GB

NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

ICS 59.140.30

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GB/T 39500-2020

Leather - Physical and mechanical tests - Determination of apparent density and mass per unit area

皮革 物理和机械试验 视密度和单位面积质量的测定

(ISO 2420:2017, MOD)

Issued on: November 19, 2020 **Implemented on: June 01, 2021**

Issued by: State Administration for Market Regulation;
Standardization Administration of the People's Republic of China.

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Leather - Physical and mechanical tests - Determination of apparent density and mass per unit area

1 Scope

This Standard specifies the determination method of apparent density and mass per unit area of leather.

This Standard applies to the determination of apparent density and mass per unit area of various types of leather.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 39364, Leather - Chemical, physical, mechanical and fastness tests - Sampling location (GB/T 39364-2020, ISO 2418:2017, MOD)

QB/T 2707, Leather - Physical and mechanical tests - Sample preparation and conditioning (QB/T 2707-2018, ISO 2419:2012, MOD);

QB/T 2709, Leather - Physical and mechanical tests - Determination of thickness (QB/T 2709-2005, ISO 2589:2002, MOD)

3 Principle

Regard the leather sample as a regular cylinder or cube; calculate the apparent density and mass per unit area of the leather by measuring the diameter or side length of the bottom surface, the mass and thickness of the sample.

4 Instruments and apparatuses

4.1 Die cutter, in line with the provisions of QB/T 2707; the inner wall is a circle whose diameter is (70 ± 1) mm or a square of (100 ± 1) mm × (100 ± 1) mm.

4.2 Thickness gauge, in line with the provisions of QB/T 2709.

4.3 Analytical balance whose accuracy is 0.000 1 g.

4.4 Vernier caliper whose accuracy is 0.01 mm.

5 Sampling and sample preparation

5.1 Sampling

Perform according to the provisions of GB/T 39364. If it is not possible to take samples from standard parts (such as direct sampling from shoes and clothing), take samples from any part within the available area. The samples shall be representative and indicated in the test report.

5.2 Sample preparation

Use the die cutter (4.1) to cut 3 samples from the grain surface.

Note: If there are more than two pieces of leather in the same batch that need to be tested, cut at least one sample from each piece of the to-be-tested leather; the total number of samples is not less than 3.

5.3 Adjustment of samples

Perform according to the provisions of QB/T 2707.

6 Test procedure

6.1 Test conditions

All operations of the test shall be carried out in the standard atmosphere that is specified by QB/T 2707.

6.2 Determination of thickness

Measure the thickness of each sample according to the provisions of QB/T 2709; select three points for measurement; each point is about 20 mm from the center of the sample to form an equilateral triangle. Then, measure the thickness of the center of the sample; use the arithmetic average of the thickness of the four points as the thickness t of the sample.

Note: The center point of the sample and the three measurement points can be estimated by visual inspection.

6.3 Determination of the bottom area

$$D_a = \frac{1.273 \times 10^6 \times m}{t \times d^2} \quad \cdots\cdots(1)$$

Where:

D_a -- apparent density of the sample, in kilograms per cubic meter (kg/m^3);

m -- mass of the sample (see 6.4), in grams (g);

t -- average thickness of the sample (see 6.2), in millimeters (mm);

d -- average diameter of the sample (see 6.3), in millimeters (mm);

Note: Formula (1) is obtained by calculating its volume V (in mm^3) under the assumption that the sample is a regular cylinder:

$V = \frac{\pi \times d2 \times t}{4}$ can be simplified to $V = \frac{d2 \times t}{1.273}$, in which the coefficient 1.273 continues to the final calculation.

7.1.2 Square sample

Calculate the apparent density D_a of the square sample according to Formula (2), in kilograms per cubic meter (kg/m^3); take the average of the calculation results of three samples as the result, accurate to 0.01 kg/m^3.

$$D_a = \frac{10^6 \times m}{t \times a \times b} \quad \cdots\cdots(2)$$

Where:

D_a -- apparent density of the sample, in kilograms per cubic meter (kg/m^3);

m -- mass of the sample (see 6.4), in grams (g);

t -- average thickness of the sample (see 6.2), in millimeters (mm);

a -- average length of AC (see 6.3), in millimeters (mm);

b -- average length of BD (see 6.3), in millimeters (mm).

Note: The apparent density of leather is usually expressed in g/cm^3; the conversion relationship between the two is: 1 g/cm^3 = 1 000 kg/m^3.

7.2 Mass per unit area

7.2.1 Round sample

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