



Windshield Washer Elastomer Tubing

1 Scope

This specification covers non-reinforced flexible tubing intended primarily for use as fluid lines for automotive windshield washer systems conforming to the requirements of Federal Motor Vehicle Safety Standard (FMVSS 104) and SAE J942.

1.1 Material Description. Materials covered by this specification are divided into two (2) Types. It is possible for a hose to be approved to more than one (1) Type.

- **Type A** hose is suitable for use for general windshield washer solvent transport within the vehicle, excluding tubing used as part of a moveable wiper arm assembly, where the tubing is subjected to the wiper arm motion.
- **Type B** hose is suitable for all windshield washer solvent transport, including moveable wiper arm assembly usage.

1.1.1 Construction. The tubing for Type A shall be made from Ethylene Propylene Diene Monomer (EPDM) compounds or from Thermoplastic Elastomer (TPE) materials. Type B tubing shall be made from EPDM only. Color shall be black. Inside and outside surfaces shall be smooth. Hose shall conform to the dimensions and tolerances listed in Appendix A, Table A1.

1.2 Symbols. Not applicable.

1.3 Applicability. Windshield Washer Tubing.

2 References

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

2.1 External Standards/Specifications.

ASTM D412	FMVSS 104	ISO 188	ISO 1817
ASTM D624	ISO 34-1	ISO 815-1	ISO 3865
ASTM D865	ISO 37	ISO 1407	ISO 23529
ASTM D2137	ISO 48	ISO 1431-1	SAE J942

2.2 GM Standards/Specifications.

9985670	B 440 0064	GMW14162	GMW16504
B 040 0218	GMW3059	GMW14270	

2.3 Additional References.

- Component Technical Specification (CTS)
- Statement of Requirements (SOR)
- Subsystem Technical Specification (SSTS)

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 procedure. Minimum six (6) test samples (hoses) are required for initial sample testing. Minimum three (3) test samples (hoses) are required for inspection testing.

Unless otherwise specified, 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.

Unless otherwise stated, ambient temperature test conditions shall be held to $+23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, all other temperatures shall be held to $\pm 3\text{ }^{\circ}\text{C}$. If not otherwise stated, mechanical properties in delivery state and after heat or fluid immersion are to be tested at $+23\text{ }^{\circ}\text{C}$ and with the same test procedures.

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

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.

3.2.1 Design Validation Testing. Material properties (material/compound approval) are summarized in Table 1, performance properties (construction approval) are summarized in Table 2. For full approval of a hose, compliance to the requirements of Table 1 and Table 2 is needed.

3.2.2 Product Validation Testing. If not defined otherwise, the following testing should be done for production audit testing.

- All tests per Table 1 except Ozone
- Burst Test (Table 2)

3.2.3 Audit/Inspection Testing. If not defined otherwise, the following testing should be done for production audit testing.

- Table 1 Tests: Elongation at Break and Tensile Strength
- Burst Test (Table 2)

3.2.4 GM Assembly Plant Specific Test Requirements. Paint system specific testing to confirm adherence to the requirements of the Paint Staining test of Table 1 may be specified. If so, this requirement, as well as sample preparation requirements, will be referenced in the Subsystem Technical Specification (STS), Component Technical Specification (CTS), Statement of Requirements (SOR), math file, part number blueprint, or other part number specific document distributed as a requirement by GM to the supplier of the windshield washer tubing.

Table 1: Material Properties

Property	Test Method	Unit	Value
Hardness			
Type A	ISO 48, Method M	IRHD	60 to 75
Type B	ISO 48, Method M	IRHD	70 to 75
Elongation at Break			
All Types	ASTM D412 or ISO 37, Type 2 dumbbell or Type 4 dumbbell, 200 mm $\pm$ 20 mm/minute	%	200 minimum
Tensile Strength			
Type A	ASTM D412 or ISO 37, Type 2 dumbbell or Type 4 dumbbell, 200 mm/minute $\pm$ 20 mm/minute	MPa	6.9 minimum
Type B	ASTM D412 or ISO 37, Type 2 dumbbell or Type 4 dumbbell, 200 mm/minute $\pm$ 20 mm/minute	MPa	14 minimum
Tear Resistance			
Type A	ISO 34-1 Method A (trouser test piece)	N/mm	2.5 minimum
Type B	ASTM D624, Die C	kN/m	26 minimum
Age Resistance (Heat Aging)			
Type A	ASTM D865 or ISO 188 Method B, 72 h +0 h/-2 h at 125 °C $\pm$ 3 °C Change of elongation at break Change of tensile strength Change in Hardness	% % IRHD	-45 maximum -25 maximum +10 maximum
Type B	ASTM D865 or ISO 188 Method B, 72 h +0 h/-2 h at 125 °C $\pm$ 3 °C Change of elongation at break Change of tensile strength Change in Hardness	% % IRHD	-40 maximum -20 maximum +10 maximum
Compression Set			
Type A	ISO 815-1 test piece Type B 70 °C $\pm$ 3 °C, 22 h +0 h/-2 h, 25% compressed	%	25 maximum
Type B	ISO 815-1 test piece Type B 125 °C $\pm$ 3 °C, 22 h +0 h/-2 h, 25% compressed	%	70 maximum
Low Temperature Resistance			
All Types	ISO 23529 -40 °C $\pm$ 3 °C; 5 h +1 h/-0 h Bending Test radius = 0.5 mm, Visual examination or ASTM D2137, Method A, 3 minutes at -50 °C		No cracks No brittleness
Staining Extractables			
All Types	Determination of the ingredients extractable by 2-Propanol to ISO 1407 Procedure A but 2 h extraction with sufficient heating rate, so that extraction cup is scoured out completely 10 times to 20 times per hour Amount of Extractables		No paste-like ingredients 12% maximum