



Determination of the Compressibility of a Cellular Elastomer Under a Specified Force

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. The object of this test procedure is the determination of the compressibility of a cellular elastomer, used as a seal or shock absorber, under a specified force. The force used in the test is analogous to that exerted on the elastomer in service.

The compressibility of a cellular elastomer under a given force acting in a specified direction, shall be the relative or absolute distance by which the test piece is deflected in that direction.

1.1.1 Summary of Test Procedure. The compressibility of a cellular elastomeric component at a given force shall be defined as the deflection obtained following compression at a uniform given velocity.

1.2 Applicability. Applicable to cellular elastomers, such as seals or shock absorbers.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 7500-1 ISO 9513

2.2 GM Standards/Specifications.

GMW16676

3 Resources

3.1 Facilities.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Test Equipment.

3.2.1.1 Testing Machine. The test machine shall fulfill the following requirements: the force measuring device of the test machine shall correspond to ISO 7500-1 Class 1; the deflection measuring device shall correspond to ISO 9513 Class 0.2. The test machine shall be such that the test piece can be, compressed between its holder and a pressure foot in a vertical direction.

Pieces shall be, tested at a uniform rate of 0.5 mm/s (30 mm/minute $\pm$ 3 mm/minute). Other test velocities must have been, agreed upon and stated on the respective drawing or math data file and test report.

3.2.1.2 Pressure Foot. Two (2) types of pressure feet are available and shall be, as defined in 3.2.1.2.1 and 3.2.1.2.2.

3.2.1.2.1 Coding A. Circular with 60 mm $\pm$ 1 mm diameter.

3.2.1.2.2 Coding B. Square, with 100 mm $\pm$ 1 mm length.

3.2.1.2.3 The pressure surface shall be plane and smooth in both types i.e., Coding A and Coding B. Unless otherwise specified, the finish of the pressure foot shall be as follows:

- $R_a = 0.03 \mu\text{m}$.
- $R_{z1\text{max}} = 0.3 \mu\text{m}$.
- Surface finish shall be, measured according to GMW16676.

3.2.1.3 Test Piece Support. The test piece support shall be horizontal and coplanar to the pressure foot and larger in dimensions than the respective pressure foot. The supporting table shall contain ventilation holes (approximately 6 mm in diameter) spaced in regular intervals (approximately 20 mm from hole center to hole center) so that air can escape rapidly during the test. Alternative test piece supports may be used if called upon the relevant part drawing or math data file.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Material.

3.3.1.1 The test piece shall consist of a complete component, or a suitable part of it. The length of the test piece shall, if possible, be longer than the width of the pressure foot. Components of a length less than the width of the pressure foot shall be tested across their entire length.

3.3.1.2 For initial sample approval and arbitration purposes, at least five (5) test pieces taken from at least two (2) components shall be, tested; for routine quality control purposes at least three (3) test pieces, preferably taken from two (2) components, shall be tested.

3.4 Test Time. Reference the laboratory test procedure(s) in Section(s) 4 for timing details.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Per laboratory accreditation requirements.

4 Procedure

4.1 Preparation.

4.1.1 Test Sample Preparation. The minimum time period between vulcanization and testing of elastomers shall be 72 h. The test piece shall remain at a temperature of $+23 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$ for at least 8 h before testing, and shall be free from strain during this period. Humidity controls, if necessary, shall be specified on the relevant part drawing or math data file and on the test report.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.3 Instructions.

4.3.1 Test Procedure.

4.3.1.1 The test shall be performed at a temperature of $+23 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$. Testing at other temperatures must have been agreed upon and stated on the respective drawing or math data file and the test report.

4.3.1.2 Mount the pressure foot to the test machine and set the force to zero. The pressure foot shall be gently lowered so as to contact the test piece support under a force of $2 \text{ N} \pm 0.1 \text{ N}$ and the device for measuring the deflection shall be set to zero.

4.3.1.3 Raise the pressure foot. The test piece shall then be placed on the test piece support with its midpoint centered to the pressure foot. It shall be placed upon the support such that the force is applied in the specified direction, as indicated on the relevant part drawing. In case of components of axial symmetry, this indication is not necessary.

4.3.1.4 The pressure foot shall again be gently lowered to contact the test piece with a force of $2 \text{ N} \pm 0.1 \text{ N}$ and the height of the test piece determined to the nearest 0.1 mm, initial height (h_0). Record the initial height (h_0) of the test piece.

4.3.1.5 The force is then increased by $18 \text{ N} \pm 0.9 \text{ N}$ (giving a total force of $20 \text{ N} \pm 1.0 \text{ N}$). Alternative loads may be used if specified on the relevant part drawing or math data file.