GM WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14683

Force-Deflection Characteristics of Elastomeric Components Under Bi-axial Stress

1 Scope

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. Determination of spring characteristic of elastomeric components. The test, according to this test procedure, provides information on the visco-elastic behavior of the elastomers used.

Determination of stressability of the elastomeric components in the installation position in vehicles and in accordance with the installation conditions.

1.2 Foreword. Not applicable.

1.3 Applicability. Not applicable.

2 References

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

2.1 External Standards/Specifications.

DIN 862 DIN 876 DIN 878 DIN 6370

2.2 GM Standards/Specifications.

GMW14734

3 Resources

3.1 Facilities. Not applicable.

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 Universal Testing Machine. For stressing of elastomeric components up to 50 kN maximum with constant velocity (maximum deviation ± 10%), short form in text universal testing machine.

- **Force measurement:** ± 1.5% of the relevant value.
- **Deflection measurement:** ± 0.05 mm.

3.2.1.1 Total deformation of universal testing machine frame, testing and clamping devices etc. ≤ 1% of deformation of the elastomeric components subjected to force F_{max} (+ F_v). In this case, correction of the measurement results by the deformation of the testing machine is not necessary.

3.2.1.2. If the deformation of universal testing machine frame, testing and clamping devices etc., is within the range > 1% to ≤ 10% of deformation of the elastomeric components, then correction of the measurement results shall be performed.

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3.2.1.3 Measurements with testing equipment, in which deformation >10% of the deformation of the elastomeric components are not permissible.

Note: The measurement of deformation of the testing equipment shall be performed using a **rigid substitute body** under the same testing and configuration parameters as the component measurement.

3.2.1.4 The velocity v_i shall be selected according to the application. The correction measurement shall cover the entire evaluation area.

3.2.1.5 The **rigid substitute body** is defined as the outer contour of the elastomeric component pressed into the corresponding component mount, according to the relevant component drawing, with an inserted pin.

3.2.1.6 The pin shall be tightened to the specified torque according to the elastomeric component drawing.

3.2.1.7 A test device for applying an additional constant force F_j to the elastomeric component hereafter referred to as the "test device".

3.2.1.8 A test device which enables a stress to be gradually applied to the elastomeric component, up to a force $F_j = F_{vj} + F_{j\ max}$ at a constant velocity of $1.25 \pm 0.10 \times 10^{-3}$ m s^{-1}, and subsequently maintains this force at a constant value. The moment at which the force reaches its maximum value shall be indicated by the test device. The test device shall span a range of force from 50 N to 4000 N with an accuracy of ≤ 10 N.

3.2.1.9 Test devices which apply the force by means of suitable masses, such as lever systems, are preferred.

3.2.1.10 Workbench with machine vice 160 DIN 6370.

3.2.1.11 Measuring plate according to DIN 876 made of cast iron, 400 × 400 mm.

3.2.1.12 Testing and clamping devices for installing and fastening the elastomeric components on the universal testing machine. Roller tables and roller or ball straight-line mechanisms for forces up to 10 kN.

3.2.1.13 Stop watch or clock with a display range of 600 s and a reading accuracy of 0.1 s.

3.2.1.14 Dimensional Measuring Equipment.

3.2.1.14.1 Dimensional change measuring instrument, e.g., dial gauge according to DIN 878 with a display range of 25 mm, a measuring accuracy of ± 0.01 mm and constant measuring force over the measuring path of < 2 N.

3.2.1.14.2 Dimensional measuring instrument, e.g., caliper gauge according to DIN 862.

3.2.1.14.3 Dimensional measuring instrument, e.g., high-accuracy marking gauge with fine adjustment of the slider, vernier 0.1 mm, marking height 500 mm maximum.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Material.

3.3.1.1 Test Sample Form. Test samples are elastomeric components (elastomeric components or elastomeric/metal components), which are used as components in vehicles.

3.3.1.2 Number of Test Samples. At least three (3) test samples shall be tested.

3.4 Test Time. Not applicable.

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Not applicable.

4 Procedure

4.1 Preparation.

4.1.1 Test Sample Preparation. For initial sampling and in cases of arbitration, the test shall be performed no earlier than seven days, and for continuous quality control no earlier than 72 h, after vulcanization. Before testing, the test samples shall be stored in an unstressed condition for at least 8 h at +23 °C ± 5 °C.

4.1.1.1 Summary of Test Method. Testing of the deformation of elastomeric components for vehicles (elastomeric components or elastomeric/metal components) with constant velocity at + 23 °C ± 5 °C.

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.

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