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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Determining Ignition Temperature of Plastics[1]

This standard is issued under the fixed designation D 1929; 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 Department of Defense.

1. Scope

1.1 This fire test response test method[2] covers a laboratory determination of the flash ignition temperature and spontaneous ignition temperature of plastics using a hot-air furnace.

1.2 **Caution**—During the course of combustion, gases or vapors, or both, are evolved that may be hazardous to personnel. Adequate precautions should be taken to protect the operator.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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.* Specific precautionary statements are given in 1.2 and 1.4.

NOTE 1—This test method and ISO 871-1996 are identical in all technical details.

2. Referenced Documents

2.1 *ASTM Standards:*

D 618 Practice for Conditioning Plastics for Testing[3]

E 176 Terminology of Fire Standards[4]

2.2 *International Standards:*[5]

ISO 871-1996 Plastics—Determination of Ignition Temperature Using a Hot-Air Furnace

ISO 5725 Precision of Test Methods—Determination of Repeatability and Reproducibility for Standard Test Methods by Interlaboratory Tests

IEC 584-2 Thermocouples—Part 2: Tolerances

3. Terminology

3.1 *Definitions:* For definitions of terms relating to fire, see Terminology E 176.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *flash ignition temperature (FIT)*—the minimum temperature at which, under specified test conditions, sufficient flammable gases are emitted to ignite momentarily upon application of a small external pilot flame.

3.2.2 *glowing combustion*—combustion of a material in the solid phase without flame but with emission of light from the combustion zone, caused by slow decomposition and carbonization at various points in the specimen, without general ignition occurring.

3.2.3 *spontaneous ignition temperature or self-ignition temperature (SIT)*—the minimum temperature at which the self-heating properties of the specimen lead to ignition or ignition occurs of itself, under specified test conditions, in the absence of any additional flame ignition source.

4. Significance and Use

4.1 Tests made under conditions herein prescribed can be of considerable value in comparing the relative ignition characteristics of different materials. Values obtained represent the lowest ambient air temperature that will cause ignition of the material under the conditions of this test. Test values are expected to rank materials according to ignition susceptibility under actual use conditions.

4.2 This test is not intended to be the sole criterion for fire hazard. In addition to ignition temperatures, fire hazards include other factors such as burning rate or flame spread, intensity of burning, fuel contribution, products of combustion, and others.

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[1] This test method is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.30 on Thermal Properties (Section D20.30.03).

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In 1996, this test method was totally revised to be technically equal to ISO 871-1996, and a specific air velocity is specified, which eliminates the need for approximations.

[2] The following reference may be of interest in connection with this test method: Stetchkin, N. P., "A Method and Apparatus for Determining the Ignition Characteristics of Plastics," *Journal of Research*, National Institute of Standards and Technology, Vol 43, No. 6, December 1949 (RP 2052), p. 591.

[3] *Annual Book of ASTM Standards*, Vol 08.01.

[4] *Annual Book of ASTM Standards*, Vol 04.07.

[5] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

5. Apparatus

5.1 *Hot-Air Ignition Furnace*[6]—A furnace similar to that shown in Fig. 1, consisting primarily of an electrical heating unit and specimen holder.

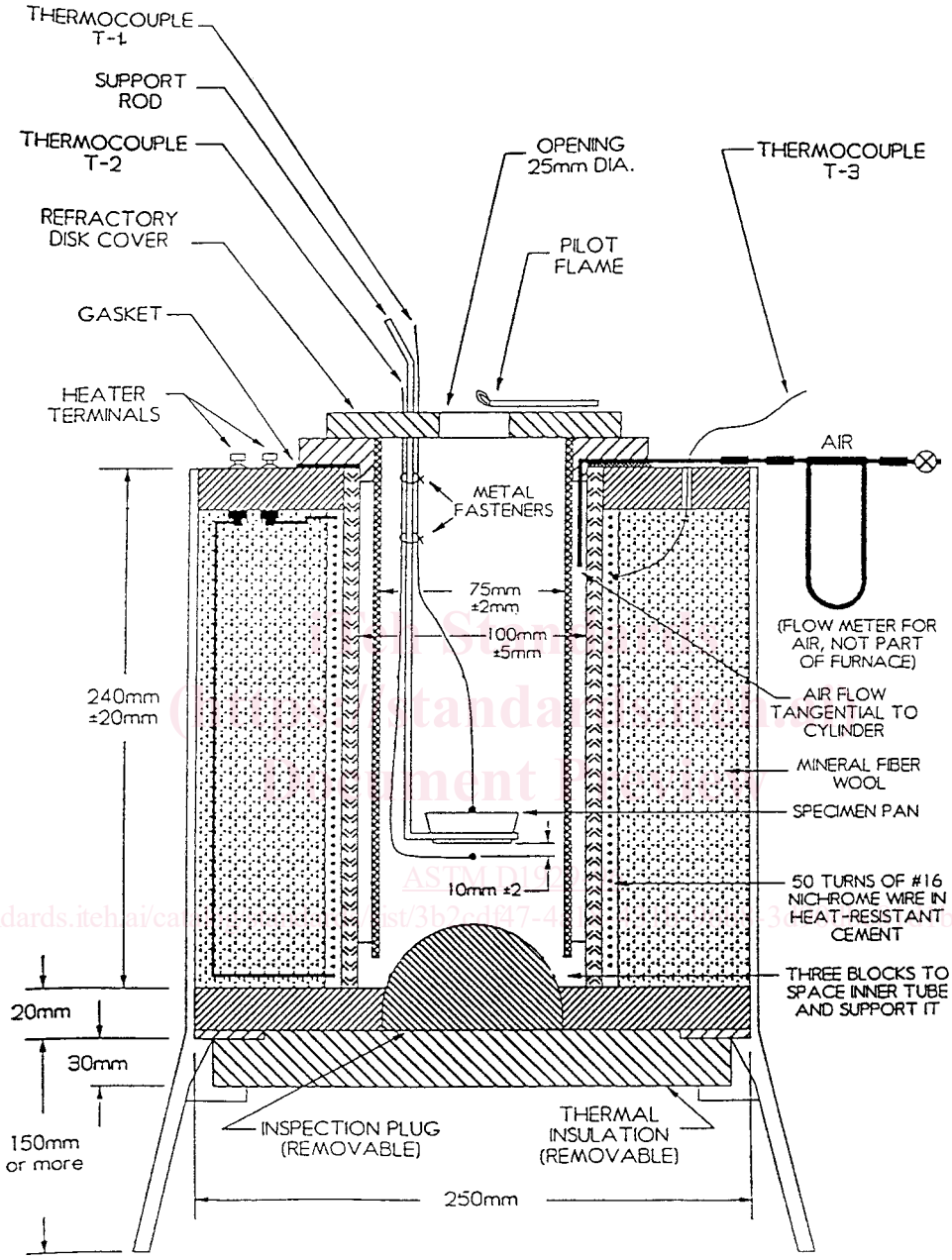

FIG. 1 Cross Section of Hot-Air Ignition Furnace

5.2 *Furnace Tube*—A vertical tube with an inside diameter of 100 ± 5 mm and a length of 230 ± 20 mm, made of a ceramic that will withstand at least 750°C. The vertical tube stands on the furnace floor, fitted with a plug for the removal of accumulated residue.

5.3 *Inner Ceramic Tube*—A ceramic tube that will withstand at least 750°C, with an inside diameter of 75 ± 5 mm, length of 230± 20 mm, and thickness of approximately 3 mm, placed inside the furnace tube and positioned 20 ± 2 mm above the furnace floor on three small spacer blocks. The top is covered by a disk of heat-resistant material with a 25 ± 2-mm diameter opening in the center that is used for observation and passage of smoke and gases. The pilot flame is located immediately above the opening.

NOTE 2—Fire resistant materials such as silica glass and stainless steel have also been found suitable for this application.

5.4 *Air Source*—An outside air source to supply clean air near the top of the annular space between the ceramic tubes, through a copper tube at a steady and controllable rate. Air

[6] Model SS1, a furnace available from Atlas Electric Devices Co., 4114 North Ravenswood Ave., Chicago, IL 60613, has been found suitable for this purpose.