



Standard Test Method for Measuring Maximum Spontaneous Heating Temperature of Art and Other Materials¹

This standard is issued under the fixed designation D6801; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers a small-scale laboratory procedure to determine the self heating tendency of oil-based materials by exposure to elevated temperatures in air in a controlled semi-adiabatic system.

1.2 This test method has been developed to address an urgent need to identify oil-based materials that may require labeling for spontaneous heating tendency. Studies based on this test method may allow the development of a practice to identify such oil-based materials.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* For safety concerns specific to disposal of solvent-soaked rags, see [Appendix X1](#).

2. Referenced Documents

2.1 *ASTM Standards*:²

[E633](#) Guide for Use of Thermocouples in Creep and Stress-Rupture Testing to 1800°F (1000°C) in Air

[E771](#) Test Method for Spontaneous Heating Tendency of Materials (Withdrawn 2001)³

3. Terminology

3.1 *Definitions*:

¹ This test method is under the jurisdiction of ASTM Committee [D01](#) on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee [D01.57](#) on Artist Paints and Related Materials.

Current edition approved Dec. 1, 2015. Published December 2015. Originally approved in 2000. Last previous edition approved in 2007 as D6801 – 07. DOI: 10.1520/D6801-07R15.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

3.1.1 *maximum spontaneous heating temperature, n*—maximum temperature reached during spontaneous heating under the specified test conditions.

3.1.2 *oil-based materials, n*—seed and nut oils or materials that contain such oils.

3.1.3 *spontaneous heating, n*—exothermic reaction of a material due to slow or incomplete reaction that results in a temperature rise above that of its surroundings (see Test Method [E771](#)); also called *self heating*.

3.2 *Symbols*:

3.2.1 T_D —difference between maximum spontaneous heating temperature and control temperature.

3.2.2 T_S —maximum spontaneous heating temperature.

3.2.3 T_C —control temperature or maximum spontaneous temperature measured over 1 h immediately preceding the beginning of an experiment.

4. Summary of Test Method

4.1 A non-woven paper cloth is covered uniformly in 9.0 mL of test material mixed with 0.25 mL of 6 to 10 % manganese drier. This covered pad is then put in a small stainless steel holder with air holes in the sides. This holder is placed in a larger chamber, which is opened to the air from the top and heated until peak temperature is reached. The maximum spontaneous heating temperature inside the soaked paper cloth is recorded with a K thermocouple and maximum temperature recorder with the base temperature adjusted to $70 \pm 2^\circ\text{C}$.

5. Significance and Use

5.1 This test method provides a means of accelerating the tendency of a material toward spontaneous heating that may eventually lead to a fire. It is applicable to liquids and pastes.

5.2 The spontaneous heating behavior of an oil-based material is affected by such factors as the availability of oxygen, the amount of driers present, the degree of polymerization of oils, the surface area of the cellulose material, measures to prevent heat dissipation, and the amount of oil in contact with cellulose material. The degree of spontaneous heating bears little relationship to the type of cellulose material to which an oil-based material comes in contact or whether or not oil