



How Changes to UL 217, Single and Multiple Station Smoke Alarms, May Impact Smoke Alarm Messaging

Arthur Lee
US Consumer Product Safety Commission
alee@cpsc.gov 301-987-2008

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New Cooking Nuisance Resistance, Polyurethane Flaming and Smoldering Tests

- UL 217, Single and Multiple Station Smoke Alarms
- Consensus on September 8, 2015
- Add Polyurethane (PU foam) Flaming Test
 - Most challenging for photoelectric type smoke alarms
- Add Polyurethane (PU foam) Smoldering Test
 - Most challenging for ionization type smoke alarms
- Add Nuisance Resistance Test
 - Challenging for all smoke alarms

PU Foam Tests (UL 217)

- Flaming Foam Test
 - Alarms shall produce an alarm signal at or before an obscuration limit of 5%/ft (15.47 percent per meter)
 - Approximately 10% percent per foot for current single sensor alarms¹
- Smoldering Foam Test
 - Alarms shall produce an alarm signal prior to the smoke obscuration exceeding 12.0 percent per foot (34.3 percent per meter)
 - Approximately 24 percent per foot for current single sensor alarms¹

¹ Cleary, T.G., NIST Technical Note 1837, *Improving Smoke Alarm Performance – Justification for New Smoldering and Flaming Test Performance Criteria*, <http://dx.doi.org/10.6028/NIST.TN.1837>

Nuisance Resistance Test (UL 217)

- Particle source - Broiling fresh-frozen hamburger in the oven of an electric range
 - The alarm shall not produce an alarm signal or other notification signal prior to an obscuration level of 1.5 percent per foot

Deleted from UL 217

- Removed Flammable Liquid Fire Test
 - Similar profiles as the new PU Flaming Test
- Removed Smoldering Smoke Test – Maximum Obscuration Without Alarm test
 - Reduce false alarms

What does changes to UL 217 mean?

- No effective date, but estimate that the standard with the new tests would take effect 3-5 years from now
- Most single-sensor ionization smoke alarms and some photoelectric smoke alarms will not pass the new PU foam tests
- Smoke alarm may need a microprocessor, may need to incorporate multiple sensors and processing of the environment
- Increased cost for smoke alarms
 - Payback on R&D
 - Tighter tolerances on sensors to satisfy nuisance resistance and PU foam tests

How do present smoke alarms stack-up to the new PU foam and nuisance resistance tests?

- FY16- CPSC/NIST will be testing current smoke alarms to the new PU foam and nuisance resistance tests
 - Understand how far or close smoke alarms are in passing the tests
 - Determine if there are categories of smoke alarms that perform well or poorly
 - Determine if there is need to change smoke alarm messaging for the public between now and effective date

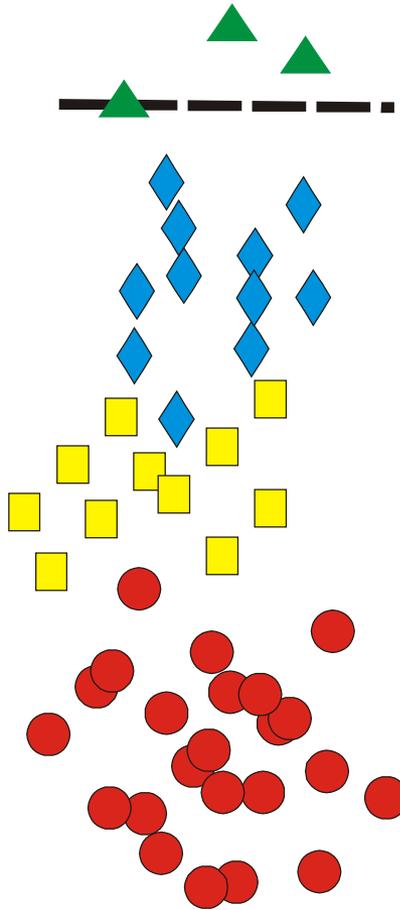
NIST/CPSC Testing (FY 16)

- Approximately 50 different types of model smoke alarm models on the market.
 - Repeats were eliminated, such that the same smoke alarm may be sold with different model numbers and features, but contain the same sensor and sensitivities
 - Six samples of each model
- All smoke alarm samples will be subjected the UL 217 smoke box test to record the sensitivity.
 - Two of the six samples will subjected to the smoke alarm box three times to achieve an average
- One sample for each model will be set aside as the control smoke alarm.

NIST/CPSC Testing (FY 16)

- Use four of the six smoke alarm samples are to be used for the new PU foam smoldering and flaming tests.
 - Three repeats for each PU test for a total of 6 tests for each model smoke alarm.
- Use an untested smoke alarm sample plus two samples from the PU foam test for the nuisance resistance test.
 - Three repeats for each nuisance test
- After all the testing has been completed, all the smoke alarms will be subjected to the UL 217 smoke box test to determine if the sensitivity has changed.

Potential performance results from NIST/CPSC testing



Pass/Fail Line

UL 217 (including new PU foam
and nuisance resistance tests)

- What if the NIST testing looked like this?
 - Some smoke alarms or category of alarms may perform better than others in specific categories (PU flaming, PU smoldering, and nuisance resistance)
- A few smoke alarms (green triangles) may pass the new performance tests
- Some will fall just below the Pass/Fail criteria line
- A large grouping of similar category may fall well below the Pass/Fail criteria line

Coordinate Smoke Alarm Messaging

- Continue to stress that the KEY in safety is a WORKING smoke alarm - not having a working smoke alarm is the worst possible option
- Using both types of sensor technologies (ionization and photoelectric) provides the best protection
- Between now and the new effective date, based on the NIST data, does the smoke alarm messaging need to be modified?
 - Such as, “If you plan on replacing or buying a smoke alarm, consider these types.”