GM WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW17335

Steering Gear Bellow

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. This standard describes the requirements to steering gear bellows consisting of materials according to paragraph 1.2.1.

1.2 Applicability.

1.2.1 Bellows for steering gears.

1.2.1 Material. The used material qualities are indicated in the respective drawings.

1.2.1.1 Type A. Polyester-Elastomer (>TPC-EE< or >TPC-ES< or >TPC-ET<) for continuous temperatures ≤ +150 °C.

1.2.1.2 Type B. Elastomer-modified polypropylene (>TPV-(EPDM+PP)<). For continuous temperatures ≤ +130 °C.

1.3 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ISO 37	ISO 188	ISO 868	ISO 1817

2.2 GM Standards/Specifications.

GMW3059	GMW14093

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. According to the specified tests.

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

3.1.1.2 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.

3.1.2 Equipment. According to the specified tests.

3.1.3 Test Vehicle/Test Piece.

3.1.4.1 At least 5 finished parts are necessary for the testing of the required properties according to paragraph 4.

3.1.4.2 The delivered parts and/or suitable sections of them or test pieces as indicated in the respective test methods are used as test pieces.

3.1.4 Test Time. Not applicable.

3.1.5 Test Required Information. Not applicable.

3.1.6 Personnel/Skills. Not applicable.

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3.2 Preparation. According to the specified tests.

3.3 Conditions.

3.3.1 Environmental Conditions. Unless otherwise specified, for initial sample approval and in arbitration purposes the test pieces shall be conditioned according to GMW3221 Code A. For routine quality control the test pieces shall be tested in the as delivered condition without any pre-conditioning.

3.3.2 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.

3.4 Instructions. According to the specified tests.

3.5 Data. Not applicable.

3.6 Safety. This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3.7 Documentation. Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard and approved by the responsible GM Department prior to the start of delivery of production level components or materials.

Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture requires a new release of the product. It is the sole responsibility of the supplier to provide the customer, unsolicited, with documentation of any change or modification to the product/process, and to apply for a new release.

If not otherwise agreed to, the entire verification test shall be repeated and documented by the supplier prior to start of delivery of the modified or changed product. In some cases, a shorter test can be agreed to between the responsible GM department and the supplier.

3.7.1 Test Results. Not applicable.

4 Requirements and Procedure

Unless otherwise specified, the tests shall be performed immediately after sample conditioning and/or in the as delivered condition at (+23 ± 5) °C.

If not otherwise specified, the tests apply to both types.

4.1 Material Requirements (Granules). The requirements are specified in the relevant Material Specification.

4.2 Requirements of Finished Part.

4.2.1 General.

4.2.1.1 The finished parts shall have a uniform structure. It shall be free from inclusions, blisters, damage or other surface or molding defects.

4.2.1.2 The thickness of the blow-molded part shall correspond with the requirements. Design measures shall be taken to prevent kinking within the area of connections. The thickness at the top of the fold shall be ≥ 0.4 mm.

4.2.2 Material Properties.

Property	Standard	Unit	Type A	Type B
Hardness	ISO 868	Shore D	54 ± 3	40 ± 3
Tensile Strength Note 1	ISO 37	MPa	≥ 28	≥ 19
Elongation at Break Note 1	ISO 37	%	≥ 450	≥ 550
Stress at a given Strain σ_{100} Note 1	ISO 37	MPa	≥ 14	≥ 7

Note 1: Test conditions: Dumb-bell test piece S3, test speed of v = (50 ± 10) mm/minute.

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