



Light Weight Interior Fabrics

1 Scope

1.1 Material Description. Fabrics covered by this specification are made from fibrous textile materials that are knit, woven, non-woven, or non-conventional in structure. This specification also covers laminated fabric constructions.

1.1.1 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 performance may be compromised if used in non-solar glass vehicles.

1.2 Symbols. This code defines the material construction and will be assigned by the responsible department.

1.3 Applicability. This specification describes aesthetic fabrics used for interior trim applications where a lighter weight fabric (typically < 300 g/m²) is appropriate (typically non-wear areas). Such applications include seat facings, seat backs, seat gussets, anti-squeak pieces and vertical door inserts. The usage and application of these lighter weight fabrics must be approved by GM Materials Engineering and be capable of meeting Vehicle Technical Specifications (VTS) for the vehicle.

1.3.1 This specification does not apply to seat facings used in the ingress/egress path (typically outboard side facings on the seat cushions and seat backs). Fabrics used in these areas need to meet GMW14231.

1.3.2 This specification does not apply to overhead fabrics (headliner type) or rear window trim panel fabrics.

2 References

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

2.1 External Standards/Specifications.

ASTM D3882	ISO 105-A03	ISO 5084	ISO/IEC 17025
ISO 105-A01	ISO 105-B06	ISO 9001	
ISO 105-A02	ISO 105-X12	ISO 13937-2	

2.2 GM Standards/Specifications.

GMW3010	GMW3232	GMW3417	GMW14146
GMW3059	GMW3259	GMW4090	GMW14162
GMW3182	GMW3326	GMW4217	GMW14231
GMW3208	GMW3347	GMW4750	GMW14270
GMW3211	GMW3387	GMW6992	GMW14444
GMW3217	GMW3402	GMW14102	GMW15058
GMW3220	GMW3405	GMW14124	GMW15651
GMW3221	GMW3414	GMW14141	GMW16440

2.3 Additional References.

- Construction Specification Form, available on <http://www.gmsupplypower.com>.
- Global Fabric Development Requirements, available on <http://www.gmsupplypower.com>.
- GM Best Practice MATINTR-29.
- Laboratory Data Forms located at <http://www.gmsupplypower.com>.
- Vehicle Technical Specifications (VTS).

3 Requirements

3.1 General Requirements.

3.1.1 Standard Conditions (GMW3221-A). All test specimens shall be conditioned to GMW3221 Code A for a minimum of 24 h, unless the test method indicates that standard conditioning is not required or that other conditions apply.

3.1.2 Sampling and Test Specimen Preparation. 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. 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 construction specification form, and Statement of Requirements and shall be indicated as such on test certificates and reports.

3.1.5 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.

3.1.5.1 Any change to the component or material, e.g., design, function, properties, manufacturing process and/or location of manufacture 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.

3.1.5.2 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.

3.1.6 Laboratory Accreditation. Laboratory testing shall be performed by a laboratory that conforms to ISO/IEC 17025 or ISO 9001 or other 3rd party accreditation and is acceptable to the regional GM Materials Engineer. Supplier shall submit documentation showing proof of accreditation.

3.1.7 Material Construction Specification. All required information shall be reported on the Construction Specification Form, Appendix A, Figure A1. A specification form shall be submitted along with each fabric and fabric composite for engineering construction approval. Established values for a construction will be reported on and controlled within the limits established on the Construction Specification Form (Appendix A, Figure A1). These forms are available at www.gmsupplypower.com.

3.1.8 Laboratory Data Forms. All required information shall be reported on the appropriate test data reporting forms, Appendix B, Figure B1. Submit all required test specimens. These forms are available at www.gmsupplypower.com.

3.1.8.1 Data Reporting. If all individual readings of a specific test meet or exceed the specified requirements, report the average. Unless otherwise stated, any individual reading outside the specified limit does not meet the requirement. Report all individual test results that do not meet the requirements.

3.1.8.2 Test Specimens. All tested specimens submitted to GM by suppliers shall be stapled to size A4 white cardstock. On each card, list the test report number, material specification and section number, test date, observations, and disposition.

3.1.9 Foam Requirements. The foam used in any laminate construction must meet the requirements of GMW15058. The supplier shall provide documentation of foam approval, included with the laboratory data.

3.2 Construction Requirements. These requirements describe the initial testing to be completed when a new fabric construction is being considered. This testing may be done on face fabric or as a composite such as a foam laminate. For initial approval of foam laminated fabrics, the thinnest foam used in production shall be tested. Initial construction submissions shall be in a light value color with an L* value of 55.0 or higher. A construction and color approval is valid when the testing in 3.2 and 3.3 are complete.

Note: Part processability may require different construction properties than those listed in this section. At the approval of the appropriate GM engineer, deviations may be given in order to meet the part processability requirements.

3.2.1 Weight (GMW3182). Report the average in grams per meters squared (g/m²) for the face fabric weight and the total fabric weight if laminated. Acceptable production tolerances shall be $\pm 6\%$, unless otherwise stated on the Construction Specification Form (Appendix A, Figure A1).

3.2.2 Thickness (ISO 5084). Report the average for three (3) specimens, in millimeters (mm) to the nearest 0.01 mm. Use a 2.0 N load and a 50.5 mm diameter presser foot to achieve a pressure of 1.0 kPa. For foam laminates, use a 4.0 N load and a 200 mm ± 0.8 mm diameter presser foot to achieve a pressure of 0.127 kPa. All readings should be taken after the presser foot has been in contact with the material for at least 5 s.

Note: Total thickness is measured after lamination and the specified foam thickness must be met after lamination.

Note: Acceptable production tolerance shall be $\pm 10\%$ for face fabric materials and $\pm 15\%$ for laminate composites, unless otherwise specified on the construction specification.

3.2.3 Color Read Through of Automotive Textiles (GMW4750). Evaluate and rate changes to ISO 105-A02. The minimum acceptable value for the face fabric is 4.5. No noticeable read through allowed when evaluated.

3.2.4 Yarn Count (GMW4090). Report the average count to the nearest yarn, for each direction.

3.2.5 Bow and Skew (ASTM D3882). The degree of pattern misalignment shall be visually acceptable in appearance, and when over 400 mm measured across any point of useable fabric width, shall be $\leq 5\%$.

3.2.6 Yarn Slippage (GMW14146). For seating fabrics only, the minimum requirement for woven fabrics in both the warp and fill directions is ≥ 50 N. For knitted fabrics, the minimum requirements for the wales and course directions are ≥ 30 N.

3.2.7 Ravel Resistance (GMW3217). For woven fabrics only, a minimum of two (2) test specimens shall be taken from both the warp and fill directions. A rating of ≥ 8 is required after 1000 cycles.

3.2.8 Seam Fatigue (GMW3405). For seating fabrics only, the joining seam of a fabric shall have no slippage (increased distance between rows of yarns), noticeable fiber or yarn breakage, fractures of the sew line, needle hole elongation >2 mm nor an objectionable seam appearance after 2500 cycles. Seam appearance shall be judged on a sew line when observed from the face side. Seam evaluation may also be conducted on the sewn assembly and disposition made in accordance with these results.

Note: Indicate the sewing needle used to sew the test specimens on the test report; use of any other needle than what is recommended in the test procedure shall be approved by the GM Materials Engineer.

3.2.9 Tensile Strength and Elongation (GMW3010 Codes S). In addition to the Machine Direction (MD) and Cross Machine Direction (CMD), test three (3) specimens each from the bias left and bias right. Established values for a construction will be reported on and controlled within the limits established on the Construction Specification Form (Appendix A, Figure A1). Report the average tensile strength, also report elongation at 25 N, 100 N, and at break. Report bias for information purposes only. Refer to Table 1 for requirements and tensile/elongation test parameters.

Table 1: Tensile and Elongation Requirements.

Minimum Requirements	Tensile Strength	Elongation (at 50 N)	
	MD/CMD	MD	CMD
Knit	250 N	5%	5%
Nonwoven	300 N	8%	12%
Woven	400 N	4%	4%

3.2.10 Stretch and Set. (GMW3211). For seating fabrics only, test three (3) specimens from the MD and three (3) from the CMD; report the average for each direction. The stretch shall be 6% to 25%; the maximum allowable set is 4%.

3.2.11 Tear Strength. Test three (3) specimens from the MD and three (3) specimens from the CMD; for Trouser Tear, consider the short direction of the test specimen the direction of test. Report the average for each direction in Newtons.

3.2.11.1 Trapezoid Tear (GMW3326). Use for woven and nonwoven fabrics. The minimum strength shall be 45 N for both MD and CMD.

3.2.11.2 Trouser Tear (ISO 13937-2). Use for knit fabrics. The minimum tear strength shall be 26 N for both MD and CMD. The electronic method of calculation shall be used.

3.2.12 Resistance to Wear - Taber Method (GMW3208). Test using a 500 g weight (on each arm) and H-38 wheels for 300 cycles. Three (3) specimens shall be tested. A rating of ≥ 6 is considered to meet this requirement; rate according to Table 2.

Table 2: Taber Method Rating Scale

Rating	Definition
10	No Change
8	Slight Change – Fluffy surface, slight fiber disturbance, no fiber breakage.
6	Moderate Change – Disturbance of surface yarns and fibers, minimal fiber breaks, slight pile distortion.
4	Significant Change – Partial yarn abrasion with 50% or more fiber breakage, permanent distortion or reduction of pile fibers, and/or loss of pattern or design intent pattern.
2	Severe Change – Holes, removal of pile, and/or backing is visible.

3.2.13 Hook Fastener Resistance (GMW15651). After 24 cycles, a rating of ≥ 6 is required; rate according to Table 3.

3.2.13.1 For any application in direct contact with any occupant, test for 48 cycles. A rating of ≥ 8 is required; rate according to Table 3.

Note: The GM Materials Engineer will determine the number of test cycles.

Table 3: Hook Fastener Resistance Rating

Rating	Definition
10	No Change
8	Slight Change – Slight filament damage (slightly fuzzy surface) only detectible upon close visual examination
6	Moderate Change – Noticeable fluffy surface and noticeable fiber breakage causing a change in design intent; slight yarn breakage; slight bearding.
4	Significant Change – , Significant amount of yarn or fiber breakage; noticeable bearding.
2	Severe Change – Severe bearding and surface distortion; holes.