



Standard Test Method for Reaction Threshold Temperature of Liquid and Solid Materials¹

This standard is issued under the fixed designation D 2883; 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 determination of the pre-flame, cool-flame, and hot-flame reaction threshold temperatures and the incipient reaction temperature of liquids and solids. Data may be obtained at pressures from low vacuum to 0.8 MPa (115 psia) for temperatures within the range from room temperature to 925 K (1200°F).

1.2 This test method may be applied to any substance that is a liquid or a solid at room temperature and atmospheric pressure and that, at room temperature, is compatible with glass and stainless steel. Air is the intended oxidizing medium; however, other media may be substituted provided appropriate precautions are taken for their safe use.

1.3 The values stated in SI units are to be regarded as the standard. In cases where materials, products, or equipment are available in inch-pound units only, SI units are omitted.

1.4 *This standard should be used to measure and describe the properties of materials, products, or assemblies in response to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the fire hazard or fire risk of materials, products, or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard of a particular end use.*

1.5 *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 specific hazard statements, see Note 2, Note 3, Note 4, Note 5, and Note 7.

2. Referenced Documents

2.1 ASTM Standards:

D 1193 Specification for Reagent Water²

D 2021 Specification for Neutral Detergent, 40 Percent

Alkylbenzene Sulfonate Type³

E 659 Test Method for Autoignition Temperature of Liquid Chemicals⁴

2.2 Military Standards:⁵

MIL-C-81302 Trichlorotrifluoroethane

MIL-T-7003 Trichloroethylene

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *catalytic reaction, n*—a fast, self-sustaining, energetic, sometimes luminous, sometimes audible reaction that occurs as a result of catalytic action on the surface of the thermocouple or other solid surface within the combustion chamber.

3.1.2 *cool-flame reaction, n*—a relatively slow, self-sustaining, barely luminous reaction of the sample or its decomposition products with the atmosphere in the combustion chamber.

3.1.2.1 *Discussion*—This type of flame is visible only in a darkened area. Figs. 1-4 illustrate the type of temperature records obtained for cool-flames.

3.1.3 *hot-flame reaction, n*—a rapid, self-sustaining, luminous, sometimes audible reaction of the sample or its decomposition products with the atmosphere in the combustion chamber.

3.1.3.1 *Discussion*—A yellow or blue flame usually accompanies the reaction. Figs. 5-7 illustrate the type of temperature records obtained for hot-flames.

3.1.4 *incipient reaction temperature, n*—the temperature obtained by extrapolation of a plot of the reciprocal of the reaction delay time versus the initial reaction temperature to that value of the reciprocal which represents infinite delay ($\tau^{-1} = 0$) (Fig. 8).

3.1.4.1 *Discussion*—The detection of sample reactions and the distinctions between different reactions are based upon the records produced by the various sensing devices used in the apparatus. The temperature record is basic to the method and shall be regarded as the primary source of such data. The use of a pressure record and the records of other sensing devices to obtain additional data is optional.

¹ This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.11 on Engineering Sciences of High Performance Fluids and Solids.

Current edition approved Jan. 15, 1995. Published March 1995. Originally published as D2883 – 70 T. Last previous edition D2883 – 93.

² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 15.04.

⁴ Annual Book of ASTM Standards, Vol 14.02.

⁵ Available from Standardization Documents Order Desk, Bldg 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094. Attn: NPODS.