



National Institute of Standards & Technology

Certificate

Standard Reference Material[®] 1007b

Smoke Density Chamber Standard

Flaming Exposure Condition

This Standard Reference Material (SRM) is recommended for checking the operation of the Smoke-Density Chamber under flaming exposure conditions by implementing the prescribed calibration and ASTM test procedures [1]. SRM 1007b consists of three nominal 254 mm × 254 mm (10 in × 10 in) sheets of (acrylonitrile-butadiene-styrene copolymer) plastic having a nominal thickness of 0.762 mm (0.030 in) from which the user can cut twenty-seven (nine from each sheet) 3-inch square specimens for testing.

The certified value for maximum specific corrected optical density D_m (corr.) and Standard Error Uncertainty is given by:

$$D_m (\text{corr.}) = (20\,743 \times t) - 214 \pm 34$$

where, t is the specimen thickness in inches.

The slope and intercept are based on a best-fit straight line derived from the maximum optical density observed in 31 tests that were made on representative specimens cut from the plastic sheets that comprise SRM 1007b. These measurements were made under flaming exposure conditions in accordance with the detailed NFPA procedures [2]. The maximum specific optical densities were corrected for the deposit of solid soot particles on the glass window by subtracting the “clear beam” value, D_c , which was 21 ± 4 . The uncertainty of the certified value is the standard error of the best-fit straight line correlating, D_m (corr.) with specimen thickness and includes contributions from curve fitting, specimen thickness and smoke density measurements.

The following table gives certified values for a series of thicknesses based on the above formula.

Table 1. Certified Values for SRM 1007b

Thickness (mm)	D_m (corr.)
0.737	388
0.762	408
0.787	429
0.813	450
0.838	471
0.864	491
0.889	512

The equation expressed in mm is: $D_m (\text{corr.}) = (816.66 \times t) - 214$

where t is the specimen thickness in mm.

Expiration of Certification: The certification of **SRM 1007b** is valid **indefinitely**, within the measurement uncertainty specified, provided the SRM is handled and stored in accordance with instructions given in this certificate (see “Instructions for Handling, Storage, and Use”). The certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

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Gaithersburg, MD 20899
Certificate Issue Date: 09 December 2010
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Robert L. Watters, Jr., Chief
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Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

Engineering tests leading to the certification of this Standard Reference Material were performed by R.L. Vettori and J.R. Lawson of the Center for Fire Research, using a commercially available Smoke-Density Chamber. Subsequent testing of SRM 1007b was performed between July and October 2008 at three fire testing laboratories at the direction of M.R. Nyden of the Fire Research Division. The results obtained in these subsequent tests were consistent with the certified values listed in the table above.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Measurement Services Division.

INSTRUCTIONS FOR HANDLING, STORAGE, AND USE

This material should be protected from exposure to direct sunlight and must be conditioned to equilibrium at $23\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$ and $50\text{ }\% \pm 5\text{ }\%$ relative humidity prior to testing. The plastic sheets that comprise SRM 1007b are not uniform in thickness. Measurements have indicated that the thickness varies over the area of a single sheet and with conditioning time. To account for the effect of these variations on the specific optical density measurements, each 3 inch \times 3 inch (76.2 mm \times 76.2 mm) specimen should be measured by a micrometer to within 0.0005 inch (0.013 mm) immediately before each test.

REFERENCES

- [1] ASTM E 662-06; *Standard Test Method for Specific Optical Density of Smoke Generated by Solid Materials*; Annu. Book ASTM Stand., Vol. 4.07 (2006).
- [2] NFPA 258; *Standard Research Test Method for Determining Smoke Generation of Solid Materials*; available at <http://www.nfpa.org> (Accessed Dec 2010).

Certificate Revision History: 09 December 2010 (Validated material stability for certified values and Certificate reformatting); 05 April 1991 (Revision of Certified values and Certificate reformatting); 27 February 1976 (Original certificate date).

Users of this SRM should ensure that the certificate in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301)-975-2200; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet at <http://www.nist.gov/srm>.