

Revision History

Since its initial publication in 2004, NIST TN 1455 has been scrutinized by fire research professionals and several inconsistencies have been identified. Analysis of noted inconsistencies has led to the identification of a number of errors in data and computations that impact the alarm performance assessment. These errors did not impact the major conclusions of the study. A description of each error and the corrective action taken for NIST Technical Note 1455-1 is given below.

- In earlier revisions of the report, the dual ion/photo alarms appeared to perform worse than individual photo or ion alarms because the dual-alarms were often located further from the fire source than the individual photo or ion alarms listed in tables 23, 24, 27 and 28. The affected tables and figures 206-208 have now been revised by removing the instances where a particular alarm type was not co-located. It is stressed that the individual alarm times reported in the appendix of the report have not been changed and remain available for direct comparison of the individual alarms and the dual ion/photo alarm in every case where these alarms were co-located. Specifically, the flaming chair fires in the two-story homes, test 28 was removed from the calculation of average alarm time for the dual or aspirated alarms since no alarms of these types were included in the test. For all other tests, alarm times for dual-alarms and aspirated alarms for placements other than every level were removed from the analysis since there were no alarms of these types co-located with individual ionization or photoelectric alarms. (February 2008)¹
- One disposable alarm in each of tests SDC10, SDC14, SDC22, and SDC28 was found to be connected with a reverse polarity. This caused the alarm time not to be properly recognized in the analysis. This has been corrected and resulted in a change to Tables 24 and 28. (February 2008)
- In the original report, the method NIST used to determine the detection time in the smoldering fire involving the 2-story house was in error. The results of the smoldering mattress test (test SDC 21) should not have been included in the analysis since the fire development did not allow enough alarms to respond by the time the test concluded. In addition, test SDC 14 was inadvertently excluded from the original analysis. Tables 11, 12, 23, 24, 27, 28, 30, and 32 were revised to correct these errors. (March 2006)
- Section 1.3.10 was corrected to define the format for the test data as comma-separated spreadsheet file. (November 2007).

¹Dates in parentheses indicate when the report was revised to correct the noted error.

- Table 11 was corrected to note that test SDC09 was conducted with the bedroom door closed. (November 2007)
- Appendix A Calculation of Times to Untenable Conditions. From test SDC30 to SDC41, the carbon monoxide (GASC_1) and carbon dioxide (GASC_3) data columns were switched for both ISO FED and NIST FED calculations. The corrective action was to switch the data columns to the proper position and recalculate the gas tenability values. Since tenability times for these tests are based on smoke obscuration (which occurred prior to reaching the gas tenability limit), no change in the report text resulted from this correction. (November 2007)
- Appendix A Calculated Alarm Times. From test SDC01 though SDC15, two sets of dual photo/ion alarms were not functioning properly and did not transmit alarms to the data acquisition system. They were subsequently coded as present but never reaching alarm. This had the effect of assignment of the end of test as a surrogate alarm time for each of the non-functioning alarms. The corrective action taken was the removal of all non-functioning dual photo/ion alarms from the Appendix A Calculated Alarm Times spreadsheets. Tables 13, 15, 21, 23, 24, 27, and 28 were revised. (November 2007)
- Gas analyzer concentrations. NIST Report of Test 4016, October 2001 and NIST Report of Test 4017, May 2002. Several carbon monoxide and carbon dioxide gas analyzers exhibited uncompensated baseline drifts that significantly impacted the gas species tenability limit calculations. The largest errors were observed in the first manufactured home test series (SDC01 -SDC15). The corrective action taken was to apply a baseline correction to all gas analyzers such that at the start of a test, carbon monoxide analyzers read zero, carbon dioxide read between 0.04 to 0.06 volume percent, and oxygen analyzers read 20.95 volume percent. After baseline adjustments, the times to untenable conditions in Appendix A were re-calculated. Tables 14, 27, and 28 were revised based on the re-calculated tenability times. (November 2007)
- Excessive gas analyzer noise - The following carbon monoxide gas analyzer data were excessively noisy indicating sampling or instrumentation malfunction:
 - SDC04 - GASA_1
 - SDC06 - GASA_1
 - SDC12 - GASA_1, GASC_1
 - SDC13 - GASC_1

The corrective action taken was that all of the excessively noisy gas data were not used in tenability calculations, thus the assessment of tenable conditions at these sampling locations is incomplete. Fortunately, there was always a gas sampling point closer to the fire that would be the likely location where the gas tenability limit would be reached first.

A single spurious data point was filtered out from SDC04 - GASC_1. Since tenability limits for these tests are based on smoke obscuration (which occurred prior to reaching the gas tenability limit), no change in the report text resulted from this correction. (November 2007)

- Smoke optical density meter drift - NIST Report of Test 4016, October 2001 and NIST Report of Test 4017, May 2002. The following smoke meter data were removed because of output signal drift that made the optical density measurement unreliable.

SDC01 - SMB_1, SMC_1, SMF_1
SDC02 - SME_4
SDC06 - SMD_4
SDC08 - SMD01
SDC11 - SMF_1
SDC34 - SMA_1
SDC35 - SMA_1
SDC37 - SMB_1, SMC_1
SDC38 - SMA_1
SDC41 - SMA_1

Only smoke meters SME_4 and SMD_4 affect the time to untenable conditions.

The corrective action taken was to re-calculate Appendix A Calculation of Times to Untenable Conditions. Tables 21, 27 and 28 were revised based on the re-calculated tenability times. (November 2007)

- The following smoke alarms were not functioning:

SDC09 - Pho1_B
SDC11 - Pho1_D
SDC36 - Ion1_C
SDC37 - Ion_1C
SDC38 - Ion_1C
SDC39 - Ion_1C
SDC41 - Ion1_D

This had the effect of assignment of the end of test as a surrogate alarm time for each of the non-functioning alarms. The corrective action taken was to remove these alarms from Appendix A Calculated Alarm Times. Tables 21, 23, 27, and 28 were revised based on the re-calculated tenability times. (November 2007)

- Appendix A Calculated Alarm Times. For tests SDC30, SDC31, SDC34, SDC35, and SDC41 location (E) was mislabeled as a bedroom. It should have been labeled as the living room. The corrective action taken was the proper label was assigned. Average time to alarm, and available egress times were updated and the values reported in tables 23 and 27 were corrected. (November 2007)
- Table 27 has been changed to reflect a correction of a rounding error and to add a footnote for the best-case scenario. (July 2004)