



Designation: D 1072 – 90 (Reapproved 1999)

Standard Test Method for Total Sulfur in Fuel Gases¹

This standard is issued under the fixed designation D 1072; 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 the determination of total sulfur in combustible fuel gases, when present in concentrations between 1 and 30 grains of sulfur per 100 ft³ (25 and 700 mg/m³). It is applicable to natural gases, manufactured gases, and mixed gases, such as are distributed by gas utility companies.

1.2 The values stated in inch-pound units are to be regarded as standard.

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

2. Referenced Documents

2.1 ASTM Standards:

- D 1193 Specification for Reagent Water²
- D 3031 Test Method for Total Sulfur in Natural Gas by Hydrogenation³
- D 4468 Test Method for Total Sulfur in Gaseous Fuels by Hydrogenolysis and Rateometric Colorimetry⁴

3. Summary of Test Method

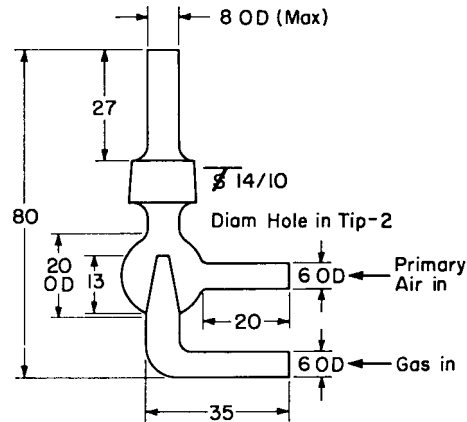
3.1 A metered sample of gas is burned in a closed system in an atmosphere of sulfur-free air. The oxides of sulfur produced are absorbed in sodium carbonate solution, wherein they are oxidized to sulfate. The sulfate in the absorbent solution is subsequently determined by titration with standard barium chloride solution, using tetrahydroxyquinone as an indicator.

4. Apparatus

4.1 *Burner* (Fig. 1), as specified in the Appendix X1.

4.2 *Chimneys, Absorbers and Spray Traps*, (Fig. 2), as specified in the Appendix X1.

4.3 *Flowmeter*—A calibrated capillary flowmeter for prede-



NOTE 1—All dimensions in millimetres.

FIG. 1 Gas Burner for Sulfur Determination

termining and indicating the rate of flow of gas to the burner. The capillary selected should be of such size that at the required rate of flow the differential pressure is at least 20 cm of water. A scale divided into millimetres will then provide a reading precision of $\pm 0.5\%$. Other metering devices, such as a rotameter or a dry displacement meter, will be suitable if the precision of reading the scale is equivalent. A flow controlling valve is attached to the inlet connection of the flowmeter.

4.4 *Vacuum System*—A vacuum manifold equipped with a vacuum regulating device, valves, and so forth. A convenient arrangement for multiple tests is shown in Fig. 3, but any other similar system may be used. The system shall be connected to a vacuum pump of sufficient capacity to permit a steady gas flow of 3 L of air per minute through each absorber and to maintain a constant manifold pressure of approximately 40 cm of water below atmospheric.

4.5 *Air-Purifying System*—A device to supply purified air to the burner manifold at a nearly constant pressure of approximately 20 cm of water and to the chimney manifold at a pressure of 1 to 2 cm of water. A convenient arrangement for multiple tests is illustrated in Fig. 4, but any other similar system may be used. The tubing that connects the chimneys to the manifold shall be of an internal diameter not smaller than 0.63 cm to prevent unnecessary restriction of air flow.

4.6 *Manometer*—A water manometer for indicating the gas pressure at the point of volume measurement. It is connected between the flowmeter and the burner, with one leg open to the atmosphere.

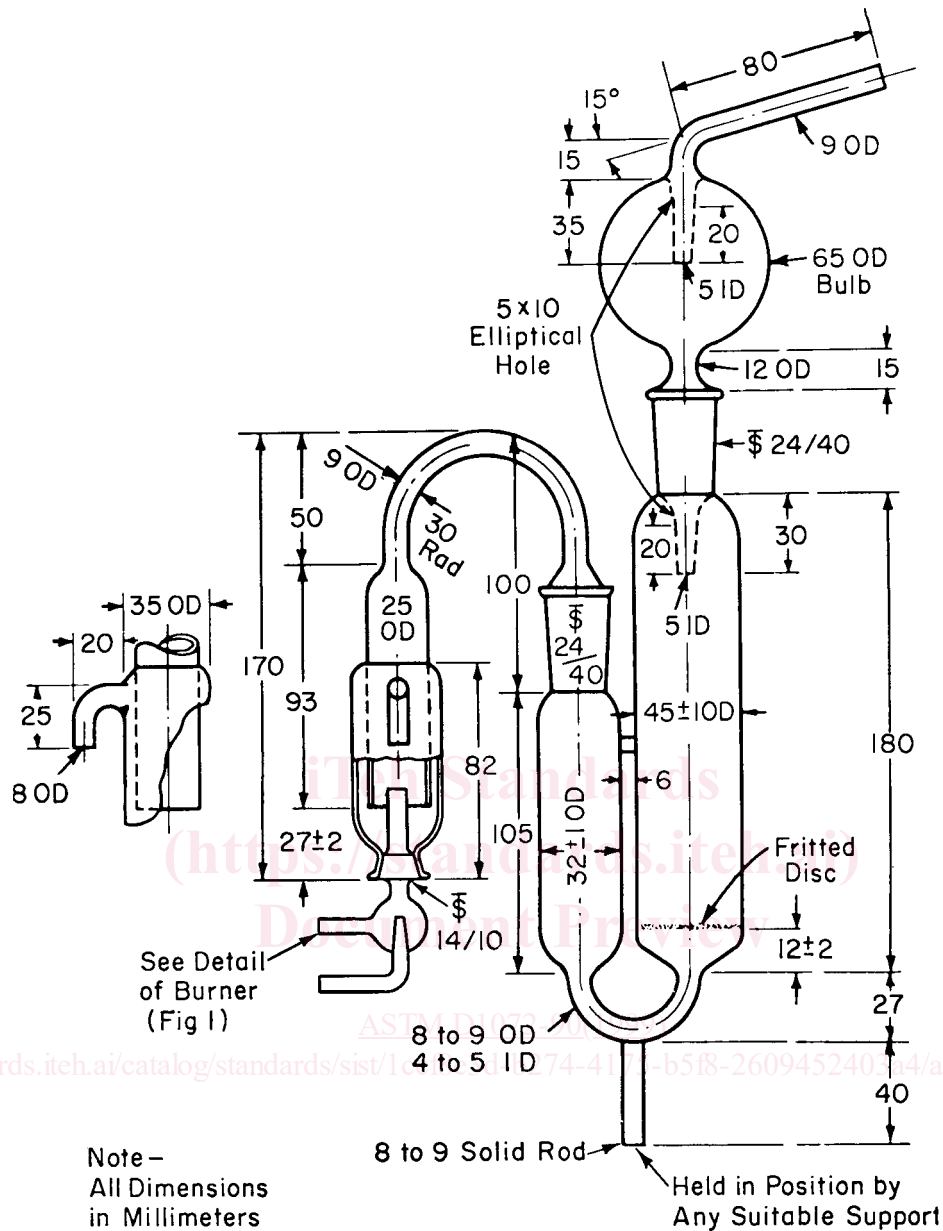
¹ This test method is under the jurisdiction of ASTM Committee D-3 on Gaseous Fuels and is the direct responsibility of D03.05 on Determination of Special Constituents of Gaseous Fuels.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Discontinued*—See 1991 *Annual Book of ASTM Standards*, Vol 05.05.

⁴ *Annual Book of ASTM Standards*, Vol 05.06.



NOTE 1—In the case of those dimensions for which no specific tolerances are designated above, the permissible variation is $\pm 10\%$ to the nearest 1 mm, provided, however, that in no case shall the deviation be greater than 5 mm.

FIG. 2 Detailed Drawing of Combustion and Absorption Apparatus for Sulfur Determination

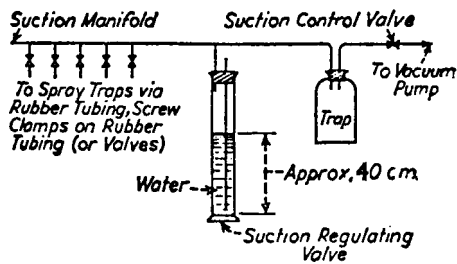


FIG. 3 Suction System for Sulfur Determination

5. Reagents and Materials

5.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that

all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.⁵ Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

5.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean reagent water conforming

⁵ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.