GM WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW15015

Elastic and Non-Elastic Cords, Straps and Bindings

1 Scope

1.1 Material Description. This specification describes materials suitable as cording used for map pockets, convenience nets, storage nets and parcel shelves, as well as pull straps and tie down straps. Cording material shall be knitted or braided and may be elastic or non-elastic. Webbing materials are typically woven and could be elastic and non-elastic. All materials shall be made from man-made fibers colored and finished to acceptable color, pattern, and physical properties.

1.2 Symbols. A unique finish symbol will be given to each construction by the responsible GM representative at initial development.

1.3 Applicability.

1.3.1 Elastic cords surrounding mesh fabric map pockets or surrounding convenience nets in occupant area or trunks of the vehicle.

1.3.2 Non-elastic straps to support the rising of the rear parcel shelf when opening the luggage compartment and pull straps to engage the folding seat feature.

1.3.3 Binding material used for binding the floor mats. The material can consist of woven webbing tape or vinyl rolled goods.

1.3.4 Elastic Webbing materials are suitable for sunshade straps and map pockets. The material shall be an elastic fabric with its stretch in warp direction only. The classification of this material is as follows.

- **Type I:** High tensile and high elongation at break, used for sunshade straps.
- **Type II:** Low tensile and low elongation for miscellaneous uses such tie downs.
- **Type III:** Medium tensile and high elongation, used for map pockets.

1.4 Remarks. For requirements for vehicles without solar absorbing glass, contact the appropriate Materials Engineer. All interior materials are developed to be used in vehicles with solar glass; therefore, the performance may be compromised if used in non-solar glass vehicles.

2 References

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

2.1 External Standards/Specifications.

ISO 105-A02	ISO 105-B06	ISO 1431-1	ISO/IEC 17025
ISO 105-A03	ISO 105-X12		

2.2 GM Standards/Specifications.

GMW3010	GMW3232	GMW14124	GMW14270
GMW3059	GMW3235	GMW14125	GMW15634
GMW3205	GMW3259	GMW14141	GMW15635
GMW3208	GMW3417	GMW14444	GMW16853
GMW3221	GMW6992	GMW14162	

2.3 Additional References. None.

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3 Requirements

3.1 General Requirements.

3.1.1 Standard Conditions (GMW3221). All test specimens shall be conditioned to GMW3221, Code A, for a minimum of 24 h before and after completion of test, unless the test method indicates that standard conditioning is not required. If specimens are tested outside of the conditioned environment, they shall be tested within 10 minutes of removal.

3.1.2 Sampling and Test Specimen Preparation. All test specimens shall be taken from the area beyond the initial 1 m of production. Prepare test specimen as required in the respective test method.

3.1.3 Visual Evaluation of Automotive Trim (GMW6992). The color, pattern, aesthetics and other related qualities shall be evaluated and approved by the responsible engineering department as an acceptable match to the engineering approval sample when viewed under conditions set forth in GMW6992.

3.1.4 Deviation from Defined Test Methods. Deviations from the conditions of any test method shall be agreed upon between supplier and vehicle manufacturer. All deviations shall be specified on the component drawings, material specifications, and Statement of Requirements and shall be indicated as such on test certificates and reports.

3.1.5 Laboratory Accreditation. Laboratory testing is to be performed by a laboratory that conforms (meets requirements, may not be formally recognized by a third party) to ISO/IEC 17025 or is acceptable to the customer (General Motors). Test reports must conform to ISO/IEC 17025. Supplier shall submit a letter of compliance.

3.1.6 Material Construction Specification. All required information shall be reported on the Construction Specification Form provided in Appendix A, Data Sheet A1. A specification form shall be submitted along with each construction for Engineering approval. Established values for a construction will be reported on and controlled within the limits established on the Construction Specification Form provided in Appendix A, Data Sheet A1.

3.1.7 Laboratory Data Forms. Test reports must conform to ISO/IEC 17025. Use of the forms provided in Appendix B, Data Sheets B1 and B2 meets this requirement.

3.1.8 Data Reporting. All required information shall be entered into the appropriate Construction or Laboratory Data Forms. If all individual readings of a specific test meet or exceed the specified requirements, report the average. Report all individual test results if any values do not meet the requirements, unless otherwise stated.

3.1.9 Documentation. Samples of components or material released to this specification shall be tested for conformity with the requirements of this specification 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 Material Construction Specification. All required information shall be reported on the Laboratory Data Form, see Appendix B, Data Sheet B1. Not applicable items on form must fill in with Not Applicable (N/A). Established values for a construction will be reported on and controlled within the limits established on the Construction Specification Form, see Appendix A, Data Sheet A1.

3.2.1 Yarn Count. For woven webbing only. The construction (machine direction (MD) and cross machine direction (CMD)) shall conform to the engineering approval sample with the following allowable tolerances:

- Machine direction count: ± 1%.
- Cross machine direction count: ± 3%.

3.2.2 Tensile Strength and Elongation (GMW3010). Established values for a construction will be reported on and controlled within the limits established on the Construction Specification Form, see Appendix A, Data Sheet A1. Test setup as described for threads and yarns in GMW3010.

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3.2.2.1 Elongation. Elongation is to be measured at 44 N, refer to the Construction Specification Form (Appendix A, Data Sheet A1) for the requirement. In addition, report elongation at 25 N, 50 N, 100 N, and at break; or include a force-elongation chart for information only.

For elastic webbing the elongation value shall be 125% for **Type I**, 50% for **Type II** and 110% for **Type III**.

3.2.2.2 Tensile Strength. The minimum breaking strength shall be 500 N for binding applications; the minimum 200 N is required.

3.2.3 Resistance to Mildew (GMW3259). This test is required whenever a new fiber, finishing agent, resin, or combination thereof is introduced. There shall be no visible growth of mildew and no objectionable odor.

3.2.4 Flammability (GMW3232).

3.2.4.1 After Conditioning (GMW3232). Immediately prior to tests, all test specimens shall be conditioned for a minimum of 24 h according to GMW3221, Code A.

3.2.4.2 After Aging (GMW3232). In addition to tests conducted in the as received condition, all materials shall additionally be tested for flammability after the following artificial condition:

- The test cycle shall commence with 48 h ± 1 h at 40 °C ± 3 °C and 93% ± 5% relative humidity followed by 168 h ± 1 h at 90 °C ± 3 °C and completed without interruption. Repeat conditioning before starting testing flammability.

3.2.5 Overall Interior Emissions (GMW16853) Applicable for GMW14444, Code E parts only. For required tests, procedure and limits see Table "Overview of Test Procedures required for the Individual Materials and Part Approvals" and Table "Emission Requirements for Interior Material/Parts/Assembly List" according to GMW16853.

3.2.5.1 Resistance to Odor (GMW3205). Report both wet and dry results. Use a ratio of specimen size to container volume of 1:50. A ratio of 6 and higher is required.

3.2.5.2 Fogging (GMW3235). Gravimetric Method. Using GMW3235, Method B, report the average of three (3) specimens.

- The weight change of the used aluminum foil shall be no greater than 2 mg. For the materials used for the parts with high heat and solar exposure, use for bath 110 °C and for the rest of locations, use 90 °C.

3.2.5.3 Determination of Volatile and Semi-Volatile Organic Compounds (GMW15634).

- Volatile Organic Compounds (VOC) shall be no greater than 150 µg/g.
- Semi-Volatile Organic Compounds (SVOC) shall be no greater than 300 µg/g.

3.2.5.4 Carbonyls (GMW15635). Record the amounts of each chemical listed along with the sum of C^2 to C^6 Carbonyls. See GMW16853, Table 4, Emission Requirements for Interior Material/Parts/Assembly List for specific requirements.

3.2.6 Ozone Resistance (ISO 1431-1). For elastic materials only. The material shall be elongated 25% and held in this condition while exposed for 24 h to air at 40 °C ± 2 °C containing 100 parts per million (ppm) ± 10 ppm ozone. At the completion of the test the material must not show signs of breakdown, deterioration or degradation. If visual evaluation is acceptable, the elongation shall be measured. The change of elongation shall be 5% maximum compared to the as received value. The following tests will be required only for Vinyl Rolled Good Binding.

3.2.7 Environmental Exposure Resistance (GMW14124, Cycle M Performed Twice). The material must withstand the environmental exposure with no objectionable visual changes. Visual observations shall include changes in color or gloss, warping, wrinkling, sagging, staining, haptic or other undesirable effects. The high temperature is to be 85 °C.

3.2.8 Abrasion Resistance (GMW3208, CS-10 Wheel, 500 g Loads, 500 Cycles). Prior to evaluation, use cotton cloth per ISO 105-A03, moistened with distilled water to clean the surface of the abraded specimen. Allow to air dry. There shall be no objectionable changes in gloss color or grain when viewed at 45 degree angle using Illuminant D65.

3.2.9 Scuffing and Marring (GMW14125, Code HX6). Slight marring and no scuffing are acceptable.

3.3 Color Properties. These requirements describe the testing to be completed with each new color being considered for an approved construction. Any new color shall meet all construction properties and conform to the original Construction Specification Form, see Appendix A, Data Sheet A1.

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