



U.S. CONSUMER PRODUCT SAFETY COMMISSION
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Paul E. Lloret
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Underwriters Laboratories Inc.
333 Pfingsten Road
Northbrook, IL 60062

Re: Request for Comments on the Proposed Requirements: 1. For Preliminary Review Only: New Cooking Nuisance, Polyurethane Flaming and Smoldering Tests for the *Standard for Single and Multiple Station Smoke Alarms*, UL 217

Dear Mr. Lloret:

This letter presents comments from U.S. Consumer Product Safety Commission ("CPSC") staff on proposed new requirements for UL 217, *Single and Multiple Station Smoke Alarms*.¹ The proposals for preliminary review can be broken down into the following five key changes to UL 217:

1. Adding a flaming polyurethane ("PU") foam test with the requirement that the smoke alarm activate with obscuration no greater than 5%/ft.
2. Adding a smoldering PU foam test with the requirement that the smoke alarm activate with obscuration no greater than 12%/ft.
3. Adding a cooking smoke nuisance resistance test with the requirement that the smoke alarm not activate with obscuration less than 1.5%/ft.
4. Removing the existing nuisance threshold of 0.5%/ft. obscuration.
5. Removing the flammable liquid test.

CPSC staff has comments on each of the five proposed changes.

Flaming PU Foam Test

CPSC staff supports this proposal because it incorporates an obscuration threshold that would significantly improve the performance of smoke alarms for flaming PU foam fires, thus allowing occupants a higher likelihood of escaping. However, if the goal is to achieve an 85 percent successful egress rate, CPSC

¹ The views expressed in this letter are those of the CPSC staff, and they have not been reviewed or approved by, and may not necessarily reflect the views of, the Commission.

staff believes that the limit should be 4%/ft., as National Institute of Standards and Technology (“NIST”) staff proposed in their presentation at Suppression and Detection Conference (“SUPDET”) in March 2014 in conjunction with NIST Technical Note 1837 - *Improving Smoke Alarm Performance – Justification for New Smoldering and Flaming Test Performance Criteria*.²

The NIST report, NIST Technical Note 1837 lists the average occupant successful escape rate for selected flaming fire test criteria in Table 10. Table 10 of the NIST report lists a smoke obscuration at 5%/ft. corresponds to 79 percent average success rate. The present UL proposal is for an alarm threshold of 5%/ft. obscuration for the flaming polyurethane test. This proposed test criterion would foster an improved performance over today’s typical single-sensor smoke alarms, which may have a 49 percent average occupant successful escape rate for fast moving flaming fires.

Regardless of whether the limit is 4%/ft. or 5%/ft., the new proposal represents a marked increase over today’s typical single sensor smoke alarms, which may have a 49 percent average occupant successful escape rate for fast-moving flaming fires. CPSC staff recommends that UL seek permission to provide the NIST SUPDET presentation to the standards technical panel (“STP”) as supporting documentation and a rationale for the proposal.

Smoldering PU Foam Test

CPSC staff also supports this proposal because it incorporates an obscuration threshold that would significantly improve the performance of smoke alarms for smoldering polyurethane fires, thus allowing occupants a successful escape rate of almost 93 percent. The rationale for selection of 12%/ft. is also based on NIST’s SUPDET presentation and TN 1837. According to NIST TN 1837 Table 10, alarming at this level would provide approximately a 93 percent average occupant successful escape rate. This proposed test criterion would foster an improved performance over today’s typical single-sensor smoke alarms, which may have a 45.3 percent average occupant successful escape rate for smoldering fires.

UL’s rationale states: “12%/ft obscuration corresponds to an approximate 85 percent successful egress rate in the NIST presentation.” The rationale, UL indicates is that the proposed acceptance criterion of 12%/ft. obscuration is a “conservative value to minimize potential risk stemming from unknown and unaccounted factors such as smoke and gas irritability, and the time an initially smoldering item might transition to flaming.” The proposed acceptance criterion of 12%/ft is more conservative than the task group’s original recommendation that the smoke alarm should alarm within 30 seconds of the obscuration level exceeding 12%/ft., which is equivalent to approximately 14%/ft. obscuration.

CPSC staff is encouraged by the proposals seeking to improve the performance of all smoke alarms, so that they can effectively alert consumers during smoldering and flaming scenarios. Staff notes that the proposed improvements are unequal between the two scenarios, and CPSC staff would like to know the rationale for the difference. The selected threshold value for the flaming PU foam test would improve the performance of smoke alarms in flaming fire scenarios from approximately 49 percent to 79 percent average success rate, but the smoldering PU foam test would improve the performance of smoke alarms in smoldering fire scenarios from 45.3 percent to 93 percent average success rate. CPSC would be interested in

² Cleary, T. (July 2014), NIST Technical Note 1837, *Improving Smoke Alarm Performance – Justification for New Smoldering and Flaming Test Performance Criteria*, U.S. Department of Commerce, National Institute of Standards and Technology, Gaithersburg, MD. <http://dx.doi.org/10.6028/NIST.TN.1837>.

understanding the rationale to justify that the success rate should be lower in flaming fires than smoldering fires.

Cooking Smoke Nuisance Resistance Test

CPSC staff supports a cooking nuisance performance tests for smoke alarms. Currently, UL 217 does not have any performance tests that represent cooking aerosols that could potentially cause nuisance alarms (*i.e.*, an alarm when no fire is pending). The proposed test at 1.5%/ft. obscuration using frozen hamburgers would provide a basic foundation for smoke alarms to be more resistant to cooking aerosols, thus allowing a better understanding in the future of smoke alarm performance to nonfire scenarios.

Removing Existing Nuisance Threshold

CPSC staff disagrees with the proposal to delete the existing nuisance threshold tests. The rationale states: “the 0.5%/ft OBS no alarm threshold was introduced into UL 217/268 in response to nuisance alarms that were plaguing the industry in the early to mid-1980s. Based on recommendations from NIST at that time, an agreed upon minimum obscuration without alarm limit of 0.5%/ft OBS was adopted as part of the smoldering smoke test in 1986.” The rationale does not show that the smoldering smoke produces the same characteristics as the proposed cooking resistance test. The rationale also does not show how the 0.5%/ft threshold for smoldering smoke is redundant with the 1.5%/ft. for the proposed cooking nuisance aerosol to warrant its removal.

Removing Flammable Liquid Test

The rationale documentation contains data to demonstrate that PU Flaming Foam and Flammable Liquid Test produced similar particles. The rationale did not contain any data on current smoke alarm activations for the flammable liquid and the PU foam tests. Accordingly, it is not possible to determine that the two tests are identical where one of the tests can be deleted.

Thank you for the opportunity to make these comments. We look forward to participating in additional discussions on modifying UL 217 to improve smoke alarm sensitivity to early fire indicators and resistance to alarming in nonnuisance scenarios.

Sincerely,



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