



Standard Guide for Measurement of Gases Present or Generated During Fires¹

This standard is issued under the fixed designation E800; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 Analytical methods for the measurement of carbon monoxide, carbon dioxide, oxygen, nitrogen oxides, sulfur oxides, carbonyl sulfide, hydrogen halides, hydrogen cyanide, aldehydes, and hydrocarbons are described, along with sampling considerations. Many of these gases may be present in any fire environment. Several analytical techniques are described for each gaseous species, together with advantages and disadvantages of each. The test environment, sampling constraints, analytical range, and accuracy often dictate use of one analytical method over another.

1.2 These techniques have been used to measure gases under fire test conditions (laboratory, small scale, or full scale). With proper sampling considerations, any of these methods could be used for measurement in most fire environments.

1.3 This document is intended to be a guide for investigators and for subcommittee use in developing standard test methods. A single analytical technique has not been recommended for any chemical species unless that technique is the only one available.

1.4 The techniques described herein determine the concentration of a specific gas in the total sample taken. These techniques do not determine the total amount of fire gases that would be generated by a specimen during conduct of a fire test.

1.5 *This standard is used to measure and describe the response of materials, products, or assemblies to heat and flame under controlled conditions but does not by itself incorporate all factors required for fire hazard or fire risk assessment of the materials, products, or assemblies under actual fire conditions.*

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 and health practices and determine the applicability of regulatory limitations prior to use.*

¹ This guide is under the jurisdiction of ASTM Committee E05 on Fire Standards and is the direct responsibility of Subcommittee E05.21 on Smoke and Combustion Products.

Current edition approved Nov. 15, 2014. Published December 2014. Originally approved in 1981. Last previous edition approved in 2007 as E800 – 07. DOI: 10.1520/E0800-14.

2. Referenced Documents

2.1 ASTM Standards:²

- D123 Terminology Relating to Textiles
- D1356 Terminology Relating to Sampling and Analysis of Atmospheres
- D2036 Test Methods for Cyanides in Water
- D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water
- D3612 Test Method for Analysis of Gases Dissolved in Electrical Insulating Oil by Gas Chromatography
- D6348 Test Method for Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy
- D6696 Guide for Understanding Cyanide Species
- D6888 Test Method for Available Cyanide with Ligand Displacement and Flow Injection Analysis (FIA) Utilizing Gas Diffusion Separation and Amperometric Detection
- D7295 Practice for Sampling and Determination of Hydrogen Cyanide (HCN) in Combustion Effluents and Other Stationary Sources
- D7365 Practice for Sampling, Preservation and Mitigating Interferences in Water Samples for Analysis of Cyanide
- E84 Test Method for Surface Burning Characteristics of Building Materials
- E176 Terminology of Fire Standards
- E535 Practice for Preparation of Fire-Test-Response Standards
- E603 Guide for Room Fire Experiments
- E662 Test Method for Specific Optical Density of Smoke Generated by Solid Materials

3. Terminology

3.1 *Definitions*—Definitions used in this guide are in accordance with Terminology D123, Terminology D1356, Terminology E176, and Practice E535 unless otherwise indicated.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *batch sampling*—sampling over some time period in such a way as to produce a single test sample for analysis.

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.