

## **A Step Up For Safety: The Latest Technology in Smoke Detectors**

**By:** Kris Cahill

When Benjamin Franklin told the citizens of Philadelphia that “an ounce of prevention is worth a pound of cure” on the need for vigilance about fire protection and prevention, he likely never imagined the potential of modern smoke detection. Smoke detector regulations began in 1976 when global safety certification company UL (formerly known as Underwriters Laboratories), which manages one of the most reputable test laboratories for smoke detector testing, authorized the first UL 268 Standard for Safety of Smoke Detectors for Fire Alarm Systems.

This standard, as well as a couple of others, UL 217 and NFPA 72 (National Fire Alarm and Signaling Code), were based on a series of smoke detector performance tests – commonly called the “Dunes Study.” The Dunes Study carried out residential fire detection tests using equipment and furnishings that were commonly used in the 1970s, when furnishings were mostly made of natural materials like wood, cotton and linen.

To keep up with evolving material and technology, UL 268 has evolved over the years in response to new equipment and building materials trends that stimulate faster fire development. Thirty years ago, a person had on average 15-17 minutes to escape a house fire, but today the time is only 3-5 minutes, according to the National Institute of Standards and Technology (NIST). Why? It’s because furnishings and equipment are more frequently made of artificial materials that are more flammable than natural materials.

Currently, most manufacturers of UL-listed smoke detectors list their devices to the 6th edition of UL 268, which has been in effect for the last decade. New updates require significant improvements to smoke detection technology, and, after the effective date, manufacturers will no longer be able to manufacture and label smoke detectors listed under the 6th edition.

Today’s smoke detectors are certainly effective. During the five-year period of 2007-2011, NFPA estimates that U.S. fire departments responded to an average of 3,340 fires in office properties per year. These fires caused an annual average of four civilian deaths, 44 civilian fire injuries, and \$112 million in direct property damage. The vast majority of the fires in this category were in business offices. Reported fires in this occupancy group fell 71% from 10,570 in 1980 to 3,050 in 2011.<sup>i</sup> However, once more of the 7th edition smoke detectors are installed, we hope to see a further reduction in the number of deaths and false alarms.

To satisfy new 7th edition requirements, manufacturers are developing more advanced photoelectric sensing technology. In these sensors, an LED light shoots a beam of light across the chamber containing the sensor. If there is smoke, the smoke particles deflect the beam of light to a photosensor in the same chamber. When that happens, the alarm is activated.

Creating a smoke detector that meets the requirements of three new fire tests, in addition to the existing fire tests, and then testing these new products in UL's laboratory already presents a challenge for the industry. This challenge was exacerbated by the COVID-19 pandemic which strained the global supply chain and limited access to laboratories. As a result, the effective date of UL 268 7<sup>th</sup> edition has been updated to June 30, 2022.

Despite the delay in implementing the new standard, buildings shouldn't wait to address new fire safety concerns. Early adoption is important and beneficial. First, as the intent of the new safety standards makes clear, fires today spread faster and the new detectors will enable quicker detector response in the event of a real fire. The most critical responsibility of any building's fire system is achieving the highest possible level of life safety and reliability. UL tests have shown that polyurethane foam – often used as a stuffing in modern furniture – generates smoke that is different from previous test materials.

The standards for smoke detectors should be updated to address the real danger posed by modern materials. The new detectors can detect fires caused by both flaming polyurethane as well as smoldering polyurethane, which have different smoke signatures.

Also adopting the UL 268 7th edition smoke detector technology will immediately result in fewer false alarms, due to new requirements to demonstrate increased resilience to nuisance smoke detector activations due to activities like cooking. Nuisance alarms create disruptions to building occupants and can lead to the removal or disabling of the detector due to the nuisance, as well as causing unnecessary fire department responses and associated costs.

The latest UL 268 update 7th edition standard requires smoke sensors, detectors and smoke alarms to pass more than 215 revised performance tests, including three new tests.

The first two, which are polyurethane foam tests, better represent fires in modern buildings due to the increased use of synthetic materials, such as polyurethane foam, that burn faster than the natural materials that they have replaced. Smoke detectors listed in the 7th edition of UL 268 must now demonstrate improved sensitivity to detect the smaller particle size of smoke generated from polyurethane foam.

The cooking test complies with "the hamburger test," where the detectors are not activated by the smoke signature from cooking a hamburger. Cooking smoke, dust and steam, which might be produced by cooking, aren't considered serious hazards. However, many people have experienced false alarms due to cooking and many were shown to disable their alarms.

Lastly, installing the latest and most advanced fire system products means your building is UL 268 7<sup>th</sup> edition code compliant and will be for many years to come, which allows building operators to spend their time on other critical tasks and priorities.

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Reference

<sup>i</sup> NFPA, [U.S. Structure Fires in Office Properties](#), August 2013