



Designation: D1988 – 20

Standard Test Method for Mercaptans in Natural Gas Using Length-of-Stain Detector Tubes¹

This standard is issued under the fixed designation D1988; 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 rapid and simple field determination of mercaptans in natural gas pipelines. Available detector tubes provide a total measuring range of 0.5 to 160 ppm by volume of mercaptans, although the majority of applications will be on the lower end of this range (that is, under 20 ppm). Besides total mercaptans, detector tubes are also available for methyl mercaptan (0.5 to 100 ppm), ethyl mercaptan (0.5 to 120 ppm), and butyl mercaptan (0.5 to 30 mg/M³ or 0.1 to 8 ppm).

NOTE 1—Certain detector tubes are calibrated in terms of milligrams per cubic metre (mg/M³) instead of parts per million by volume. The conversion is as follows for 25 °C (77 °F) and 760 mm Hg.

$$\text{mg/M}^3 = \frac{\text{ppm} \times \text{molecular weight}}{24.45} \quad (1)$$

1.2 Detector tubes are usually subject to interferences from gases and vapors other than the target substance. Such interferences may vary among brands because of the use of different detection principles. Many detector tubes will have a pre-cleanse layer designed to remove interferences up to some maximum level. Consult manufacturer's instructions for specific interference information. Hydrogen sulfide and other mercaptans are usually interferences on mercaptan detector tubes. See Section 6 for interferences of various methods of detection.

1.3 *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 environmental practices and determine the applicability of regulatory limitations prior to use.* For specific hazard statements, see 8.3.

1.4 *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 Recom-*

mendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 *ASTM Standards:*²

D4150 Terminology Relating to Gaseous Fuels

2.2 *GPA Standard:*³

GPA 2188 Method for the Determination of Ethyl Mercaptan in LP-Gas Using Length of Stain Tubes

3. Terminology

3.1 *Definitions*—For definitions of general terms used in D03 Gaseous Fuels standards, refer to Terminology **D4150**.

4. Summary of Test Method

4.1 The sample is passed through a detector tube filled with a specially prepared chemical. Any mercaptan present in the sample reacts with the chemical to produce a color change, or stain. The length of the stain produced in the detector tube, when exposed to a measured volume of sample, is directly proportional to the amount of mercaptan present in the sample. A hand-operated piston or bellows-type pump is used to draw a measured volume of sample through the tube at a controlled rate of flow. The length of stain produced is converted to parts per million (ppm) by volume mercaptan by comparison to a calibration scale supplied by the manufacturer for each box of detection tubes. The system is direct reading, easily portable, and completely suited to making rapid spot checks for mercaptans under field conditions (see **Note 1**).

5. Significance and Use

5.1 The measurement of mercaptans in natural gas is important, because mercaptans are often added as odorants to natural gas to provide a warning property. The odor provided by the mercaptan serves to warn consumers (for example, residential use) of natural gas leaks at levels that are well below

¹ This test method is under the jurisdiction of ASTM Committee **D03** on Gaseous Fuels and is the direct responsibility of Subcommittee **D03.07** on Analysis of Chemical Composition of Gaseous Fuels.

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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 Available from Gas Processors Association (GPA), 6060 American Plaza, Suite 700, Tulsa, OK 74135, <http://www.gpaglobal.org>.