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**Flexible cellular polymeric materials -
Determination of fatigue by constant-load pounding**

高聚物多孔弹性材料 定负荷冲击 疲劳的测定

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Flexible cellular polymeric materials -

Determination of fatigue by constant-load pounding

WARNING: Persons who use this Standard shall be familiar with formal laboratory operating procedures. This Standard is not intended to cover all safety issues that may arise due to the use of this Standard. It is the user's responsibility to develop appropriate safety and health systems and ensure compliance with national regulations.

1 Scope

This Standard stipulates the determination methods for the thickness reduction value and the hardness reduction value of flexible cellular materials that are used in interior decoration. This test method provides/ evaluates the means for the functional performance of the latex-type and polymeric acid-type flexible cellular materials for bearing decoration. The measured thickness reduction value and hardness reduction value are related to the possible loss in use; but they are not necessarily the same.

This Standard applies to standard-size samples that are taken from finished materials, and also to molded parts.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

GB/T 12825, Polymeric materials, cellular flexible - Determination of hardness by indentation technique

3 Principle

Through an indenter whose area smaller than the sample, repeatedly indent into the sample; reach the maximum load in each impact cycle within the specified range.

4 Instruments

A reciprocating impact testing machine that has the following components.

4.1 A platform that can fully support the sample, and has a hole, whose diameter is about 6 mm and spacing is about 20, that is suitable for ventilation, so that air can escape under the sample.

4.2 An indenter that has a diameter of $250\text{ mm} \pm 1\text{ mm}$ and has a rounded corner whose radius is $25\text{ mm} \pm 1\text{ mm}$ at its lower edge. It is installed on a device that can apply a maximum force of $750\text{ N} \pm 20\text{ N}$ in a load cycle. The indenter shall be firmly installed on its guide rod; its surface shall be smooth and shall not be polished. Through a curved roller or other suitable mechanical device, the testing machine shall be able to bear the weight of the platen (4.1) or the indenter support for advance and return movement; one impact to the other from the vertical direction at a rate of (70 ± 5) times per minute; the impact amplitude shall be adjustable.

4.3 An indenter support. When the support and the platform are close together, this indentation force can be transmitted through it except for the impact point. At this time, all the indentation force is borne by the sample; the indenter shall be freely lifted by the support, so as prevent the test piece from being overloaded. During the entire period when a force is applied to the sample through the indenter, at any impact point, measures shall be taken to use it to control the impact time; this time is not greater than 25% of the duration of each impact cycle.

4.4 A force measuring device. It can be used to measure the load that is applied to the sample through the indenter; a suitable method is to fix the platform on the load sensor.

Note: In the case of manual calibration, through the axis that is vertical to the guide rod on the platform that bear the weight of the sample, the adjustment of the vertical position of the indenter whose indenter is fixed at the lower end of the indenter opposite to the platform can control the length of time at which any impact point is subjected to full indentation force by the sample. The recommended method for reliable automatic calibration is shown in Figure 1, so that the length of time during which the sample is subjected to the indenter can be controlled by the valve opening time.

40% ± 1% according to the provisions of 7.2 (Method A) in GB/T 12825; it shall include the pre-indentation procedure that is specified in 7.1 of the national standard; besides, the 40% ± 1% indentation shall be calculated by the initial thickness measurement d_1 .

For the two remaining samples, repeat the above steps from the initial thickness to the hardness index measurement at the beginning of this section.

7 Result expression

7.1 Thickness reduction value

The percentage of thickness reduction value Δd is given by Formula (1):

$$\Delta d = 100 \times \frac{d_1 - d_2}{d_1} \quad \dots\dots\dots (1)$$

Where:

d_1 -- the initial thickness, in mm;

d_2 -- the final thickness, in mm;

The result is expressed by the median of the values that are measured from the three samples.

7.2 Hardness reduction value

The hardness reduction value ΔH is obtained from Formula (2):

$$\Delta H = H_1 - H_2 \quad \dots\dots\dots (2)$$

Where:

H_1 -- the initial hardness;

H_2 -- the final hardness.

The result is expressed by the median of the values that are measured from the three samples.

Note: It is better to choose the method of expressing the hardness reduction by absolute value rather than the hardness reduction value percentage, because the analysis of the test data shows that the variability of the results that is expressed in this method will be reduced. The reduction value percentage that is usually used is related to the absolute reduction value, which is calculated by the following formula:

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