
Environmental Tobacco Smoke In Multi-Family Housing Fact Sheet

October, 2007

A rapidly emerging building issue is environmental tobacco smoke (ETS) exposure in multi-family housing.

Many people, smokers in particular, feel they should have the right to smoke in their own home. While this may be acceptable in single family detached residences, with the issue of exposure to children and non-smoking spouses aside, smoking can pose significant concerns/problems in multi-family housing.

The following are some facts regarding ETS exposure in multi-family housing and what can be done to eliminate or at least minimize exposure.

ETS Exposure Facts

- ETS produces a large number of air contaminants including:
 - respirable sized condensed liquid particles consisting of many known human carcinogens (e.g. polycyclic aromatic hydrocarbons)
 - volatile organic compounds including many known carcinogens and sensory irritants
 - carbon monoxide
 - nicotine
- There are many potential pathways in the enclosing wall, floor, and ceiling assemblies (e.g. electrical outlets, ceiling light fixtures, plumbing penetrations, ventilation system components, etc.) through which ETS can migrate from one unit to another.
- The driving forces which cause ETS to migrate from one unit to another are the differential air pressures caused by wind induced air flows around the building, indoor-outdoor air temperature differences (i.e. building stack effect where air rises from lower units into upper units), and ventilation system air flows.

ETS Exposure Control Facts

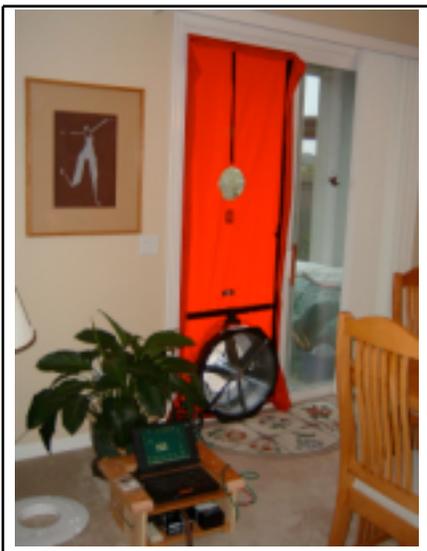
There are three ways in which ETS exposure can be eliminated or at least minimized in multi-family housing:

- 1.) Ban Smoking. ETS can of course be eliminated by banning smoking indoors and at outdoor locations near building openings (e.g. windows, doors, outdoor air intakes).

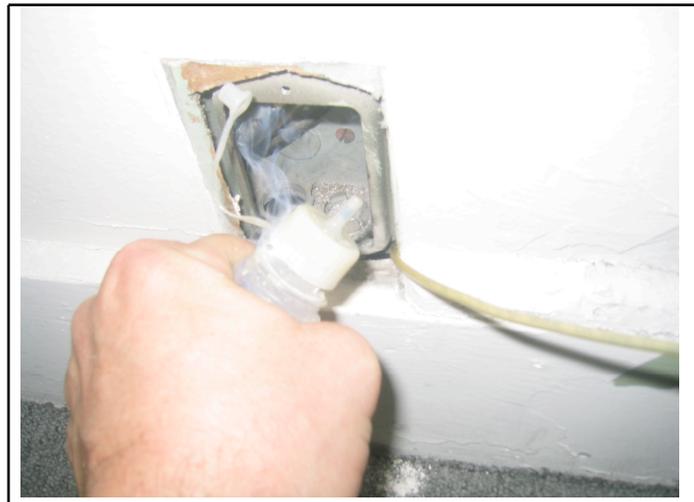
- 2.) Control Air Pressures. Confine smoking to locations where air is exhausted to outdoors and the space is maintained at a negative space pressure with respect to adjacent non-smoking areas.
- 3.) Minimize Air Leakage Pathways. Seal potential air leakage pathways (e.g. electrical outlets, ceiling light fixtures, plumbing penetrations, ventilation components etc.) such that the air leakage area is less than 1.25 square inches per 100 ft² of enclosure area (USGBC LEED “Environmental Tobacco Smoke (ETS) Control” criteria).

This can be done through the following three steps:

- Determine the air leakage area in the unit utilizing a blower door and multi-port micro manometer in accordance with ANSI/ASTM-779-03.
- Identify air leaks with chemical smoke and then seal the leaks.
- Verify the air leakage area reduction by repeating the blower door test.



Blower door measurement of air leakage area.



Identification of air leakage pathway in an electrical outlet box with chemical smoke.

Other diagnostic tools for determining ETS exposure and identifying migration pathways in multi-family housing include:

- continuous differential pressure measurements at potential building element pathways
- tracer gas measurements of air movement
- measurement of tobacco specific air contaminants

For additional information on identifying and mitigating ETS exposure in multi-family housing and the testing/consulting services provided by Indoor Environmental Engineering, see our web page at www.iee-sf.com or contact Bud Offermann PE CIH directly at (415)-567-7700.