



Designation: ~~D4982~~—~~12~~ D4982 – 20

# Standard Test Methods for Flammability Potential Screening Analysis of Waste<sup>1</sup>

This standard is issued under the fixed designation D4982; 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 ~~Scope~~\*

1.1 These test methods are used to indicate the fire-producing or fire-sustaining potential of wastes. The following test methods can be applied to waste liquids, sludges, or solids:

<del>Test Method A—Test Sample Exposed to Heat and Flame</del>	Sections <del>7—9</del>
<del>Test Method A—Test Specimen Exposed to Heat and Flame</del>	<u>8 – 10</u>
<del>Test Method B—Test Sample Exposed to Spark Source</del>	<del>10 and 11</del>
<del>Test Method B—Test Specimen Exposed to Spark Source</del>	<u>11 and 12</u>

~~1.2 These test methods should be used to measure and describe the properties response of materials, in response products, or assemblies to heat and flame under controlled laboratory conditions and should not be used to describe or appraise the conditions, but does not by itself incorporate all factors required for fire hazard or fire risk of materials assessment of the materials, products, or assemblies under actual fire conditions. However, results of these tests may be used in addition to all other factors that are pertinent to a fire hazard assessment of a particular end use.~~

1.3 Fire testing is inherently hazardous. Adequate safeguards for personnel and property shall be employed in conducting these tests.

1.4 These test methods are designed and intended as preliminary tests to complement quantitative analytical techniques that ~~may be used~~ are useful to determine flammability. These test methods offer the option and the ability to screen waste for hazardous flammability potential when the analytical techniques are not available or the total waste composition is unknown.

1.5 Units—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.6 *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, health, and ~~health~~environmental practices and determine the applicability of regulatory limitations prior to use.* Specific hazard information is given in Section ~~56, 8.3.19.3.1, and 9.4.310.4.3.~~

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

<sup>1</sup> These test methods are under the jurisdiction of ASTM Committee D34 on Waste Management and is the direct responsibility of Subcommittee D34.01.05 on Screening Methods.

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\*A Summary of Changes section appears at the end of this standard

## 2. Referenced Documents

### 2.1 *ASTM Standards:*<sup>2</sup>

[D5681 Terminology for Waste and Waste Management](#)

[D8174 Test Method for Finite Flash Point Determination of Liquid Wastes by Small-Scale Closed Cup Tester](#)

[D8175 Test Method for Finite Flash Point Determination of Liquid Wastes by Pensky-Martens Closed Cup Tester](#)

## 3. Terminology

3.1 For definitions of terms used in these test methods, refer to Terminology [D5681](#).

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *screening analysis*—a *preliminary* qualitative or semiquantitative test that is designed to efficiently give the user specific information about a waste that will aid in determining waste identification, process compatibility, and safety in handling.

## 4. Summary of Test Methods

4.1 *Method A*—A test ~~sample~~specimen is exposed to heat and flame. The sample is reported as having a positive or negative flammability potential as described in the test procedure.

4.2 *Method B*—Sparks from a flint lighter are introduced to the vapor space immediately above a representative ~~sample~~specimen of a waste, and observation is made for a flash in the vapor space or ignition of the ~~sample~~specimen. A flash in the vapor space or ignition and burning of the waste indicates a positive flammability potential at ambient temperature.

## 5. Significance and Use

5.1 These test methods are intended for use by those in the waste management industries to aid in identifying the flammability potential or waste materials. In addition to the test methods described here, flash points specific to liquid waste can be determined according to Test Method [D8174](#) or [D8175](#).

## 6. Hazards

6.1 ~~Avoid inhalation and inhalation, skin or eye contact, or both, and eye contact~~ of any hazardous materials.

6.2 Standard laboratory hygiene practices ~~should~~shall be followed when conducting these tests.

6.3 All tests must be performed in a laboratory hood.

6.4 Waste containing or suspected of containing highly volatile organics or peroxides ~~should~~shall be tested using a ~~much~~-smaller ~~sample~~specimen than that used in [9.2.10.2](#).

6.5 The aluminum weighing boat ~~should~~shall be placed on an inert, nonflammable surface.

## 7. Sampling

7.1 Sample containers must be kept tightly sealed until tested.

7.2 Samples ~~should~~shall be analyzed as soon as possible after collection.

7.3 If necessary, allow the sample to come to room temperature in a tightly sealed container. For example, frozen material ~~should~~shall be allowed to thaw ~~completely to room temperature~~.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

## TEST METHOD A—EXPOSURE TO HEAT AND FLAME

### 8. Interferences

8.1 Drafts in the laboratory fume hood where the test is performed ~~could cause excessive~~ have the potential to cause cooling and false negative results. A properly operating fume hood with a face velocity of 100 ft/min ~~should provide~~ typically provides consistent, usable results.

8.2 Ignition sources that provide excessive heating rates alone or combined with a very small test ~~portion may specimen~~ have the potential to obscure results. That is, it is feasible that the sample may will be decomposed, sintered, fused, evaporated, or otherwise consumed before positive or negative evidence of flammability is observed. The use of sufficiently large test ~~portions~~ specimens and of heating rates typical of a bunsen burner ~~should~~ is likely to resolve this problem.

8.3 An inadequate source of heating ~~could will~~ limit the volatilization of flammable components and provide false negative results.

8.4 ~~Difficult to observe flames resulting~~ The potential exists for false negative results from difficult-to-observe flames that result from the burning of certain compounds (for example, methanol) could provide false negative results. methanol). If the presence of these compounds is suspected, the presence of flammability ~~might~~ shall be confirmed by the insertion of a ~~watchglass~~ watch glass just above the test material. The ~~watchglass~~ watch glass is then examined for combustion products of combustion (for example, moisture and soot).

NOTE 1—The ~~watchglass~~ watch glass method cannot distinguish between vaporized water or water produced by combustion.

8.5 ~~An~~ The potential exists for false positive results from an improperly adjusted gas burner (for example, with an insufficiently aerated flame) could introduce that introduces unburnt gas into or immediately above the sample. This unburnt gas could will briefly support a flame after the source of ignition is removed, providing the appearance of a flammable ~~sample and a false positive result.~~ sample.

8.6 Separation of materials within a sample will result in a non-representative specimen from the sample. Sufficient agitation of the sample before selecting a test specimen will typically resolve this problem.

### 9. Apparatus

9.1 *Gas Burner*, (for example, a bunsen burner) with an adjustable air shutter and an adjustable gas orifice is needed. The gas burner and fuel supply line must be appropriate to the gas supplied: natural gas, artificial gas (including propane and butane), or liquified petroleum gas (LP gas or LPG). Where a gas supply line cannot be provided, a propane torch ~~may be substituted.~~ is an appropriate substitute.

9.2 *Lighter*, (for example, piezo lighter) for the burner is required.

9.3 *Aluminum Weighing Boats* or other ~~non-flammable~~ nonflammable containers are ~~needed.~~ used.

9.3.1 **Warning**—Weighing boats composed of material other than aluminum shall be used if the tested materials react with aluminum, for example, caustics. ~~Warning—Weighing boats of material other than aluminum should be used if the testing materials react with aluminum, for example, caustics.~~

9.4 ~~Watchglass.~~ Watch Glass.

9.5 *Large Beaker, Tongs, Asbestos-Free High-Temperature Gloves or Mittens*, or other apparatus as needed to extinguish burning materials.

### 10. Procedure

10.1 Light a gas burner and adjust to a typically blue flame that is not readily blown out. A yellow flame easily affected by drafts

indicates insufficient air (the ~~air-fuel~~air/fuel ratio is too low). A sharp, blue flame is ~~good~~ideal. (If the flame rises above the burner head, is very difficult to light, or tends to extinguish itself, this indicates that too much air or too much air and fuel are being supplied to the burner.)

10.2 Place a sufficient amount (approximately 5 g) of a test ~~sample~~specimen in an aluminum weighing boat or other nonflammable container.

10.3 Using a gas burner, hold the flame immediately above and perpendicular to the test sample for 2 to ~~3~~3 s without touching the visible flame to the ~~sample~~specimen.

10.3.1 If ignition (a flash or burning) is observed before or after the ~~ignition~~ source of ~~ignition~~ (the flame of the burner) is removed, the ~~sample~~specimen is said to have a positive flammability potential. A positive result ~~may~~will require further investigation (see ~~9.4~~10.4.1.1).

10.3.2 The ~~confirmation of flammability~~ flammability confirmation will require the use of a ~~watchglass~~watch glass (see ~~7.4~~8.4).

10.3.3 If there is no ignition, proceed to ~~9.4~~10.4.

10.4 Using a gas burner, briefly (for at least 10 s) apply the flame to the ~~sample~~specimen in an attempt to ignite the ~~sample~~specimen.

10.4.1 If the ~~sample~~specimen ignites, the ~~sample~~specimen is said to have a positive flammability potential.

10.4.1.1 When more accurate waste characterization is necessary, liquid samples ~~may be~~are quantified using a closed-cup flash point ~~tester~~tester such as described in Test Methods ~~D8174~~ and ~~D8175~~.

10.4.1.2 Solids with a positive flammability potential ~~should~~shall be further investigated.

10.4.2 If the ~~sample~~specimen decomposes, boils (if a liquid), or otherwise fails to ignite after at least ~~15~~10 s of continuous ~~sample~~specimen heating by the burner flame, the flammability potential is reported as negative.

10.4.2.1 Continuous heating after a specimen decomposes results in a physical and/or chemical change to a test specimen (see ~~8.2~~) that no longer represents the original sample. Continuing a test (example, 300 s) with a decomposed specimen identifies the flammability potential of residual materials of interest for process compatibility. If the decomposed specimen ignites, the sample is said to have a positive flammability potential. In this case, the sample is identified as modified and classified as positive.

10.4.3 Halogenated solvents typically give off visible vapors that ~~may~~ result in a false positive flammability potential. (~~Warning—Phosgene, an extremely toxic gas, is a combustion product of halogenated compounds burned in air.~~) ~~Warning—Phosgene, an extremely toxic gas, is a combustion product of halogenated compounds burned in air.~~

10.5 Shut off the gas burner when not in use. Extinguish a burning ~~sample~~specimen by setting an aluminum weighing boat or ~~watchglass~~watch glass atop the one containing the burning ~~sample~~specimen (or invert a spoutless beaker over the ~~sample~~specimen container and all). Use of tongs or ~~high-temperature~~high-temperature gloves or mittens ~~may be~~are necessary to handle the equipment.

## TEST METHOD B—EXPOSURE TO SPARK SOURCE

### 11. Apparatus

11.1 *Oven Gloves*.

11.2 *Flint Lighter*, the type typically used to light an air/acetylene torch is required.

11.3 *Disposable 250-mL Beaker*, of plastic is required.