicidal energy (UV-C) has been shown to inactivate viruses, bacteria, and fungi. A few studies have shown that air-cleaning technologies using UV-C disinfection (also termed *ultraviolet germicidal irradiation* [UVGI]) produce beneficial health effects. There are also studies that have failed to detect health benefits.
- Many types of packaged stand-alone air cleaners using combinations of air-cleaning technologies are available. Scientific data addressing the effects of these air cleaners on health are sparse and inconclusive.
- **Negative health effects arise from exposure to ozone and its reaction products. Consequently, devices that use the reactivity of ozone for cleaning the air should not be used in occupied spaces. Extreme caution is warranted when using devices in which ozone is not used for the purpose of air cleaning but is emitted unintentionally during the air-cleaning process as a by-product of their operation.**