



Elastomer for Axle Half Shaft Bellows

1 Scope

This specification covers the materials and performance of elastomeric axle half shaft bellows.

1.1 Material Description. Axle half shaft bellows made of Polychloroprene (CR) elastomer suitable for continuous operation temperatures of +70 °C maximum with intermittent operation at temperatures up to +100 °C maximum.

1.2 Symbols. Not applicable.

1.3 Applicability. Elastomeric axle half shaft bellows for use on passenger vehicles.

1.4 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 815	ISO 1431-1
ISO 1817	ISO 7619-1	ISO 23529	

2.2 GM Standards/Specifications.

GMW3059	GMW15416	GMW16955
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3 Requirements

3.1 Resources.

3.1.1 Test Samples. Unless otherwise specified, the shape, size, and number of test pieces shall be in accordance with the relevant test methods. Minimum three test samples (bellows) are required for inspection testing. Report both individual and averaged values. Unless otherwise specified, samples are finished parts or to be taken from finished parts. Where the dimensions of the finished parts do not allow preparing of test pieces, tests shall be performed on sheet material of the same production batch. Tests shall be performed to confirm same state of cure between sheet material and finished parts. If not otherwise stated, mechanical properties in delivery state and after heat or fluid immersion shall be tested at $(+23 \pm 5) ^\circ\text{C}$, and with the same test methods.

3.1.2 Conditioning. Conditioning shall be as specified in the relevant test procedure.

3.1.2.1 Environmental Conditions. The minimum time between vulcanization and testing of elastomers shall be 72 h. The test pieces shall be maintained at a temperature of $(+23 \pm 5) ^\circ\text{C}$ for at least 8 h prior to test and shall be free from strain during this period.

3.1.3 Equipment. Conforming to the relevant test procedures.

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

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

3.1.6 Facilities. Conforming to the relevant Test Procedures.

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

3.2 Material and Performance Requirements. Material and performance requirements are summarized in Table 1.

Table 1: Material and Performance Properties

Property	Test Procedure	Unit	Value
Hardness			
	ISO 7619-1	Shore A	See part drawing ± 5
Elongation at Break			
	ISO 37, Test piece in the shape of ring, (5200 $\pm$ 20) mm/minute	%	150 minimum
Tensile Strength			
	ISO 37, Test piece in the shape of ring, (200 $\pm$ 20) mm/minute	MPa	7 Minimum
Age Resistance (Heat Aging)			
	ISO 188 Method B, (168 $\pm$ 2) h at (+70 $\pm$ 3) °C Change in Hardness Change in Elongation at Break Change in Tensile Strength	Shore A % %	+10 maximum -20 maximum -10 maximum
Oil Resistance			
	ISO 1817 to engine oil GMW16955 Fluid F (72 $\pm$ 2) h, at (+70 $\pm$ 3) °C Change in Volume	%	-15 to +5
Grease Resistance			
	ISO 1817 to grease specified on drawing (72 $\pm$ 2) h, at (+70 $\pm$ 3) °C Change in Volume	%	-7 to + 10
Resistance to Anticorrosion Wax for Underbody			
	ISO 1817 to GMW15416 (72 $\pm$ 2) h, at (+70 $\pm$ 3) °C Change in Volume	%	+50 maximum
Ozone Resistance			
	ISO 1431-1, 50 pphm, 20 % strain on mandrel, (+40 $\pm$ 2) °C, (72 $\pm$ 2) h visual examination (no magnification)		No cracks
Cold Resistance			
	ISO 23529, (-30 $\pm$ 3) °C; (5 $\pm$ 1) h Change of Hardness	Shore A	+17 maximum
Compression Set			
	ISO 815 test piece Type B ^{Note 1} , samples to be taken from finished part (+70 $\pm$ 3) °C, (24 $\pm$ 2) h, 25 % compressed	%	25 maximum

Note 1: The reference to ISO 815 indicates the test piece diameter and refers to the calculation of the results. Test pieces shall be taken from finished part and can be plied if possible.

3.2.1 Design Validation Testing. Material and constructional properties are summarized in Table 1. For full approval of a compound/construction compliance to the requirements of Table 1 is needed.

3.2.2 Product Validation Testing and Audit/Inspection Testing. If not defined otherwise, the following testing should be done for production and audit testing:

- Values at delivery condition
- Oil resistance test
- Compression set