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

GB/T 18942.1-2003

**Polymeric materials, cellular flexible -- Determination of
stress-strain characteristic in compression -- Part 1:
Low-density materials
(English Translation)**

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Foreword

This Part of this Standard is equivalent to the international standard ISO 3386-1.1996

"Polymeric materials, cellular flexible -- Determination of stress-strain characteristics in compression -- Part 1.Low-density materials".

GB/T 18942 "Polymeric materials, cellular flexible -- Determination of stress-strain characteristic in compression" consists of the following two parts.

Part 1.Low-density materials;

Part 2.High-density materials.

This Standard was proposed by former State Administration of Petroleum and Chemical Industry.

This Standard shall be under the jurisdiction of National Technical Committee on Rubber and Rubber Products of Standardization Administration of China.

The drafting organizations of this Standard. Zhuzhou Rubber and Plastics Industry Research and Design Institute of China Rubber Group.

Main drafters of this Standard. Zheng Sanyang, Tan Yunhua.

Polymeric materials, cellular flexible -- Determination of

stress-strain characteristic in compression -- Part 1.Low-density materials

WARNING. Personnel using this standard should be familiar with formal laboratory operating procedures. This standard does not purport to address all safety issues that may arise from its use. It is the user's responsibility to establish appropriate safety and health systems and ensure compliance with national regulations.

1 Scope

This Part of the standard specifies the method for determining the compressive stress-strain characteristics of low-density porous elastic materials with a mass fraction of less than 250 kg/m³. It also describes the method for calculating the compressive stress value of such materials.

Although such materials may not necessarily have the ability to withstand long-term loads, the compressive stress-strain characteristics can be used as a measure of the material's load-bearing performance.

The compressive stress-strain characteristics are different from the indentation hardness characteristics (measured according to GB/T 12825), which are affected by the thickness and tensile properties of the tested porous elastic material, the shape of the compression plate, and the shape and size of the test piece.

Part 2 of this Standard specifies the method for determining compressive stress and strain in high-density materials and differs from Part 1 in the following respects.

- Primarily relevant for materials with densities above 250 kg/m³.
- Compressive stress values have been eliminated.
- Cylindrical test pieces are not permitted.

2 References

The provisions contained in the following standards constitute the provisions of this Standard through reference in this Standard. The versions shown are valid at the time of publication of this standard. All standards are subject to revision, and parties using

this standard should investigate the possibility of using the latest versions of the following standards.

GB/T 6342, Cellular plastics and rubbers. Determination of linear dimensions

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

3 Definitions

This Standard uses the following definitions.

3.1 Compressive stress-strain characteristics (C). The stress required to compress to a

specified deformation at a constant deformation rate during the fourth loading period of a specified test, expressed as a function of the compression deformation. The unit of stress is kPa.

3.2 Compressive stress value (CV40). Compressive stress-strain characteristics when

compressed to 40%.

4.1 Testing machine

The testing machine should be capable of compressing the test piece between the support surface (see 4.2) and the compression plate (see 4.3). The relative speed of the testing machine in the vertical direction should always be maintained at (100 ± 20) mm/min.

The testing machine should be capable of measuring the force required to produce the specified compression deformation to an accuracy of $\pm 2\%$, and the ability to measure the thickness of the test piece under load to an accuracy of ± 0.2 mm. The testing machine should be equipped with a device for automatically recording stress and strain values.

4.2 Supporting surface

Unless otherwise specified, the test piece should be placed on a smooth, flat, horizontal, and rigid support surface. The support surface should be larger than the test piece. The surface should have vent holes with a diameter of 6 mm and a spacing of approximately

5.1 Shape and size

The test piece should be a parallelepiped or cylinder. The selected test piece thickness should be $50\text{ mm} \pm 1\text{ mm}$ and should never be less than 10 mm. Test pieces less than 10 mm thick should be overlapped to achieve the specified range, but the thickness of each layer must be at least 10 micropore diameters.

The area of the test piece shall not be less than 2500 mm² and the test piece and the compression plate shall not overlap exactly.

NOTE: For specimens with an area close to the lower limit, the compression force may be low and special test equipment may be required to meet the accuracy specified in 4.1.

5.2 Orientation of the sample

If the product shows a porous structure orientation, the direction of compression should be agreed with all parties involved. Usually, the direction of product testing is the direction of force in which the finished product will be subjected under the conditions of use.

6 Test steps

Measure the dimensions of the test piece and calculate the area of the load-bearing surface according to the corresponding steps specified in GB/T 6342.

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