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**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

MH/T 6040-2017

Replacing MH/T 6040-2006

**Test method for smoke density generated by aircraft materials
(English Translation)**

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Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

This standard replaces and abolishes MH/T 6040-2006 "Aeronautical Material Smoke Density Test Method". Compared with MH/T 6040-2006, the main technical the technical changes are as follows.

--Figure 1 "Schematic diagram of the structure of the smoke density tester" (see 4.1.2, 2006 edition 4.1.2);

- Modify the power of the radiant furnace to 650 W (see 4.1.3, 2006 version 4.1.3)
- The test equipment "sample backing" and its description have been added (see 4.1.6);
- Added Figure 5 "Schematic Diagram of Insulated Lead Frame B" (see 4.1.7, 2006 edition 4.1.6);
- The "heat flow meter" and its description have been revised (see 4.1.10, 2006 edition 4.1.9);
- Modified the "General Requirements" and deleted the requirements for gas (see 4.1.15.1, 2006 version 4.1.14.1);
- Figure 10 "Schematic Diagram of Straight Tube Burner" is added (see 4.1.15.3, 2006 edition 4.1.14.2);
- Added "gas" and its requirements (see 4.1.16);
- Modified the "Specimen Orientation" and added "The maximum value in the report and report the orientation direction of the specimen" (see 5.2, 2006 edition 5.2);
- Modified "Sample Installation" and revised wire diameter (see 5.4.2.3, 2006 edition 5.4.2.3);
- The "radiation furnace protection" has been revised, and the thickness of the asbestos board has been revised (see 7.1, 2006 edition 7.1);
- The requirement for flameless combustion is added. "When performing flameless combustion, the burner should be removed before starting the test" (see 8.2.3c);

This standard was proposed by the Aircraft Airworthiness Certification Department of the Civil Aviation Administration of China.

This standard was approved by the Aircraft Airworthiness Certification Department of the Civil Aviation Administration of China.

This standard is under the jurisdiction of the China Academy of Civil Aviation Science and Technology.

Drafting organization of this standard. The Second Research Institute of Civil Aviation Administration of China.

1 Scope

This standard specifies the method for determining the density of smoke from burning or thermal decomposition of solid aviation materials or components (including insulated wires).

This standard is suitable for measuring and describing the reaction to heat and fire of aeronautical materials under controlled conditions. It is not suitable for describing or

evaluating materials.

The hazards or dangers of materials, products, structures or components under actual fire conditions.

2 Terms and definitions

The following terms and definitions apply to this document.

Smoke density

The smoke concentration of the material or component under the specified test conditions.

Maximum smoke density the maximum smoke density within a specified time.

Example. The maximum smoke density in 4 minutes is recorded as 4Dm, and the maximum smoke density in 20 minutes is recorded as 20Dm.

3 Test principle

The basic principle of the test method specified in this standard is Bouguer's Law, which is based on the combustion or thermal decomposition of the tested material the light attenuation caused by the smoke (solid suspended matter or liquid particles) accumulated in the closed box is derived by the geometric factor and the measured light transmittance Expressed by smoke density.

4.1.1 Composition

The composition of the smoke density tester is shown in Figure 1.

4.1.2 Smoke density box

As shown in Figure 1, the dimensions of the cavity width, depth, and height of the smoke density box are (914 ± 3) mm, (610 ± 3) mm, and (914 ± 3) mm, respectively.

The material of the smoke density box should be enamel steel plate or stainless steel plate to prevent chemical corrosion and easy to clean regularly. The front of the box should be equipped with Door with glass observation window. The vertical light path passes through the left side of the smoke density box. The bottom and top plates of the box are inlaid with two corresponding plates of glass.

It is a light window so that the vertical parallel beam can pass through the smoke box. The box shall be equipped with air inlet, exhaust port, sampling port, mixed gas inlet, pressure relief port and and pressure measuring ports, etc., the door on the box body and the surroundings of all openings should be sealed to ensure that during the test, when the door is closed, the inside of the box the substance does not leak and may generate a small positive pressure to remain in the box. Explosion-proof plates should be provided at

appropriate positions on the box wall.

4.1.3 Radiant furnace

The radiant furnace uses an electric furnace with an opening diameter of 76 mm and a power of about 650 W. The specific structure is shown in Figure 2. The electric stove should be located in the box the center line of the front and rear walls is equidistant, the opening end is 305 mm from the right box wall, and the furnace center line is 195 mm higher than the bottom of the box. Stability after closing the door in the state, the radiant furnace control system should maintain the heat at (2.50 ± 0.05) W/cm². The control system should have an autotransformer or AC control equipment.

4.1.4 Power supply

A stable power supply should be configured according to the requirements of the components of the smoke density analyzer. If the voltage fluctuation exceeds 2.5% of the rated value, it should also be equipped A voltage regulator.

4.1.5 Sample box

The sample box is shown in Figure 3. The exposed area of the sample should be (65.0 ± 1.5) mm $\times$ (65.0 ± 1.5) mm, and the sample box frame should be fixed separately the backing plate, spring leaf and stop rod of the sample.

4.1.6 Specimen backing

Use a heat insulation board as the backing of the sample and the blank sample. The heat insulation board shall be cut into (74 ± 1) mm $\times$ (74 ± 1) mm $\times$ (13 ± 1) mm.

4.1.7 Insulated lead frame

The insulated lead frame is used to support the test lead. Its material is stainless steel. The structure and dimensions are shown in Figure 4 and Figure 5.

4.1.8 Support for radiant furnace and sample box

The brackets of the radiant furnace and the sample box should be assembled according to Figure 6. The distance between the end face of the furnace mouth of the radiant furnace and the exposed surface of the sample should be (38 ± 1) mm.

4.1.9 Optical measurement system

4.1.9.1

The light measurement system is composed of a light source and a photodetector. The photodetector is used to measure the light emitted by the test material in the vertical