



Functional, Non-visible, Interior Trim System Minimum Material Performance Requirements

1 Scope

This standard identifies minimum performance requirements for interior materials intended for visible or non-visible applications where material definition to a common commodity specific specification is not critical and a General Motors, international, or industry specification does not exist. It also defines the minimum physical properties that need to be provided and documented to describe the material. It defines a set of color property tests for these types of appearance materials. These materials can be listed on an approved source list such as MATSPC or the Appearance Database and the specification allows for a methodology to define the material. This specification is intended to be used in conjunction with the appropriate part performance specification such as GMW14444.

1.1 Material Description. The material description is part of each unique usage of this specification. Section 8 on Coding has the details on how to denote this specification on an Engineering drawing. The material description includes a thickness or mass per unit area of the construction, a general manufacturing technique, a polymeric family or natural fiber description, originating region and a serial number. It is invalid to use the specification without a proper suffix.

1.2 Symbols. Not applicable.

1.3 Applicability. Typical applications include air caps, stuffer foams, filler panels, scrims, non-foam seat cushions, after sales custom textile products, one time use textiles, cardboard laminates, emerging market textile materials etc., that are not covered by other material specifications.

1.4 Remarks. Not applicable.

2 References

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

2.1 External Standards/Specifications.

ISO 105-A02	ISO 178	ISO 13937-2	SAE J2412
ISO 105-B06	ISO 5084	ISO 17025	

2.2 GM Standards/Specifications.

GMW3010	GMW3221	GMW3326	GMW14444
GMW3059	GMW3232	GMW3417	GMW16853
GMW3182	GMW3259	GMW6992	

2.3 Additional References.

Reporting Data Sheets available from www.supplypower.com.

3 Requirements

3.1 General Requirements on Test Specimens.

3.1.1 Test Data. Laboratory testing is to be performed by a laboratory that conforms to ISO 17025 and is acceptable to the customer (GM). Test reports must conform to ISO 17025.

Note: Meets requirements but may not be formally recognized by a third party.

3.1.2 Standard Conditions (GMW3221-A). All test specimens shall be conditioned to GMW3221, Code A, unless the test method indicates that standard conditioning is not required.

3.1.3 Sampling and Test Specimen Preparation. For directional properties, samples shall be reported with Machine Direction (MD) and Against Machine Direction (AMD), or if not identifiable in driving direction and across driving direction. All test specimens shall be taken from the area beyond the initial 2 m of production and at least 50 mm from either selvage edge if a textile, otherwise, sample per the direction of the responsible Materials Engineer. Prepare test specimen as required in the respective test method.

3.1.4 Data Reporting. Report all individual test values and the average value. A material with any one individual reading outside the specified limit does not meet the requirement. All required information shall be reported on the appropriate test data reporting forms; Appendix A, Data Sheet A1 and A2, and Appendix B, Data Sheet B1. All material approvals will use Appendix A and B, Data Sheets A1 and B1, only materials that have color match and UV stability requirements shall use Appendix A, Data Sheet A2.

3.2 Construction Requirements. The physical properties of the material are reported on Appendix A, Data Sheet A1.

3.2.1 Weight (GMW3182). Test three (3) specimens. Acceptable production tolerances shall be $\pm 10\%$. Any deviation must be agreed to by appropriate GM Engineer.

3.2.2 Thickness (ISO 5084). Test three (3) specimens. Acceptable production tolerances shall be $\pm 10\%$. Source must report formed nominal thicknesses to provide accurate design guidelines, if the material is a layered material.

3.2.3 Volumetric Density. Report the volumetric density in kg/m^2 to the nearest tenth for use in the GM Materials Property Database (GMMPD). Test three (3) specimens.

3.2.4 Breaking Strength (GMW3010). Test three (3) specimens. Acceptable production tolerances shall be $\pm 10\%$. Test per code appropriate to textile construction method.

3.2.5 Tear Strength. Only test for textile or film materials. The requesting GM Materials Engineer shall determine if both Trapezoid Tear (typically for woven and non-woven materials) and Trouser Tear (typically for knits) are required or if one requirement is not applicable.

3.2.5.1 Trapezoid Tear (GMW3326). Test three (3) specimen. Acceptable production tolerances shall be $\pm 10\%$ of the average.

3.2.5.2 Trouser Tear (ISO 13937-2). Test three (3) specimen. Acceptable production tolerances shall be $\pm 10\%$ of the average.

3.2.6 Elongation (GMW3010). Test three (3) specimen. Acceptable production tolerances shall be $\pm 10\%$ of the average. Test per code appropriate to textile construction method.

3.2.7 Flexural Properties (ISO 178). Only test for materials that have some rigidity and where stiffness is an important performance attribute. The requesting GM Materials Engineer shall determine which these requirements apply. Test five (5) specimens in the MD and AMD at nominal thickness. Test speed 50 mm/minute, 100 mm span, 5 mm support radius, and sample size 75 mm $\times$ 200 mm. Report flexural strength (maximum force over first 25 mm of deflection), flexural stiffness (initial slope of flexural curve) and flexural toughness (percent retention of maximum force compared to force at 25 mm) on construction sheet. Submit flexural force deflection curve.

3.2.8 Fogging (see GMW16853).

3.2.9 Flammability (GMW3232). Test as received and after aging. Report Maximum Burn Rate (B_{max}) and Maximum Statistical Burn Rate (B_{stat}) requirement must be less than 100 mm/minute. Report data by submitting GMW3232, Appendix B Data Sheet.

3.2.10 Odor (see GMW16853).

3.2.11 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.

3.2.12 Mildew (GMW3259). Required only if natural fibers are present in the construction. There shall be no visible growth or odor of mildew.

3.3 Color Requirements. The color property performance of the material is reported on Appendix A, Data Sheet A2 for each and every program color.

3.3.1 Colorfastness to Light.

- Visual evaluation of the test panel by the responsible GM engineer shall override measured values in cases of disagreement.
- Natural Weathering performance shall override the Xenon-Arc results specified in ISO-105 B06.
- There shall be no more than a noticeable change in hue or chroma and no objectionable tackiness, blotchiness, loss of grain, wrinkling or other undesirable effects. Samples should be evaluated for these conditions prior to cleaning.
- Objectionable color change shall be defined as a measured color change ΔE of > 3.0 or $<$ rating 3 to 4 according to ISO 105-A02 grey scale.
- Color reading shall be measured in the same location on the sample before and after exposures per CIELAB ($L^*a^*b^*$ color space), 10 degree observer, illuminant D65 specular included. Exposed samples may be wiped with a solution of water and mild detergent and blotted dry with a clean white cloth before the color reading is taken.
- A noticeable value (lightness) and/or chroma (saturation) change with minimum hue change is acceptable. Evaluate specimens as specified in GMW6992.

3.3.1.1 Artificial Weathering (ISO 105-B06, Condition 5). Samples shall be exposed to SAE J2412, also known as ISO 105-B06, Condition 5, to 225 kJ/m² unless otherwise specified by the Responsible GM Materials Engineer.

3.3.1.2 Natural Weathering (GMW3417, L1-F2-G1-T3). Samples shall be exposed for 10 000 Temperature Normalized Radiation (TNR) Langleys at 85 °C unless otherwise specified by the Responsible GM Materials Engineer.

3.3.2 Flammability. (GMW3232). Test as received and after aging. Report Maximum Burn Rate (B_{max}) and Maximum Statistical Burn Rate (B_{stat}) requirement must be less than 100 mm/minute. Report data by submitting GMW3232, Appendix B Data Sheet.

3.4 Laminate, Composite and Substrate Requirements. All requirements of this specification shall be tested and reported according to the material description, whether the material is a single layer, laminate or composite. The construction of the material is defined in Appendix B, Data Sheet B1.

3.5 Additional Requirements.

3.5.1 Z suffix. Additional requirements shall be indicated with a Z suffix. The alpha Z and the number of the additional requirement will be included in the specification string. The Z will then be defined on the drawing. It is permissible to use the Z suffix to define the material supplier and product code for ease of defining the approved source. It is also permissible to use the Z suffix for an alternative test method for a property.

3.5.2 Appendices. The appendices found herein may be replaced by the appendices of the GM Common Commodity Specific Specification as modified and supplied by the Responsible GM Materials Engineer.

3.5.3 Computer Aided Engineering (CAE) Requirements. As requested by GM Engineering, material supplier shall be responsible for obtaining requested testing. Examples would be high speed tensile and compression testing associated with head impact or knee impact needed to perform accurate analysis.

3.6 Laboratory Test Certification Package. The Appendix A and B, Data Sheets A1, A2 and B1 shall be used to present data to this specification. Flammability results (3.2.9 and 3.3.2) shall be reported using GMW3232 Appendix B Data Sheet. Data sheets are available at www.gmsupplypower.com.

4 Manufacturing Process

4.1 Manufacturer's Identification. Not applicable.

4.2 Alignment. Not applicable.

4.3 Quality Control Monitoring. All quality control processing guidelines provided by material source must be followed by appropriate manufacturing source. Material source is responsible to recertification through any questionable results found in any testing or manufacturing of the part.

4.4 Part Performance Processability. All materials covered by this specification are subject to part performance testing through part validation.