



Seat Belt Webbing - Polyester

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 specification establishes the webbing requirements for 2-point seat belt assemblies used in GM vehicles. It defines key physical and functional requirements that are intended to drive commonality across GM vehicles worldwide and interchangeability between suppliers' systems worldwide. The common functions, performance, reliability, and validation required of the webbing component are defined in this document.

This specification applies to seat belt webbing used as buckle straps, and in 2-point seat belt assemblies.

1.1.1 Material Description. This specification describes a narrow fabric woven with continuous yarns and finished selvages suitable for automotive seat belt webbing. All seat belt webbings must meet all applicable laws and regulations in addition to this specification. The webbing described in this specification is only intended for use with buckle straps and 2-point seat belt assemblies.

1.2 Applicability. Webbing described in this specification is classified as being either:

- Type A: 30 kN webbing high strength webbing for use in most buckle strap applications; 30 kN webbing is thicker than standard webbing, (Default webbing if no Type is specified) or
- Type B: 27 kN webbing standard strength webbing for use in most 2-point applications.

1.3 Remarks. Seat Belt webbing is a textile product that is an integral component of a seat belt assembly. Vehicle seat belts are intended to provide injury protection benefit to occupants of the vehicle in the event of a crash. Their primary function is to restrain an occupant (or child seat), and to reduce the risk or severity of injury by managing the occupant's kinetic energy.

Seat Belt webbing must function in harmony with the rest of the seat belt subsystem, be as comfortable and unobtrusive as practicable, and be in visual harmony with the interior theme of the vehicle.

Webbing must also comprehend the differences in governmental and market requirements of the different countries in which it is sold.

In the event of a conflict between this specification and the documents cited herein, the text of this specification takes precedence. Nothing in this specification, however, supercedes applicable laws and regulations unless a specific exemption has been obtained.

2 References

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

2.1 External Standards/Specifications.

ASTM D747-02	ISO 105-A01	ISO 105-B06	SAE J882
CMVSS 209	ISO 105-A02	ISO 105-X12	SAE J2412
FMVSS 209	ISO 105-A03	ISO/IEC 17025	UN R 16.06 SUPPL. 10
FMVSS 302	ISO 105-B02	SAE 6992	VDA 230-209

2.2 GM Standards/Specifications.

GMW3020	GMW3232	GMW14141	GMW14334
GMW3059	GMW3417	GMW14162	GMW14444
GMW3116	GMW6992	GMW14231	GMW14831
GMW3221	GMW14102	GMW14317	GMW16853

2.3 Additional References.

- Geometric Gray Scale
- GM SupplyPower
- Supplier Test Data Charts
- Tinius Olsen Stiffness Tester, Model 02007001

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.1.1 General Requirements. The tests referred to in the following requirements are based on historic performance which has been deemed satisfactory for meeting customer performance needs.

3.1.1.1 The use of "shall" in this document denotes a binding provision that must be met.

3.1.2 The use of "should" denotes a desired performance level or conformance, (e.g., materials specification) which, if not met, must be documented and approved by both the Design Release Engineer and the Seat Belt Subsystem Leadership Team.

3.1.3 The term "safety belt" in this document has been replaced by the term "seat belt" which is consistent with GMW3020.

3.1.4 Laboratory testing shall be performed by a laboratory that conforms to ISO/IEC 17025 and is acceptable to the responsible GM department. Test reports must conform to 5.10.2 and 5.10.3 of ISO/IEC 17025. Supplier shall submit a letter of compliance.

3.1.5 There shall be no change in raw materials, construction, formulation, or manufacturing processes permitted without prior notification and approval by Engineering. Completed copies of Appendix B, Data Sheet B1 and Data Sheet B2, meeting GM requirements information must be submitted with any new submissions or whenever a composition change has occurred.

3.2 Construction Requirements.

3.2.1 Composition. The webbing shall be composed of 100% polyester fiber. The specific construction shall be documented in the Seat Belt Webbing Material Construction Specification (Appendix B, Data Sheet B1). The properties of a specific construction shall be documented in the Webbing Certification Data Form (Appendix B, Data Sheet B2).

3.2.2 Pattern and Construction. For pattern/construction codes and properties.

3.2.2.1 Woven Pattern Visual Approval (SAE 6992). The woven pattern shall be approved by the GM Engineer responsible for determining that it is an acceptable match to the standard.

3.2.3 Thickness (SAE J882). The thickness shall be measured using a 6.35 mm pressure foot with 85 g of applied weight. The reading shall be taken after 1 minute. See Table 1 for requirement.

3.2.4 Width (FMVSS 209 and UN R 16.06 SUPPL. 10). All webbing shall have a maximum width under no load as shown in Table 1, and 46.00 mm minimum under 10 018 N $\pm$ 218 N load. Test material as received per 4.1.1 and measure width during breaking-strength test (4.2.1).

3.2.5 Emissions Testing of Interior Materials and Parts. For all Code E designated parts per GMW14444, reference GMW16853 for emissions testing of interior materials and parts.

3.2.5.1 Odor. See GMW16853 for test procedure and requirement.

3.2.5.2 Fogging. See GMW16853 for test procedure and requirement.

3.2.5.3 Volatile Organic Composition and Semi-Volatile (VOC/SVOC). See GMW16853 for test procedure and requirement.

Table 1: Construction Properties

Identification (ID) Code	Elongation	Tinius Olsen Warp	Frank PTI Warp – Longitudinal (N)	Tinius Olsen Filling	Frank PTI Fill - Lateral (N)	Tensile Strength (kN)	Thickness (mm)	Width Under no Load (mm)	Finish
Type A	12% to 17%	< 100	≤ 6	45 to 65	2 ± 1.3	30 Minimum	1.45 + 0.05 1.45 - 0.08	49.0	Yes
Type B	6% to 8%	25 to 45	Report	10 to 30	Report	27 Minimum	1.22 ± 0.05	48.0	Yes

4 Standard Test Conditions and Requirements

4.1 Standard Test Conditions. Webbing samples are to be subjected to the following specified conditions prior to testing:

Note: Seat Belt System Level conditioning requirements are covered in Section 6 and the Component Technical Specification (CTS) GMW14831. Parameters specific to webbing are listed as follows:

4.1.1 Room Temperature Conditioning (As-Received). Unless otherwise specified, the material shall be tested under standard conditions, 23 °C ± 2 °C and 65% ± 5% relative humidity (covers both Federal Motor Vehicle Safety Standards (FMVSS) and Economic Commission for Europe (ECE) Regulations). Condition specimens for 24 h prior to testing or until moisture equilibrium is reached. If specimens are tested outside the controlled environment, the specimens shall be tested within 5 minutes of removal.

4.1.2 Common Environmental Conditioning. Expose material within a closed space at 80 °C over water for 24 h. Next, subject material to one (1) 24 h cycle in the following sequence:

4.1.2.1 Dry heat soak 6 h at 100 °C, attained within 80 minutes.

4.1.2.2 Cold soak 6 h at 0 °C, attained within 20 minutes.

4.1.2.3 Ambient soak remainder of the 24 h cycle at 23 °C.

4.1.3 Special Light Conditioning. Refer to FMVSS 209, S5.1 (e) demonstration procedure for Resistance to Light, and UN R 16.06 SUPPL. 10 Conditioning of Straps and Break-strength Test (Static) Light Conditioning for the test requirements. See "Requirements for Webbing", FMVSS 209 color retention for requirement.

4.1.4 Special Heat Conditioning (UN R 16.06 SUPPL. 10). Refer to UN R 16.06 SUPPL. 10 for the details for Special Heat Conditioning.

4.1.5 Special Cold Conditioning (UN R 16.06 SUPPL. 10). Refer to UN R 16.06 SUPPL. 10 for the details for Special Cold Conditioning.

4.1.6 Special Water Conditioning (UN R 16.06 SUPPL. 10). Refer to UN R 16.06 SUPPL. 10 for the details for Special Water Conditioning.

4.2 Tensile Strength (FMVSS 209, S5.1 (b), and UN R 16.06 SUPPL. 10). For all tensile tests, a minimum of three (3) samples shall be tested and reported in Appendix B, Data Sheet B2.

4.2.1 As-Received (see 4.1.1). See Table 1 for minimum tensile strength requirements for each construction code/webbing type. The lowest strength test sample shall not be < 90% of the highest strength test sample (group of three (3) samples tested).

4.2.2 After Common Environmental Conditioning (4.1.2). All webbing must retain at least 80% of the average strength determined in 4.2.1.

4.2.3 After Hex Bar Abrasion FMVSS 209, S5.1 (d). All webbing must retain at least 80% of the average strength determined in 4.2.1.

4.2.4 After Light - Conditioning.

4.2.4.1 After Light Conditioning per FMVSS 209, S5.1 (e). Webbing shall retain at least 75% of the average strength determined in 4.2.1.

4.2.4.2 After Light Conditioning per UN R 16.06 SUPPL. 10. Webbing shall retain at least 75% of the average strength determined in 4.2.1 after tested to all three (3) conditions called out in ISO 105-B02: normal conditions, low effective humidity, and high effective humidity.

4.2.5 After Heat Conditioning (UN R 16.06 SUPPL. 10). Webbing shall retain at least 75% of the average strength determined in 4.2.1.

4.2.6 After Cold Conditioning (UN R 16.06 SUPPL. 10). Webbing shall retain at least 75% of the average strength determined in 4.2.1.

4.2.7 After Water Conditioning (UN R 16.06 SUPPL. 10). Webbing shall retain at least 75% of the average strength determined in 4.2.1.

Note: The technical service conducting the ECE tensile strength tests may dispense with one (1) or more of these tests, if the composition of the material used or information already available renders the test or tests superfluous.

4.3 Stiffness. Stiffness shall be determined according to ASTM D747-02 method using a Tinius Olsen Tester or as an option the Frank Stiffness test per VDA 230-209_DE_EN can be used. The Tinius Olsen Stiffness Tester, Model 02007001, 0.70 J (6 in/lb) capacity, shall be used with an additional 45 g of added weight. The distance between the center clamp and the flex post shall be 12.5 mm. Die cut an additional ten (10) specimens 75 mm in length and approximately 30 mm in width in the warp direction and midway between the selvages. Die cut an additional ten (10) specimens in the filling direction 25 mm in width. The cut must be parallel to the filling yarns. The filling length will be the width of the webbing. Each group of ten (10) specimens will be divided in two (2) groups of five (5): Five (5) specimens will be tested face side up, and five (5) specimens will be tested face side down.

Each warp specimen will have enough yarns removed from each side of the longer dimension until a width of 25 mm is obtained. Trim the filling yarns close to the exposed warp yarns. Condition the prepared specimens to 24 h in the standard atmosphere.

To test, proceed as follows:

- Place the end of one (1) specimen (face side up) into the clamping device and tighten.
- Rotate the clamping device, by hand, until the sample just touches the flex post. Continue to rotate the clamping device until a reading of "1" is indicated on the load scale.
- Zero the angle indicator and start the machine. Refer to Table 2 for the angles to take the stiffness readings for both the warp and fill directions.
- Report the individual results for the face side up and face side down specimens in each direction in Appendix B, Data Sheet B2 or additional report if more space is required.

Note: The total weight of the individual weights must be 45 g $\pm$ 1 g. Do not use the numbers stamped on the face of each weight. See Table 2 for specified range.

Table 2: Measurement Angles

Construction	Stiffness Fill			Stiffness Warp		
	Specimen Size (mm) (Tinius Olsen)	Specimen Size mm (Frank PTI)	Angle Reading (Degrees)	Specimen Size (mm) (Tinius Olsen)	Specimen Size (mm) (Frank PTI)	Angle Reading (Degrees)
Type A	25x width of webbing	50x width of webbing	60	75 x 25	50 x 25	60
Type B	25x width of webbing	Not applicable	60	75 x 25	Not applicable	15