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Plastics - Determination of burning behaviour by oxygen index - Part 4: High gas velocity test

塑料 用氧指数法测定燃烧行为 第4部分：高气体流速试验

(English Translation)

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10 Precision
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1 Scope

This document describes the minimum oxygen required to sustain combustion of small vertical sheets under specified ambient temperature and oxygen/nitrogen mixture flow rate conditions.

The volume fraction method is used when the gas flow rate is higher than that specified in ISO 4589-2.

Note: Results are expressed as the high gas flow rate oxygen index (HOI).

This document specifies the equipment for determining HOI.

This document applies to sheets with a thickness of no more than 2 mm and flexible sheets vertically supported by a specific sample holder.

4 Principles

The sample was vertically supported under an oxygen/nitrogen mixture flowing upward through a transparent chimney. The volume fraction of oxygen in the mixture and the vertical flow of the mixture were determined.

The combustion speed is preset and measured and controlled during the test. The upper part of the sample is ignited, and its subsequent combustion behavior is observed in order to determine the sample's combustion rate.

The combustion length was compared with the specified limit. The HOI was obtained by conducting a series of tests with different oxygen volume fractions (see 8.7).

5.1 Chimney

The chimney should consist of a heat-resistant glass tube, which is vertically fixed to a base that can introduce an oxygen/nitrogen mixture (see Figure 1).

The chimney should ideally be 450mm-500mm high and 75mm-100mm in inner diameter. The top outlet should be open and unrestricted.

Note: It has been found that turbulence is generated inside the chimney at high gas flow rates in the outlet cup specified in 5.1 of ISO 4589-2:2017.

If the specified gas flow rate is within the allowable error range, chimneys with a height greater than 500 mm or less than 450 mm can also be used.

The lower end of the chimney or the base supporting the chimney should include a device

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for uniformly distributing the gas mixture entering the chimney, as shown in Figure 1.

As shown. Installing a porous screen under the sample holder helps prevent combustion debris from falling and blocking the gas entry and distribution path. One approach is to...

The chimney is designed as a two-part structure that can be separated to make it easier to place samples and clean them.

5.2 Sample holder

Used for vertical support specimens at the center of chimneys.

The sample holder can be hung on the upper edge of the chimney (see Figure 2) or supported by a vertical rod of the chimney base (see Figure 3). The vertical...

Partially made of stainless steel fork type, the specimen should be able to be fixed in the stainless steel fork. The specimen support frame should be 20mm, 100mm and [other dimensions] in the vertical direction.

A reference mark is provided at 140 mm, as shown in Figures 2 and 3.The surface of the sample holder should be smooth to minimize the impact of gases inside the chimney.

Turbulence.

5.3 Gas Supply

The oxygen/nitrogen mixed gas flow velocity in the chimney should be at least 1000 mm/s, and the deviation of the gas flow velocity should not exceed ±50 mm/s.

The oxygen/nitrogen mixture flow rate in this document is higher than the flow rate specified in ISO 4589-2, and the gas supply capacity should be higher than that specified in ISO 4589-2.

5.4 Gas Control System

It should be able to set and adjust the volume fraction of oxygen in the mixed gas entering the chimney. At 23°C±2°C and a gas flow rate inside the chimney of [missing information].

At a gas flow rate of 800 mm/s ± 50 mm/s, the resolution of gas regulation is 0.1%, and the accuracy is ± 0.2%. The gas flow rate should be between 600 mm/s and...

1000mm/s is controllable.

The flow rate of the mixed gas should also be controllable at 100 mm/s or below (see 8.3).

The temperature of the gas mixture entering the chimney should be ensured to be 23°C±2°C. If a gas mixture temperature probe is present, its location and profile should be designed to maximize...

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To minimize gas turbulence inside the chimney.

5.5 Oxygen Analyzer

It should be suitable for measuring the volume fraction of oxygen in the mixed gas entering the chimney, with a resolution of 0.1% and an accuracy of ±0.1%.

Note 1: The paramagnetic oxygen analyzer has been found to meet the accuracy requirements.

Note 2: If the oxygen volume fraction around the sample location differs from that controlled by the gas supply line, it is necessary to troubleshoot the problem.

5.6 Flame Igniter

It should include a tube that can be inserted into a chimney, with an end diameter of 2 mm ± 1 mm, for igniting the sample.

The flame fuel should be propane, unmixed air, with a purity of at least 98%. The fuel supply should be adjustable to match the set oxygen level.

The integral numbers match, and when the tube is vertically downward inside the chimney, the total flame height is 16mm ± 4mm.

A flame height gauge should be used.

5.7 Timing Device

The measurement range is at least 5 minutes, and the accuracy is ±0.5 seconds.

5.8 Smoke Exhaust System

It should have sufficient ventilation capacity to remove smoke or soot from the chimney without affecting the gas flow or temperature inside the chimney.

5.9 Gas Flow Rate Measurement Device

That is, the anemometer should be able to measure the vertical gas velocity at the sample location inside the chimney, with a resolution of 0.01 m/s.

Note: A hot-wire anemometer suitable for this purpose has been discovered. Studies have found that this device can also typically measure the gas temperature specified in 5.10.

5.10 Gas Temperature Device

The accuracy of measuring the gas temperature inside the chimney should be ±0.5°C.

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