



Safety Belt Webbing - Polyester

1 Scope

This specification establishes the webbing requirements for 2-point safety 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 safety belt webbing used as buckle straps, and in 2-point safety belt assemblies.

1.1 Material Description. This specification describes a narrow fabric woven with continuous yarns and finished selvages suitable for automotive safety belt webbing. All safety 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 safety belt assemblies.

1.2 Symbols. Not applicable.

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

- 30 kN webbing (WWNSAD), high strength webbing for use in most buckle strap applications; 30 kN webbing is thicker than standard webbing, or
- 27 kN webbing (WWNSB and WWNSR) standard strength webbing for use in most 2-point applications.

1.4 Remarks. Safety belt webbing is a textile product that is an integral component of a safety belt assembly. Vehicle safety 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.

Safety belt webbing must function in harmony with the rest of the safety 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-B02
CMVSS 209	ISO 105-B06
ECE R16	ISO 105-X12
FMVSS 209	ISO 17025
FMVSS 302	ISO/IEC 17025
ISO 105-A01	SAE J361
ISO 105-A02	SAE J882
ISO 105-A03	

2.2 GM Standards/Specifications.

GMW3059	GMW14141
GMW3116	GMW14162
GMW3221	GMW14231
GMW3232	GMW14317
GMW3235	GMW14334
GMW3417	GMW14444
GMW6992	GMW14831
GMW14102	GMW16853

2.3 Additional References.

- Geometric Gray Scale
- Supplier Identification Chart
- Textile Engineering Construction Specification
- Tinius Olsen Stiffness Tester, Model 02007001

- TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

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 platform release engineer and the Safety Belt Subsystem Leadership Team.

3.1.3 The term "seat belt" in this document has been replaced by the term "safety belt" which is more globally accepted as a descriptor.

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 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 Data Sheet B2 (in Appendix B) meeting GM requirements information must be submitted with any new

submissions or whenever a composition change has occurred.

3.2 Construction Requirements. The following properties shall be specified by and conform to the appropriate Textile Engineering Construction Specification.

3.2.1 Composition. The webbing shall be composed of 100% polyester fiber. The specific construction shall be documented in the Safety Belt Webbing Material Construction Specification (Data Sheet B1). Refer to the Supplier Identification Chart as published by Textile Engineering for yarn identification placement.

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

3.2.2.1 Woven Pattern Visual Approval (SAE J361). The woven pattern shall be approved by the Textile Engineering Department to be 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 one minute. See Table 1 for requirement.

3.2.4 Width (FMVSS 209 and ECE R16). 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.

Table 1: Construction Properties

Identification (ID) Code	Elongation	Tinius Olsen Warp	Tinius Olsen Filling	Tensile Strength (kN)	Thickness (mm)	Width Under no Load (mm)	Finish
WWNSAD	12% to 14%	<100	45 to 65	30	1.45 $\pm$ 0.05	49.00	Yes
WWNSB	6% to 8%	25 to 45	10 to 30	26.69	1.22 $\pm$ 0.05	48.4	Yes
WWNSR	6% to 8%	25 to 45	10 to 30	26.69	1.22 $\pm$ 0.05	48.00	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: Safety 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, $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and $65\% \pm 5\%$ 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, they shall be tested within five 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 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 ECE R16 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 (ECE R16). Refer to ECE R16 for the details for Special Heat Conditioning.

4.1.5 Special Cold Conditioning (ECE R16). Refer to ECE R16 for the details for Special Cold Conditioning.

4.1.6 Special Water Conditioning (ECE R16). Refer to ECE R16 for the details for Special Water Conditioning.

4.2 Tensile Strength (FMVSS 209, S5.1 (b), and ECE R16). For all tensile tests, a minimum of three samples shall be tested and reported in Data Sheet B2.

4.2.1 As-Received (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 less than 90% of the highest strength test sample (group of three 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 ECE R16. Webbing shall retain at least 75% of the average strength determined in 4.2.1 after tested to all three conditions called out in ISO 105-B02: normal conditions, low effective humidity, and high effective humidity.

4.2.5 After Heat Conditioning (ECE R16). Webbing shall retain at least 75% of the average strength determined in 4.2.1.

4.2.6 After Cold Conditioning (ECE R16). Webbing shall retain at least 75% of the average strength determined in 4.2.1.

4.2.7 After Water Conditioning (ECE R16). 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 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. 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 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 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 specimens will be divided in two groups of five: five specimens will be tested face side up, and five 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 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 Data Sheet B2 or additional report if more space is required.

Note: The total weight of the individual weights must be $45 \text{ g} \pm 1 \text{ g}$. 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)	Angle Reading (Degrees)	Specimen Size (mm)	Angle Reading (Degrees)
WWNSAD	25 x width of webbing	60	75 x 25	60
WWNSB		60		15
WWNSR		60		15

4.3.1 Lateral Stiffness. The bending moment of the webbing as received (4.1.1) as well as after Common Environmental Conditioning (4.1.2) and hex bar abrasion (FMVSS 209, S5.1d) shall be 45 to 65 for WWNSAD construction, and 10 to 30 for WWNSB and WWNSR constructions on Tinius Olsen scale.

4.3.2 Longitudinal Stiffness. The bending moment of the webbing as received (4.1.1) as well as after Common Environmental Conditioning (4.1.2) and hex bar abrasion (FMVSS 209, S5.1d) shall be 100 maximum for WWNSAD construction, and 25 to 45 WWNSB and WWNSR constructions on Tinius Olsen scale.

4.4 Flammability GMW3232. All webbing must meet the flammability requirements of GMW3232 test methods.

4.5 Elongation. As received (4.1.1). See Table 1 for requirement of each construction when subjected to 11 120 N of tensile force when tested per FMVSS 209 S5.1 (c).

4.6 Fogging (GMW3235, Code A) Photometric. Photometric procedure: heating temperature 90 °C, cooling temperature 38 °C, 6 h test time, 15 h post-conditioning time. The amount of fog when measured with a 60 degree gloss meter shall be 60 units or higher. Samples that result in a residue that

forms a transparent film, oily droplets, or any visual signs of crystallinity shall be judged to have not passed this requirement. Report results of three samples and average.

4.7 Resistance to Curvature After hex bar abrasion (FMVSS 209, S5.1d), webbing must not exhibit curvature in excess of that identified in Appendix A.

4.8 Resistance to Waviness After Hex Bar Abrasion (FMVSS 209, S5.1d). Webbing must not exhibit waviness in excess of that identified in Appendix A.

5 Color Requirements

Any new color shall meet all construction requirements and properties and conform to the original Material Construction Specification sheet (Appendix B, Data Sheet B1). Once officially approved visual color match per 5.2.2 has been achieved, test per 3.2 thru 5.8 as indicated in Appendix B. **Note:** Some applications of the webbing described in this specification are not visible to the customer, i.e., webbing mounted buckle with a sleeve covering the webbing. Webbing used exclusively in applications where the customer cannot see the webbing need not meet any of the non-regulated appearance requirements. It is the