



Determination of the Permanent Set Characteristics of Elastomeric Components

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 permanent set characteristics of elastomeric components used in vehicles, subjected to a constant deformation at specified temperatures.

The data given by this test procedure will also enable an indication of the state of cure of the elastomer to be obtained.

1.2 Applicability. This standard is used to determine the permanent set characteristics of elastomeric components.

1.3 Remarks. See 7.1 for an explanation of alphabetical, numerical, suffixes, subscripts and permanent set.

2 References

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

2.1 External Standards/Specifications.

ISO 188

2.2 GM Standards/Specifications.

GMW14734

2.3 Additional References.

Relevant Elastomeric Component Drawing, Test Specification or Material Specification

Relevant Part Drawing

Relevant Test Specifications

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 Measuring equipment for determining the heights, e.g., unstressed elastomeric component (h_0), strain removed from elastomeric component (h_s), and installed height of the elastomeric component in accordance with GMW14734.

3.2.2 Test fixtures in which the test samples may be deflected to the installed height (H), and held at that deflection.

3.2.3 Air Oven. Heating oven, capable of maintaining the required temperatures within the specified tolerances (e.g., heat oven to ISO 188 Method B) and having suitable volume.

3.2.4 Cold Cabinet. Temperature range: -30 °C to 5 °C continuously adjustable.

- Temperature Variation: $\leq \pm 2$ K.
- Temperature change speed for the empty cabinet: ≥ 1.5 K/minute (recommended).
- Work space of suitable volume.

3.2.5 Timing device, with an indicating range of 24 h, and accurate to one (1) minute in 24 h.

3.3 Test Vehicle/Test Piece.

3.3.1 The test samples shall be elastomeric components, to be assembled into the vehicle.

3.3.2 For determination of properties for initial samples approval and arbitration purposes, and for routine quality control purposes, at least three (3) test pieces shall be tested.

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

3.5 Test Required Information. See 5.3.

3.6 Personnel/Skills. Conform to company and/or laboratory requirements. Technician training records must be available upon request.

4 Procedure

The test samples shall be tested in accordance with the requirements of this test procedure and to the values specified on the relevant part drawing or relevant test specifications regarding the magnitude and direction of forces applied, and method of assembling to the test fixture.

4.1 Preparation.

4.1.1 Test Sample Preparation. For initial sample approval and arbitration purposes, the time between vulcanization and testing shall be seven (7) days minimum. For quality control purposes, the time shall be 72 h. The test samples shall remain at a temperature of $+23\text{ °C} \pm 5\text{ °C}$ for 8 h minimum before testing, and shall be free from strain during this period.

4.2 Conditions.

4.2.1 Environmental Conditions.

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 The unstressed height " h_{oi} " and installed height " H_i " shall be determined in accordance with GMW14734, if this test procedure is required for the elastomeric component. Where the force deflection to GMW14734 is not required, the specified value for the installed height " H_i " shall be used.

4.3.2 The test samples shall then be allowed to recover for 24 h -1 h at $+23\text{ °C} \pm 5\text{ °C}$ in an unstressed condition.

4.3.3 The test sample shall then be inserted into the test fixture (see 3.2.2) deflected to the installed height (H_i) within one (1) minute and maintained at that height.

4.3.4 The test fixture and test sample shall then be placed into the oven/cold cabinet and maintained under one (1) of the conditions specified in Table 1.

4.3.5 After the appropriate period, the test fixture and sample shall be removed from the oven/cold cabinet and allowed to recover to $+23\text{ °C} \pm 5\text{ °C}$ within 6 h -0.1 h.

4.3.6 Following the recovery period defined in 4.3.5, the stress shall be removed from the test sample, and it shall be allowed a further recovery period of 60 minutes ± 3 minutes at $+23\text{ °C} \pm 5\text{ °C}$. The height " h_{si} " shall then be measured.

4.4 Test Duration and Temperature of Storage. One of the following conditions from Table 1 shall be used as specified on the relevant elastomeric component drawing, test specification or material specification.