GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW14720

Elastomer for Duct – Air Cleaner

1 Scope

This specification covers the materials and performance of elastomeric hose elbows for duct air cleaner.

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/Material Description. Materials covered by this specification are divided into five (5) types.

1.1.1 Type A. Nitrile Acrylonitrile Butadiene Rubber Copolymer (NBR) for +100 °C permanent and +125 °C peak temperatures.

1.1.2 Type B. Ethyl Acrylate Ethylene Copolymer (AEM) for +160 °C permanent and +175 °C peak temperatures.

1.1.3 Type C. Drawing defined (e.g., using SAE J200 or ASTM D2000 line callout).

1.1.4 Type D. AEM for +175 °C permanent and +185 °C peak temperatures.

1.1.5 Type E. AEM with increased dynamic duct properties for Type B and Type D elastomers.

1.2 Symbols. Not applicable.

1.3 Applicability. Elastomeric hose elbows for duct air cleaner.

1.4 Remarks. All GMW14720 AEM types shall have a Minimum of 50% Base Polymer.

2 References

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

2.1 External Standards/Specifications.

ASTM D2000	ISO 48-4	ISO 1431-1	ISO 23529
ASTM D7426-08	ISO 188	ISO 1817	SAE J200
ISO 37	ISO 815-1	ISO 11357-2	

2.2 GM Standards/Specifications.

GMW3059	GMW14444	GMW16853	GMW17245
GMW14270	GMW14914		

2.3 Additional References.

- Component Technical Specifications (CTS)
- Statement of Requirements (SOR)
- Statement of Requirements (SOR) Appendix D, Elastomer Finite Element Data Request Form (CG5335)

3 Requirements

3.1 Requirements on Test Specimens. Tests shall be conducted using the latest issue of the test methods indicated. Suitable precautions should be taken to ensure that applicable safe limits are not exceeded when conducting test procedures, processes and/or handling the materials required by this specification.

3.2 Test Preparation and Evaluation Resources.

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

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3.2.2 Test Samples. Unless otherwise specified, the shape, size and number of test pieces shall be in accordance with the relevant test procedure. For Design and Product Validation, test pieces for material test shall be cut from at least three (3) finished parts, for routine quality control from at least one (1) finished part.

3.2.2.1 Samples are finished parts or to be taken from finished parts. Where the dimensions on the finished parts do not allow preparing of test pieces, tests are to be performed on sheet material of same production batch. The same state of cure between slabs or buttons and finished parts must be ensured by appropriate tests, which must be described in the test report.

3.2.2.2 If not otherwise stated, mechanical properties in delivery state and after heat or fluid immersion, are to be tested at 23 °C ± 5 °C and with the same test procedures. Unless otherwise stated, ambient temperature test conditions shall be held to 23 °C ± 5 °C. Unless otherwise stated, all other temperatures except 23 °C ± 5 °C shall be held to ± 3 °C.

3.2.2.3 Conditioning. Conditioning shall be as specified in the relevant test procedure. The minimum time between vulcanization and testing of elastomers shall be 72 h.

3.2.3 Equipment. Conforming to the relevant test procedure.

3.2.4 Facilities. Conforming to the relevant test procedure.

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

3.2.6 Test Required 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 manufacturer, 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.

3.2.7 Test Results. With reference to this standard, the test results shall be presented in a test report.

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

3.3 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to obtain a GM-approved International Material Data System (IMDS) submission.

3.3.1 Design or Product Validation Testing. Material and performance properties are summarized in Table 1. For full approval of a hose, compliance to the requirements of Table 1 and Table 2 is needed. Three (3) samples of material shall be tested to each of the requirements for Design or Product Validation Testing.

3.3.2 Audit/Inspection Testing. If not defined otherwise, the following testing shall be done for production audit testing. Three (3) samples of material shall be tested to each of the requirements for Audit/Inspection Testing.

All tests shall be completed per Table 1, except Long Term Aging Resistance, Ozone Resistance, and Cold Tests.

Table 1: Material and Performance Properties

Property	Test Procedure	Unit	Value
Hardness			
Type A, Type D	ISO 48-4	Shore A	75 ± 5
Type B	ISO 48-4	Shore A	75 ± 5
Type C	As specified on drawing/math data file	Shore A	As specified on drawing
Type E	ISO 48-4	Shore A	70 ± 5

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Property	Test Procedure	Unit	Value
Elongation at Break			
Type A, Type D	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	%	200 Minimum
Type B	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	%	150 Minimum
Type C	As specified on drawing/math data file	%	As specified on drawing
Type E	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	%	250 Minimum
Tensile Strength			
Type A	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	7 Minimum
Type B	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	8.5 Minimum
Type C	As specified on drawing/math data file	MPa	As specified on drawing
Type D	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	10 Minimum
Type E	ISO 37, Type 2 or Type 4 dumbbell, 200 mm/minute ± 20 mm/minute	MPa	13.5 Minimum
Age Resistance (Heat Aging)			
Type A	ISO 188 Method B, 168 h -2 h at +125 °C ± 3 °C Bending Test r = 2 mm		No cracks
Type B	ISO 188 Method B, 168 h -2 h at +175 °C ± 3 °C Change in Hardness	Shore A	+15 Maximum
Type C	As specified on drawing/math data file		As specified on drawing
Type D, Type E	ISO 188 Method B, 336 h -2 h at +175 °C ± 3 °C Change in Hardness Change in Elongation at Break Elongation at Break Change in Tensile Strength	 Shore A % % %	 +15 Maximum -60 Maximum 80 Minimum -50 Maximum
Type D, Type E	ISO 188 Method B, 168 h -2 h at +185 °C ± 3 °C Change in Hardness Change in Elongation at Break Elongation at Break Change in Tensile Strength	 Shore A % % %	 +15 Maximum -60 Maximum 80 Minimum -50 Maximum
Oil Resistance			
Type A	ISO 1817 to heat-aged engine oil to GMW17245 168 h -2 h; at +70 °C ± 3 °C Change in Volume	%	± 15
Type B, Type D, Type E	ISO 1817 to heat-aged engine oil to GMW17245 168 h -2 h; at +150 °C ± 3 °C Change in Volume	%	-10 to +20
Type C	As specified on drawing/math data file	%	As specified on drawing

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