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

GB/T 22838.6-2024

Replacing GB/T 22838.6-2009

**Determination of physical characteristics for cigarettes and
filter rods - Part 6: Hardness**

卷烟和滤棒物理性能的测定 第6部分:硬度

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1 Scope

The document describes the method for determining the hardness of cigarettes and filter rods.

It applies to the determination of the hardness of cigarettes, filter rods and cylindrical tobacco products similar to cigarettes.

2 Normative references

Two documents are cited: GB/T 8170 on rules for rounding off numerical values and the expression and judgement of limiting values, and GB/T 16447 on the atmospheres for conditioning and testing tobacco and tobacco products.

3 Terms and definitions

Hardness is the ability of a test piece to resist deformation in the radial direction under a given atmosphere; the definition is adapted from 4.2.8 of GB/T 18771.4-2015.

The diameter on contact point is the diameter of the test piece at the end of the preload time, after the preload has acted on it. The depressed diameter is the diameter of the test piece at the end of the load time, after the load has acted on it. The depressed deformation is the difference between the diameter on contact point and the depressed diameter.

The preload is the steady force applied to the test piece by the force mechanism through the pressure head over a given time in order to measure the diameter on contact point. The

load is the steady force applied in the same way over a given time in order to measure the depressed diameter, and it takes in the preload together with the force applied afterwards on top of it.

The preload time is the time for which the preload acts, the load time is the time for which the load acts, and the load speed is the speed of the pressure head as it touches the test piece.

4 Apparatus

The instrument used to determine hardness applies radial point pressure to the test piece.

The pressure head is a flat circle 12.00 mm in diameter with a maximum permissible error of ± 0.01 mm. The preload applied to the test piece is 0.10 N with a maximum permissible error of ± 0.02 N, and the preload time is 1.5 s with a maximum permissible error of ± 0.5 s. The load speed is not greater than 3.00 mm/s. The load is 2.94 N with a maximum permissible error of ± 0.03 N, and the load time is 10 s with a maximum permissible error of ± 1 s.

The specimen baffle is fixed to the instrument so that the test piece cannot move under pressure; in the test area its contact with the test piece is a rectangular plane of 20.0 mm in the radial direction of the test piece by 35.0 mm in the longitudinal direction. The displacement measuring system has a range of not less than 10.00 mm, a resolution of 0.01 mm and a maximum permissible error of ± 0.02 mm. The displacement standard rod or gauge block has a maximum permissible error of ± 0.003 mm.

5 Test conditions

Before the test the piece is conditioned as GB/T 16447 requires and brought to equilibrium.

The testing atmosphere meets the conditions laid down in GB/T 16447.

6 Test procedure

The instrument is switched on and warmed up until steady, then calibrated according to its operating procedure or manual so that its displayed value agrees with the calibrated value of the standard rod.

The test piece is placed on the instrument baffle. Pressure is applied at the middle of a cigarette and at the middle of a filter rod; on a capsule filter rod the capsule is avoided, and on a composite filter rod with an acetate segment the pressure is applied at that segment.

The preload is applied at the set load speed and, when the preload time reaches 1.5 s, the diameter on contact point is measured. Pressure continues until the load is reached and, when the load time reaches 10 s, the depressed diameter or the depressed deformation is measured.

7 Expression of results

Hardness is calculated by formula (1). The legend gives H as the hardness in per cent, D as the diameter on contact point in millimetres, a as the depressed deformation in millimetres and d as the depressed diameter in millimetres. The printed equation is broken in the extracted text and is not reproduced here.

Results are rounded as GB/T 8170 lays down: the result for a single test piece to one decimal place, and the mean and the standard deviation of the sample to two decimal places.

8 Test report

The test report gives the identification and description of the test pieces, the time of testing, the instrument model, the number of samples tested, the number of this document, the way the pieces were conditioned, for example in the pack or loose, the duration of conditioning, the test ambient temperature in degrees Celsius, the test ambient humidity as relative humidity, the test results and the name of the operator.

The bibliography lists GB/T 18771.4-2015, Tobacco terminology, Part 4: Quality evaluation and testing.

Series Position within GB/T 22838

The introduction states that GB/T 22838 is planned in sixteen parts according to the object measured and the means of measurement. The parts listed are Part 1 cigarette packaging and marking, Part 2 length by the photoelectric method, Part 3 circumference by the non-contact optical method, Part 4 cigarette mass, Part 5 draw resistance of cigarettes and pressure drop of filter rods, Part 6 hardness, Part 7 loose end content of cigarettes, Part 8 moisture content, Part 9 open ends of cigarettes, Part 10 burst ends, Part 11 cigarette self-extinguishing, Part 12 cigarette appearance, Part 13 filter rod roundness, Part 14 filter rod appearance, Part 15 determination of cigarette ventilation, definitions and measuring principles, and Part 17 determination of tobacco shed from the ends of cigarettes by the vibration method. The purpose of the present part is to set the method for determining the hardness of cigarettes and filter rods.

The foreword lists the same sixteen parts as already published and records that the document is the first revision of GB/T 22838.6-2009, published in 2009.