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Built Environment Today

ASHRAE Position Document on **ENVIRONMENTAL TOBACCO SMOKE**

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ASHRAE is a global professional society of over 55,000 members, committed to serve humanity by advancing the arts and sciences of heating, ventilation, air conditioning, refrigeration and their allied fields (HVAC&R).

ASHRAE position documents are approved by the Board of Directors and express the views of the Society on specific issues. These documents provide objective, authoritative background information to persons interested in issues within ASHRAE's expertise, particularly in areas where such information will be helpful in drafting sound public policy. The documents also clarify ASHRAE's position for its members and building professionals.

Environmental Tobacco Smoke is a Public Interest Issue

While indoor smoking has become less common in recent years in many countries (WHO 2021), exposure to Environmental Tobacco Smoke (ETS) continues to have significant health and cost impacts (USDHSS 2014).

Researchers have investigated the health and irritant effects among non-smokers exposed to tobacco smoke in indoor environments. Such exposure is also known as passive smoking and as involuntary exposure to secondhand smoke. A number of national and global health research groups and agencies (Cal EPA 2005, EPA 1992, IARC 2004, IOM 2010, NRC 1986, SCTH 1998, USDHHS 2014, USDHHS 2006, WHO 2019) have concluded, based on the preponderance of evidence, that exposure of nonsmokers to tobacco smoke causes specific diseases and other adverse effects to human health most significantly, cardiovascular disease and lung cancer. No cognizant authorities have identified an acceptable level of ETS exposure to non-smokers, nor is there any expectation that further research will identify such a level.

Despite extensive evidence of such harm, the well-documented benefits of bans, including exposure reduction and benefits to public health (CPSTF 2013) and widening adoption of smoking bans, many locations worldwide still lack laws and policies that provide sufficient protection. In many locations, laws and policies are only partially protective, permitting smoking in certain building types including casinos, entertainment and multifamily housing. Even where permitted by law, many developers, building owners, and operators, including those of restaurants and other hospitality venues, do not allow smoking indoors.

There is currently a trend of increased use of electronic nicotine delivery systems (ENDS), smoking of cannabis, use of hookahs and other related activities that are beyond the scope of this document. The harm from these activities has not been researched to the same breadth and depth as

traditional secondhand smoke (smoke exhaled by the smoker and combustion products from the end of a lit tobacco cigarette). Therefore, they present risks that are not as well understood, but are likely to be similar.

Why ASHRAE Takes Positions on Environmental Tobacco Smoke

While ASHRAE does not conduct research on the health effects of indoor contaminants, ASHRAE has been involved in this topic for many years. Through its committees, standards, handbooks, guides, and conferences, ASHRAE has long been providing information to support healthful and comfortable indoor environments, including efforts to reduce indoor Environmental Tobacco Smoke (ETS) exposure.

Consequently, ASHRAE's positions, standards and design guidance can help avoid health risks associated with Environmental Tobacco Smoke (ETS).

ASHRAE Takes the Positions that:

- All smoking activity inside and near buildings should be eliminated, which is supported by the conclusions of health authorities that any level of ETS exposure leads to adverse health effects.
- The only means of avoiding health effects and eliminating indoor ETS exposure is to ban all smoking activity inside and near buildings. This position is supported by the conclusions of health authorities that any level of ETS exposure leads to adverse health effects and therefore,
 - The building and its systems can reduce only odor and discomfort but cannot eliminate exposure when smoking is allowed inside or near a building.
 - Even when all practical means of separation and isolation of smoking areas are employed, adverse health effects from exposure in non-smoking spaces in the same building cannot be eliminated.
 - Neither dilution ventilation, air distribution (e.g., "air curtains") nor air cleaning can be relied upon to control ETS exposure.

ASHRAE Recommends that:

- ASHRAE's current policy (ROB 1.201.008) that Standards and Guidelines shall not prescribe ventilation rates or claim to provide acceptable indoor air quality in smoking spaces, should be extended to other ASHRAE documents.
- Building design practitioners educate and inform their clients, where smoking is still permitted, of the limits of engineering controls of ETS exposure; multifamily buildings have smoking bans inside and near them; and
- Given current and developing trends, further research be conducted on the health effects of involuntary exposure in the indoor environment from smoking cannabis, using hookahs and electronic nicotine delivery devices (ENDS), and other activities commonly referred to as e-cigarettes or vaping.
- Building design practitioners work with their clients to define their intent, where smoking is still permitted, for addressing ETS exposure in their building and educate and inform their clients of the limits of engineering controls in regard to ETS.

- Multifamily buildings have complete smoking bans inside and near them in order to protect nonsmoking adults and children.
- ASHRAE is committed to encouraging lawmakers, policymakers and others who exercise control over buildings to eliminate smoking inside and near buildings.

Appendix: Background Information

ASHRAE, through its Environmental Health Committee, TC 4.3 Ventilation Requirements and Infiltration, SSPCs 62.1 Ventilation for Acceptable Indoor Air Quality, 62.2 Ventilation and Acceptable Indoor Air Quality in Residential Buildings, 189.1 Standard for the Design of High-Performance Green Buildings, Handbook Applications Chapter 46 (ASHRAE 2023) and Handbook Fundamentals Chapters 10 and 11 (ASHRAE 2021), Indoor Air Quality Design Guides (ASHRAE 2018, 2009), and IAQ conferences, has long been active in providing engineering technology, standards and design guidance in support of providing healthful and comfortable indoor environments.

Previous versions of this position document have been instrumental in informing the public, building scientists and practitioners, policymakers and lawmakers about the inability of HVAC technologies to eliminate health risks to nonsmokers from exposure to tobacco smoke in indoor environments.

The evidence on the health consequences of exposure to ETS is extensive (hundreds of scientific papers) and has been reviewed by numerous independent expert groups in the United States and internationally, all reaching similar conclusions regarding the adverse health effects caused among nonsmokers exposed to tobacco smoke indoors. These include but are not limited to:

- U.S. Surgeon General (USDHHS 1986, 2014, 2006)
- U.S. Environmental Protection Agency (EPA 1992)
- National Research Council (NRC 1986)
- California Environmental Protection Agency Cal EPA 2005)
- World Health Organization (WHO 2019)
- International Agency for Research on Cancer (IARC 2004)
- United Kingdom Department of Health (SCTH 1998)

The first studies on passive smoking involved the health of children whose parents smoked. The first major studies on passive smoking in adults reported that passive smoking was associated with lung cancer in non-smokers. Subsequent evidence has identified other health effects in adults and children, including linking ETS to cardiovascular disease. Notably, the number of coronary heart disease deaths attributed to ETS greatly exceeds the number of ETS-caused lung cancer deaths. Additionally, the scientific evidence recognizes substantial subpopulations, such as children (USDHHS 2014) and adults with asthma or heart disease, whose disease may be exacerbated by ETS exposure.

There is no threshold for ETS exposure below which adverse health effects are not expected, as indicated in the referenced health authority reports. In general, risks tend to increase with the level of exposure and conversely to decrease with a reduction in exposure.

Only an indoor smoking ban, leading to near zero exposure, provides effective control, and only such bans have been recognized as effective by health authorities. Experience with such bans documents that they can be effective (CPSTF 2013; USDHHS 2014, 2006). While there are no engineering design issues related to this approach, the existence of outdoor smoking areas near the building and their potential impacts on entryway exposure and outdoor air intake need to be considered.

Nevertheless, smoking is permitted in some indoor spaces in some buildings. There are now several decades of international experience with the use of strategies, including separation of smokers and nonsmokers, ventilation, air cleaning and filtration, to limit contamination spread from smoking-permitted areas to other areas inside the building.

There are three general cases of space-use and smoking activity in sequence from most to least effective in controlling ETS exposure:

1. allowing smoking only in isolated rooms;
2. allowing smoking in separate but not isolated spaces; and
3. totally mixing occupancy of smokers and nonsmokers.

These approaches do not necessarily account for all circumstances. Each leads to different engineering approaches as follows.

1. **Smoking Only in Isolated Rooms:** Allowing smoking only in separate and isolated rooms, typically dedicated to smoking, can reduce ETS exposure in non-smoking spaces in the same building. Effective isolation requires
 - a. sealing of cross contamination pathways and airtightness of the physical barriers between the smoking and nonsmoking areas,
 - b. the use of separate ventilation systems serving the smoking and non-smoking spaces,
 - c. exhausting air containing ETS so it does not enter the non-smoking area through the outdoor air intakes, windows, and other airflow paths,
 - d. airflow and pressure control including location of supply outlets and return and exhaust air inlets to preserve airflow into the smoking space at doorways and other openings, which is powerful enough so that movement of people between non-smoking and smoking areas and so that thermal and other effects do not disrupt intended air distribution patterns.

Even when all available strategies have been employed in multifamily housing, there is a lack of credible evidence that anything short of a smoking ban will provide full protection to occupants of non-smoking residential dwelling units. The risk of adverse health effects for the occupants of the smoking room itself also cannot be controlled by ventilation.

2. **Smoking in Separate but Not Isolated Spaces:** This approach includes spaces where smokers and non-smokers are separated but still occupy a single space or a collection of smoking and non-smoking spaces not employing all the isolation techniques described in 1a through 1d above. Examples can be found in restaurants and bars with smoking and non-smoking areas, or buildings where smoking is restricted to specific rooms, but a common, recirculating air handler serves both the smoking and non-smoking rooms.

Engineering techniques to reduce odor and irritation include, directional airflow

patterns achieved through selective location of supply and exhaust vents, and air cleaning and filtration. Limited evidence is available, and none supports the significant reduction of health effects on those exposed.

- 3. Mixed Occupancy of Smokers and Nonsmokers:** If smoking is allowed throughout a space or a collection of spaces served by a single air handler, with no effort to isolate or separate the smokers and nonsmokers, there is no currently available or reasonably anticipated ventilation or air cleaning system that can adequately control or significantly reduce the health risks of ETS to an acceptable level.

This situation includes unrestricted smoking in homes, dormitories, casinos, bingo parlors, small workplaces, and open plan office spaces. Air cleaning, dilution ventilation and displacement ventilation can provide some reduction in exposure, but they cannot adequately control adverse health effects, nor odor and sensory irritation for nonsmokers in general.

Ongoing trends, studies and research:

- Electronic nicotine delivery systems (ENDS) are increasing in use and the health effects of primary and secondary exposure continue to be revealed. ENDS and other related exposures in the indoor environment, including those arising from cannabis combustion and use of hookahs, are outside the scope of this position document. ENDS are addressed in an ASHRAE [Emerging Issue Brief](#).
- Third-hand smoke, which results from the release of contaminants from the clothing of smokers and other surfaces, is a relatively new concept. There is evidence of potential hazards (Sleiman 2010) and researchers are still studying it (Mayo Clinic 2017).

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DOCUMENT REVISION COMMITTEE ROSTER

The ASHRAE Position Document on Environmental Tobacco Smoke was developed by ASHRAE's Environmental Tobacco Smoke Position Document Committee, formed on May 16, 2018, with Larry Schoen as its chair.

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DOCUMENT HISTORY

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