Material Specification for Transmission Venting Hoses Single and Double Layered

1 Scope

1.1 Material Description. Each hose type shall be defined by construction. The designation for the hose is defined as GMW17862 Type Y, where Y defines the construction of the hose per 3.2.1, and Table 1.

1.1.1 Construction Type A. Hoses are defined as consisting of a smoothbore tube of Nitrile Butadiene Rubber (NBR) copolymer compound and a cover of Chlorosulfonated Polyethylene (CSM) or Chlorinated Polyethylene (CM) compound. The hoses and/or hose assemblies are capable of giving satisfactory service at temperatures of -40 °C to the continuous temperature of +125 °C, and +150 °C excursion temperature.

1.1.2 Construction Type B. Hoses are defined as consisting of a single wall of Ethylene Acrylic Copolymer (AEM) compound. The hoses and/or hose assemblies are capable of giving satisfactory service at temperatures of -40 °C to the continuous temperature of+150 °C and +165 °C excursion temperature.

1.1.3 Construction Type C. Hoses are defined as consisting of a smoothbore tube of Ethylene Acrylic Copolymer (AEM) compound and a cover of fluorinated elastomers (FKM) compound. The hoses and/or hose assemblies are capable of giving satisfactory service at temperatures of -40 °C to the outer continuous temperature of +200 °C and +225 °C excursion temperature.

1.2 Symbols. Not applicable.

1.3 Applicability. Transmission venting hoses for under-the-hood applications.

2 References

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

2.1 External Standards/Specifications.

ASTM D380	B 040 2030	ISO 48	ISO 1817
ASTM D413	ISO 36	ISO 188	ISO 23529
ASTM D573	ISO 37	ISO 815-1	

2.2 GM Standards/Specifications.

9986153	9986396	GMW3221	GMW16955
9986333	9986505	GMW14270	GMW17180
9986354	9986530	GMW14291	
9986368	GMW3059	GMW15423	

2.3 Additional References.

GM Drawing

Statement of Requirements (SOR)

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 Resources.

3.2.1 Test Samples. Unless otherwise specified, the shape, size, and number of test pieces shall be in accordance with the relevant test methods. Minimum of three (3) test samples (hoses) are required for inspection testing. Report both individual and averaged values. Unless otherwise specified, samples are finished parts or

© Copyright 2017 General Motors Company All Rights Reserved

Documents Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW17862 2017

to be taken from finished parts. Where the dimensions of the finished parts do not allow preparing of test pieces, tests are to be performed on sheet material of the same production batch. The same state of cure between slabs or buttons and finished parts must be assured by appropriate tests, which must be described in the test report. If not otherwise stated, mechanical properties in delivery state and after heat or fluid immersion are to be tested at +23 °C ± 3 °C, and with the same test methods.

3.2.2 Conditioning. Conditioning shall be as specified in the relevant test methods.

3.2.2.1 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 °C ± 5 °C for at least 8 h prior to test and shall be free from strain during this period. Ambient temperature test conditions shall be held to +23 °C ± 5 °C. All other temperatures shall be held to a ±3 °C and all pressures to -0 kPa ± 690 kPa unless otherwise noted.

3.2.3 Equipment. Conforming to the relevant test methods.

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

3.2.5 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 its physical definition.

3.2.6 Facilities. Conforming to the relevant test methods.

3.2.7 Deviations. Deviations from the requirements of this specification shall have been agreed upon by the GM Materials Engineer generating the engineering source approval. Such deviations shall be specified on component drawings, test certificates, reports, etc.

3.3 Hose Construction.

3.3.1 Construction. The construction of the hoses defines the material content and construction of the hoses. The following materials are used in the various constructions.

- Nitrile Butadiene Rubber (NBR)
- Chlorosulfonated Polyethylene (CSM)
- Chlorinated Polyethylene (CM)
- Ethylene Acrylic Copolymer (AEM)
- Fluorinated Elastomers (FKM)

Hose construction are determined by the maximum temperature exposure of the transmission venting hoses. Table 1 provides a generic construction selection guideline.

Table 1: Construction Type and Usage

Lining	Cover	Application Temperature		Construction Type Coding
		Continuous	Excursion	
NBR	CSM or CM	+125 °C	+150 °C	A
AEM	None	+150 °C	+165 °C	B
AEM	FKM	+200 °C	+225 °C	C

© Copyright 2017 General Motors Company All Rights Reserved

Documents
Document Sharing Hub
Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW17862 2017

3.3.2 Transmission Fluid Compatibility. The default automatic transmission fluid (ATF) is DEXRON® VI per GM9986153, defined as GMW16955 Code L. To be approved under this specification, suppliers should test their materials in the default ATF.

Since other ATFs are used in GM transmissions; it is supplier's responsibility to ensure the proposed material shows good fluid resistance in the fluid specified in GM Statement of Requirements (SOR) and/or GM drawings. In any doubt, contact the part releasing engineer for direction. GM designated fluids may include, but is not limited to the following: 9986153, 9986333, 9986368, 9986354, 9986505, 9986530, 9986396, Pentosin FFL-4, and AW-1 ATF per B 040 2030.

3.3.3 Dimensions and Tolerances. Hoses furnished to this specification shall conform to the dimensions and tolerances shown in Table 2 for hoses of construction Type A and Type C (double layers); or Table 3 for hoses of construction Type B (single layer) for the size (nominal inside diameter) specified by the purchaser. For hoses requiring a cover, the hose cover wall thickness shall be between 25% and 40% of total wall thickness.

Concentricity based on total indicator reading between inside bore of hose and outer surface of hose shall not exceed the values given below:

- Sizes 6.35 mm and under: 0.8 mm
- Sizes over 6.35 mm and up to 12.70 mm: 1.0 mm
- Sizes over 12.70 mm: 1.3 mm

Table 2: Dimensions and Tolerances (Type A and Type C - Double Layer Hoses)

Table 2.1 – Metric Units						Table 2.2 – Customary Units				
Size Millimeters (mm)	Inside Diameter (mm)		Outside Diameter (mm)			Size (inches)	Inside Diameter (inches)		Outside Diameter (inches)	
	Max	Min	Max	Min			Max	Min	Max	Min
3.97	4.37	3.57	9.70	9.50		5/32	0.172	0.140	0.383	0.337
4.76	5.16	4.36	10.90	9.74		3/16	0.204	0.172	0.429	0.383
5.56	5.96	5.16	11.69	10.53		7/32	0.235	0.203	0.461	0.415
6.35	6.75	5.95	13.28	12.12		1/4	0.266	0.234	0.530	0.477
7.14	7.54	6.74	14.07	12.91		9/32	0.297	0.265	0.554	0.508
7.94	8.34	7.54	14.87	13.71		5/16	0.328	0.296	0.585	0.539
8.73	9.13	8.33	15.66	14.50		11/32	0.360	0.328	0.617	0.571
9.53	9.93	9.13	16.46	15.30		3/8	0.391	0.359	0.648	0.602
11.11	11.69	10.53	19.05	17.47		7/16	0.461	0.415	0.750	0.688
12.70	13.28	12.12	20.63	19.05		1/2	0.523	0.477	0.812	0.750
15.88	16.67	15.09	24.60	23.02		5/8	0.656	0.594	0.969	0.907
19.05	19.84	18.26	29.37	27.79		3/4	0.781	0.719	1.156	1.094

Max = Maximum, Min = Minimum

© Copyright 2017 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW17862 2017

Table 3: Dimensions and Tolerances (Type B - Single Layer Hoses)

Table 3.1 – Metric Units						Table 3.2 – Customary Units				
Size Millimeters (mm)	Inside Diameter (mm)		Outside Diameter (mm)			Size (inches)	Inside Diameter (inches)		Outside Diameter (inches)	
	Max	Min	Max	Min			Max	Min	Max	Min
2.78	3.18	2.63	6.86	5.48		7/64	0.125	0.093	0.270	0.230
3.97	4.37	3.57	8.43	7.42		5/32	0.172	0.140	0.332	0.292
4.76	5.16	4.36	9.25	8.23		3/16	0.204	0.172	0.364	0.324
5.56	5.96	5.16	10.03	9.02		7/32	0.235	0.203	0.395	0.355
6.35	6.75	5.95	13.28	12.12		1/4	0.266	0.234	0.523	0.477
7.14	7.54	6.74	14.07	12.91		9/32	0.297	0.265	0.554	0.508
7.94	8.34	7.54	14.87	13.71		5/16	0.328	0.296	0.585	0.539
8.73	9.13	8.33	15.66	14.50		11/32	0.360	0.328	0.617	0.571
9.53	9.93	9.13	16.46	15.30		3/8	0.391	0.359	0.648	0.602
11.11	11.69	10.53	19.05	17.47		7/16	0.461	0.415	0.750	0.688
12.70	13.28	12.12	20.63	19.05		1/2	0.523	0.477	0.812	0.750
15.88	16.67	15.09	24.60	23.02		5/8	0.656	0.594	0.969	0.907
19.05	19.84	18.26	29.37	27.79		3/4	0.781	0.719	1.156	1.094

Note: Max = Maximum, Min = Minimum

3.4 Test Requirements

All hoses shall be tested to the requirements as specified in Table 4 through Table 7. Six (6) samples each should be test for hose design validation (DV) and hose process validation (PV).

3.4.1 Engineering Approval Factors. Engineering source approvals generated through testing to prove compliance to this specification are specific for combinations of the following factors (3.5.1 through 3.5.3).

3.4.1.1 Type. Refer to Table 1.

3.4.1.2 Size of hose.

3.4.1.3 Hose material and construction.

3.4.1.4 Supplier specifications and manufacturing procedures, supplier (both hose and assembly) manufacturing sites.

3.4.2 Design Level Requirements. All hoses manufactured for testing to this specification for engineering source approval purposes shall be completely representative of production level materials, components, processes and tooling. Any deviation from these requirements must be discussed with the GM Materials Engineer generating the approval to the specification prior to the initiation of the test program.

3.5 Material and Performance Requirements.

These requirements for testing are specific to this specification for the purpose of hose suppliers to become qualified to supply hose assemblies to GM, and to stay qualified. Sample sizes are described in Table 4 for Design Validation Testing, Process Validation and Audit/Inspection Testing.

3.5.1 Hose Design Validation Testing. Material properties (material/compound approval) are summarized in Tables 4 and 5, constructional properties in Table 6, and performance requirements (construction approval) in Table 7. For full approval of a hose, compliance to the requirements of Tables 4 through 7 is needed.

3.5.2 Hose Process Validation Testing. If not defined otherwise, the following testing should be done for production validation testing.

- **Material Properties** (For hose manufacturing site production validation testing.) All tests per Tables 4 and 5.

© Copyright 2017 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW17862 2017