

AUTOMOTIVE UPHOLSTERY FABRIC

GM2751M

1 SCOPE. This specification describes aesthetic fabrics used for seat covers, door trim and other miscellaneous applications. The fabrics are made from fibrous textile materials and are either knit, woven or nonconventional in construction. This specification also covers bilaminate, trilaminate and moldable fabric construction.

2 REFERENCED STANDARDS.

GM502M	GM9315P	ASTM D1777
GM1000M	GM9316P	ASTM D3774
GM6291M	GM9317P	ASTM D3775
GM9070P	GM9318P	ASTM D3882
GM9125P	GM9330P	ASTM D3884
GM9126P	GM9452P	ASTM D5034
GM9128P	GM9505P	ASTM D5735
GM9129P	GM9538P	ASTM D5587
GM9132P	GM9652P	ISO 25
GM9133P	GM9664P	SAE J361
GM9134P	GM9771P	SAE J883
GM9139P	GM9900P	SAE J1351
GM9140P	GP-10	SAE J1756
GM9144P	AATCC 8	SAE J1767
GM9184P	AATCC 81	SAE J1885
GM9200P	AATCC 107	
GM9231P	AATCC 118	

3 REQUIREMENTS. Unless otherwise specified, the material shall be conditioned and tested under standard conditions of $21 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ RH. Condition materials until moisture equilibrium is reached. When 3 specimens are to be tested 1 shall be cut from 1 side of the sample, 1 from the center, and 1 from the opposite side.

3.1 COLOR AND PATTERN. The color and pattern shall be approved by the engineering department as an acceptable match to the engineering approval sample when viewed under conditions set forth in SAE J361.

3.2 DESIGN AND MANUFACTURE FOR THE ENVIRONMENT.

3.2.1 Restricted and Reportable Chemicals (GM1000M). All materials supplied to this specification must comply with the requirements listed in GM1000M, **Restricted and Reportable Chemicals**.

3.2.2 Recycling Guidelines (GM502M). Materials developed to this specification shall be optimized to provide maximum end-of life cycle value utilizing the Recyclability Checklist and GM Recycling Design Guidelines. Recycled content shall be reported to the approving and procuring Materials Engineering departments utilizing the Recycled Content Report Form.

3.2.3 Lab Accreditation. Testing is to be performed by an accredited laboratory certified by GM or certified by an accrediting agency recognized by GM to ISO 25 or GM GP-10.

4 MATERIAL CONSTRUCTION. The following properties shall be specified by and conform to the appropriate Textile Engineering Construction Specification.

4.1 COMPOSITION. Fiber content, back coating, dye type, substrate material (foam, knits, nonwovens), etc.

4.2 PRODUCTION. Machine type, machine setup, yarn construction, dye method, etc.

4.3 YARN COUNT (ASTM D3775). Warp or wale, filling or course count.

4.4 WEIGHT. Test 3 specimens, each 294 cm^2 . Weigh to the nearest 0.1 g. Multiply the weight by 33.9 and report the average in g/m^2 . Acceptable production tolerance will be $\pm 6\%$.

4.5 THICKNESS (ASTM D1777). Use a 25.4 mm or larger diameter pressure foot, 0.60 kPa (1.4 oz/in^2) load, reading taken after 5 s. Use a 200 mm ($\pm 4\text{ mm}$) foot diameter for foam laminates with 4 N preload. Take 3 measurements and report average and 3 sigma variations.

4.6 WIDTH (ASTM D3774). A fabric construction will be allocated a default width. The width will be determined as follows: 54 inches for Jacquard Wovens, 60 inches for Circular Knits and 59 inches for all other construction. GM Purchasing will notify sources if production width is different than default width. A Construction Specification must be submitted to Textile Engineering.

5 PROPERTIES REQUIRED FOR PHYSICAL EVALUATION.

5.1 TENSILE STRENGTH AND ELONGATION (ASTM D5034, GRAB METHOD, CONDITIONED TESTING, CRE, 300 mm/minute). Test 3 specimens in the warp (wale) direction and 3 in the filling (course) direction. Report averages and 3 sigma variations. No individual test result shall be less than the minimum value required.

5.1.1 Tensile Strength. The tensile strength shall be 270 N minimum. After the tensile values have been established for a specific fabric construction, they shall be specified on the Textile Engineering Construction Specification.

5.1.2 Elongation. The elongation shall be taken during the tensile test @ 25, 50, 100 N load and at break. Test the warp (wale) direction, filling (course) direction and both the bias (45° angle to the warp) directions. Elongation values shall be specified on the Textile Engineering Construction Specification.

5.2 TEAR STRENGTH. Test 3 samples in the warp (wale) direction and 3 in the filling (course) direction, as received only. Report the average of the 3 specimens and 3 sigma variations. No individual test result shall be less than the minimum value required.

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5.2.1 Trapezoid Method (ASTM D5587, Condition 1, Option 1, CRE). The tear strength shall be 36 N minimum. Vinyl coated moldable fabrics shall be 67 N minimum. After the trapezoid tear strength has been established for a specific fabric construction, it shall be specified on the Textile Engineering Construction Specification.

5.2.1.1 Tear Strength after Xenon Exposure. After exposure per the tear strength shall be 36 N minimum.

5.2.2 Tongue Method (ASTM D5735, Condition 2, CRE, 300 mm/minute). Knits only. The strength shall be 16 N minimum when tested in all 4 directions of the material (into roll, out-of-roll, to left selvage and to right selvage). Record the average of the maximum tear force for each individual sample in the wale and course directions.

5.2.2.1 Tongue Tear Strength after Xenon Exposure. After exposure per the tongue tear strength shall be 16 N minimum.

5.3 BOND STRENGTH. Tensile Testing Machine for Textiles or Hunter Instrument Scale L-30M, CRE, 300 mm/minute.

5.3.1 Bilaminate (Nonwoven). The bond strength shall be greater than the internal strength of the nonwoven. If a separation occurs in the nonwoven, the minimum internal strength shall be 30 N/25 mm width in both directions.

5.3.2 Trilaminate or Bilaminate (Foam). Bond strength shall be taken between fabric and foam and between foam and scrim after the following conditions. The bond strength between the layers shall meet the following requirements or there shall be a failure of the foam.

Condition	Fabric and Scrim (mm)
As received	3.0 N/25
Cycle aged per GM9200P	3.0 N/25
Hydrolytic Stability per GM9231P	3.0 N/25
Xenon Exposure per 6.1	3.0 N/25

NOTE: Test 3 samples (side-center-side) in each direction. Record the average value. No individual test shall be less than the minimum value required.

5.3.3 The foam used in a laminate construction must meet the requirements of GM6291M. The scrim shall meet the appropriate scrim specification, where available. Bonded on films used in place of scrims are exempt from meeting the bond requirements of scrim to foam.

5.4 MINK PULLOUT (GM9134P). At the discretion of the engineer for seat coverings only. The guard hairs removed by the sample shall be equal to or less in number than the guard hairs removed by the standard when tested in any material direction. Report both the count of the sample and the standard.

5.5 RESISTANCE TO WEAR - TABER ABRASION (ASTM D3884, CS-10, 1000 g WEIGHTS, 1000 CYCLES).

A minimum of 3 specimens are to be tested. A rating based on the following scale of a 3 or greater is considered to meet this requirement. A 5X or 10X lighted magnifying device should be used for evaluation.

5.5.1 Test Method Modifications. Start with Section 6 in (ASTM D3884).

5.5.1.1 Prior to cutting the specimens, apply a piece of double coated tape (3M #400) or a #36 mounting card to the back side of the material.

5.5.1.2 Using a circular die or scissors, cut the specimens 108 mm in diameter. A 7 mm hole must be cut in the exact center of the specimens. Do not fold the sample to cut the hole.

5.5.1.3 Mount the specimen as directed in Section 11 with the exception of 11.3. The following shall be substituted: Place the test specimen face up on top of the rubber mat on the flat specimen holder. Secure the clamp plate and the knurled nut in place to hold the center of the specimen. Using scissors, cut around the edge of the specimen to remove any material that might extend over the edge. Place the outer clamp over the specimen, apply slight downward pressure and tighten. Under no circumstance is any of the material to extend over the edge and be held in place by the outer clamp.

5.5.2 Rating Scale.

- 5 - No change. No abrasion noticed.
- 4 - Slight change. Fluffy surface, slight fiber disturbance, no fiber breakage.
- 3 - Moderate change. Disturbance of surface yarns and fibers, minimal fiber breaks, slight pile distortion.
- 2 - Noticeable change. Abrasion of surface yarns, excessive fiber breakage, permanent distortion or reduction of pile fibers, loss of pattern or design intent appearance.
- 1 - Severe change. Surface yarn abrasion, destructive abrasion or yarn breakage.

NOTE: Exclude 2 mm from the edges when rating the abrasion.

5.6 RESISTANCE TO MILDEW (GM9128P). All fabrics are expected to meet this requirement. Actual test results are required ONLY at the discretion of the GM engineer. This test is required for manufacturers whenever a new fiber, finishing agent, resin, backcoating, or combination thereof is introduced. Tested fabric shall have no visible growth of mildew and no objectionable odor.

5.7 RESISTANCE TO ODOR (SAE J1351). This test is required for manufacturers whenever a new fiber, finishing agent, resin, backcoating, or combination thereof is introduced. Tested fabric shall have no offensive or objectionable odors with a maximum rating of 3.

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5.7.1 Evaluation. Replace 5.4 with: Remove the cans from the oven and allow to cool to room temperature for a minimum of 15 minutes. Raise the lid partially but do not remove it. With a cupped hand, draw the air from the can to the nose and slowly inhale. Immediately repeat the procedure for the first test specimen (dry) and record the appropriate rating listed in Section 6. Lids should not be raised longer than 5 s. Tests must be conducted in an environment free from drafts and contaminant odors.

5.8 RESISTANCE TO RAVELING (GM9132P). There shall be no separation of a yarn(s) from the base structure of the fabric.

5.9 SHRINKAGE (SAE J883). Section 1 through . There shall be no greater than 2.5% dimensional change in either direction.

5.9.1 Following the 30-minute drip dry time, place the specimen in an area under standard conditions for 24 h or until moisture equilibrium is reached.

5.10 DIMENSIONAL STABILITY (GM9452P WITH CONDITIONS OF GM9505P CYCLE M). For Information Only. Test after each condition measuring before and after ambient for 1 cycle only. Test high temperature @ 85°C.

5.11 FLAMMABILITY (GM9070P). The material shall not burn or transmit a flame front across its surface at a rate greater than that specified by Table 1 in GM9070P, after the following conditions: as received, after accelerated aging (GM9200P) and after steaming (GM9200P). If a specimen has a designated burn rate of DNI, SE, or SE/NBR the resultant burn rate for use in Table 1 shall be 0. Test the required number of samples in both the warp (wale) and the filling (course) direction.

NOTE: If the material is a composite (as defined in the test procedure) or is to be used in a composite, the composite must meet this requirement.

5.12 SEAM STRENGTH (GM9129P). The joining seam of a fabric shall have no slippage (increased distance between rows of yarns) or fractures of the sew line of needle holes that measure more than 1 mm. Seam appearance may be judged on a sew line when observed from the face. Seam evaluation may also be conducted on sewn assembly and disposition made in accordance with these results.

5.13 CLEANABILITY (GM9126P, PROCEDURE A). A minimum rating of satisfactory is required. If testing bilaminate or trilaminate, the composite shall retain its integrity and performance.

5.14 RESISTANCE TO LINT RETENTION (GM9139P). There shall be a minimum of a 3 rating of lint retention as compared to the photographic standards published after October 1992. Test samples from both sides (Top and Bottom) of a double plush fabric and from a dark colored sample are required.

5.15 HYDROLYTIC STABILITY (GM9231P). Foam laminates ONLY. The sample shall show no signs of degradation.

5.16 FOGGING (SAE J1756). Photometric Procedure; Bath temperature of 85°C; cooling temperature of 38°C; 6 h test time; 16 h post conditioning time. The amount of fog when measured with a 60° glossmeter shall have a rating of 60 units or more. Samples that result in a residue that forms a transparent film, discernible droplets, or any visual signs of crystallinity, shall be judged to have not passed this requirement. Evaluate the presence of crystallinity using 200X magnification and report the results, for information only. Test 9 samples for approval if initial test is less than 90 units.

5.17 ACOUSTICAL PERFORMANCE SOUND TRANSPARENCY. Fabric materials intended for use as a covering for an audio speaker must exhibit satisfactory audio test results as determined by a Delco Electronics Engineer per GM9318P. Any broad band deviation greater than 2/3 of an octave in band width, should not exceed 1.5 dB. Narrow band deviation, 2/3 of an octave or less in band width, should not exceed 3.0 dB.

5.18 STAIN PROTECTOR PERFORMANCE. The following requirements are applicable only if the fabric has been treated with a stain protector finish. All material used for Engineering evaluation must meet the 3M requirements for Category 1. Production lots of woven, cut pile fabrics made with yarn dyed, textured filament polyester are acceptable if they meet the 3M Category 2 requirements.

5.18.1 Oil Repellency (The American Association of Textiles Chemists and Colorists AATCC 118). There shall be a minimum grade of 4A.

5.18.2 Water Repellency (GM9317P). Use stain #3 (70/30 water/isopropyl alcohol) in the Water/Alcohol Drop Test. If after 10 s, 2 of the 3 drops are still visible as spherical to hemispherical, the fabric passes the test.

5.19 PLIABILITY (GM9664P). Samples are tested in the machine and cross-machine direction, both face up and down. All results, measured on the attached metric ruler of the apparatus, must fall between 30 and 100 mm. After the pliability value has been established for a specific fabric construction, it shall be specified on the Textile Engineering Construction Specification.

5.20 RESISTANCE TO ARCING OR CHARRING (GM9144P). There shall be no arcing or charring when tested @ 3000 V after 4 h conditioning @ 21 ± 2°C and 65 ± 5% RH. All initial material constructions to be evaluated for arcing or charring and the performance will be recorded on the Textile Engineering Construction Specification.

5.21 DIELECTRIC BOND (GM9184P). There shall be no lifting in the die-line after 4 h exposure @ 85 ± 2°C. All initial material constructions to be evaluated for bonding and the performance will be recorded on the Textile Engineering Construction Specification.