

FINISHED LEATHER

GM2756M

1 SCOPE. This specification describes a material used for automotive interior trim applications, such as seat cushions and backs, seat inserts, door panels, horn pads, shift knobs, shift boots, and steering wheel covers. This leather must be dyed throughout with a color that is compatible with the surface color.

2 REFERENCED STANDARDS.

GM502M	GM9149P	ASTM D1912
GM1000M	GM9150P	ASTM D2097
GM6291M	GM9151P	ASTM D2261
GM9032P	GM9200P	ASTM D3776
GM9069P	GM9220P	ASTM D3884
GM9070P	GM9231P	ASTM D5034
GM9126P	GM9240P	SAE J912
GM9129P	GM9502P	SAE J1351
GM9140P	GM9736P	SAE J1756
GM9141P	9981062	SAE J1885
GM9142P	AATCC 8	
GM9143P	ASTM D1813	

3 GENERAL REQUIREMENTS. Unless otherwise specified, the material shall be conditioned and tested under standard conditions of $22 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ RH. Condition materials until moisture equilibrium is reached.

3.1 FINISH. Leathers covered by this specification include any interior automotive grade leather such as corrected, buffed or full milled grain as well as calendered or finish split leathers. Soft quality leathers shall be full milled top grain. All leathers should be flexible, free from tackiness, and conform to trim fabrications. See the appropriate Leather Construction Specification for the finish information.

3.2 COLOR AND PATTERN (GM9220P). The color, grain, gloss and hand shall be approved by NAO Color and Trim Engineering to be an acceptable match to the standard.

3.3 NATURAL MARKINGS. Leather is a natural product and as such may contain natural markings. Permissible natural markings are impossible to describe solely in words and are best specified by compared requirements with natural markings contained in the Leather Natural Markings Standards Book approved and retained by NAO Color and Trim Engineering.

3.3.1 All areas of the hide that conform to the natural markings requirements must comply with this specification.

3.4 REPORTING.

3.4.1 If all individual readings of specific test meet or exceed the specific requirements, report the average. No individual readings shall fall outside the specified limits.

3.4.2 Format for reporting data shall be equivalent to the certification data sheets provided in the appendix.

3.4.2.1 See Appendix A, Construction Certification Data Sheet, for properties required for construction approval.

3.4.2.2 See Appendix B, Color Certification Data Sheet, for properties required for color approval on previously approved constructions.

3.4.2.3 See Appendix C, Laminate Certification Data Sheet, for properties required for bi-laminated or tri-laminated approval on previously approved constructions.

3.4.3 Any perforated leather shall meet thickness, weight, and pliability requirements of the generic leather from which it is perforated and requires only the additional tests specified for perforated leathers only when the non-perforated version is certified concurrently.

3.5 AROMATIC LEATHER. Leather defined as aromatic in the Leather Construction Specification Sheet shall be reviewed by an aromatic review panel made up of at least 6 members. This panel should include people from NAO Color and Trim, Platform Materials Engineering, Marketing Division and other appropriate sources. The review process shall be defined by the panel.

3.6 DESIGN AND MANUFACTURE FOR THE ENVIRONMENT.

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

3.6.2 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 Recycling content Report Form. Reference the GM Recycling Design Guide, GM502M.

3.7 MANUFACTURER'S IDENTIFICATION. The marking compound must be permanent and not transfer to the face of the leather or migrate to the face of the leather when handled or cleaned. The material shall be marked clearly and legibly in accordance with packaging specifications as furnished by the purchasing department.

3.8 PART PROCESSABILITY. All materials covered by this specification are subject to part performance testing through part validation.

4 REQUIREMENTS. Unless otherwise specified, the material shall be conditioned and tested under standard conditions of $22 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ RH. Condition materials until moisture equilibrium is reached.

4.1 MATERIAL CONSTRUCTION. The following properties shall be specified by and conform to the appropriate NAO Engineering Construction Specification while maintaining the

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appropriate color, grain, gloss, embossed depth, perforation, hand, aroma, russet treatment and hide markings as defined by the Engineering w-code. These properties shall be reported on the certification data sheet (Appendix A) as part of the material testing certification.

4.1.1 Thickness (ASTM D1813). Refer to the Leather Construction Specification Sheet.

4.1.2 Weight (ASTM D3776). Three (3) specimens shall be taken at random from any area of the hide. Refer to the Leather Construction Specification Sheet.

4.1.3 Pliability (GM9151P). Refer to the Leather Construction Specification Sheet for require pliability. Run test @ 50 g total weight.

4.2 PROPERTIES REQUIRED FOR PHYSICAL EVALUATION. The following properties shall be reported on the Certification Data Sheets, provided in the Appendix as stated in 3.4.

4.2.1 Tensile Strength (ASTM D5034, Grab Method, CRE). Three (3) specimens in each direction taken from random areas of the hide shall be tested. Specimens shall be perpendicular to each other and at a random angle to the backbone. The tensile strength shall be 355 N minimum.

4.2.2 Elongation (ASTM D5034, Grab Method, CRE). Elongations are evaluated on the tensile strength specimens. One (1) of 2 adjacent directions shall not exceed 45% at a 355 N load while the second direction shall not exceed 70% at a 355 N load.

4.2.3 Tear Resistance (ASTM D2261, CRE, 300 mm/minute). Three (3) specimens in each direction taken from random areas of the hide shall be tested. The tear resistance shall be 12 N minimum. Specimens shall be taken perpendicular to each other and at a random angle to the backbone. If all individual readings fall above the specified minimum tear strength report the average.

4.2.4 Stitch Tear Resistance (GM9149P). The stitch tear resistance when taken from random areas of the hide shall be a minimum of 70 N.

4.2.5 Seam Strength (GM9129P). The joining seam shall resist failure.

4.2.6 Resistance to Wear (ASTM D3884, 500 g weight, 300 cycles, H-18 wheels, S-36 mounting cards). A minimum of 3 specimens are to be taken from random areas of the hide and tested. There shall be no rupture of leather finish. Loss of gloss is acceptable, but a complete color change or exposure of the russet is not.

4.2.6.1 Test specimens shall be taken from an area with the least embossing.

4.2.6.2 High wear leather as defined in the Leather Construction Specification shall be tested to 500 cycles.

4.2.6.3 Use a cheese cloth moistened with water to clean the surface of the abraded specimen and to highlight any areas caused by the vinyl coating has been removed.

4.2.6.4 Excluded 2 mm from the edges and the depressed areas caused by the wheels starting and stopping when evaluating wear.

4.2.7 Cold Crack Resistance (ASTM D1912, GM9140P and GM9032P).

4.2.7.1 Seating and Shift boot use (ASTM D1912). Six (6) specimens shall be tested. There shall be no cracking or peeling of the coating or any other failure when tested @ $-30 \pm 2^\circ\text{C}$ as received.

4.2.7.2 Door Use (GM9140P). Six (6) specimens shall be tested. On the as received sample there shall be no cracking from a 4.0 J impact @ -30°C .

4.2.7.3 High Impact Leather (GM9032P). High impact leather as defined in the Leather Construction Specification Sheet shall exhibit no cracking or any other failure from impact, when tested to GM9032P using a 250 g impactor with a 5 mm radius hemisphere head dropped 100 mm. The tested samples shall be evaluated at room temperature and condensation may be blotted off.

4.2.8 Resistance to Blocking (SAE J912). There shall be no blocking or surface marring when placed face to face with itself under 3 kPa pressure for 30 minutes @ 80°C .

4.2.9 Compatibility Test (GM9141P), Seating and Door Use only. The surface of the sample shall not become soft, tacky, or stain when placed in contact with white vinyl. In addition, the sample shall not become soft, tacky, or stain when placed in contact with production white leather.

4.2.10 Grain Retention (GM9142P). There shall be no loss of grain following exposure for 16 h in an air-circulating oven @ 85°C .

4.2.11 Crazing (GM9143P). There shall be no crazing or whiteness when folded and creased manually 10 times face to face at room temperature.

4.2.12 Resistance to Scuffing and Marring (GM9150P). There shall be no more than a slight marring when tested with a 750 g weight. On any questionable results, the samples shall be oven aged for 16 h @ 70°C and retested.

4.2.13 Resistance to Humidity. There shall be no appreciable change in the surface color or adhesion of finish when subjected to 24 h @ 38°C and $95 \pm 5\%$ RH.

4.2.14 Cleanability (GM9126P), Procedure A. There shall be no loss of pattern, color, or gloss when cleaned with 9981062. The cleanability shall not be rated less than satisfactory. The surface finish shall also allow removal of normal soilage with mild soap and water.

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4.2.15 Resistance to Sulfur Ion Staining (GM9069P, GM9736P). The moisture surface of the part shall not show any yellowing or shade alterations following sulfur ion exposures.

Sulfide (GM9069P) 10 s
Sulfur Dioxide (GM9736P) 25 minutes

4.2.16 Topcoat Adhesion (GM9502P). The samples shall exhibit a rating of 8 or better when tested to the Knife Cross-Hatch and Scrape Adhesion Test as received and after humidity exposure as directed in 4.2.13

4.2.17 Coating Adhesion (ASTM D2097), Seating and Shift Boot Use only. Three (3) specimens taken at random shall be tested. The flexed specimen shall show no more than slight crazing, no extreme cracks to the russet or any group of 3 mm cracks when tested as received for 2 h or approximately 60 000 cycles.

4.2.17.1 The specimens shall be viewed using a 5X magnifying light.

4.2.18 Flammability (GM9070P). The material shall not burn or transmit a flame front across its surface at a rate greater than that specified in Table 1 of 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 a 0.

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

4.2.19 Colorfastness to Light (SAE J1885). A noticeable on tone fade as defined in the test procedure is acceptable after 225.6 kJ/m² @ 340 nm exposure. An AATCC gray scale rating of 3 may be used for guidance.

4.2.19.1 Loss of grain, blistering, or tackiness is evaluated on the loss of grain specimen (4.2.10).

4.2.19.2 High Ultraviolet Exposure. All leather constructions which will be used in high exposure areas such as the rear seat rollover shall meet the requirements of 4.2.19 after 451.2 kJ/m² @ 340 nm.

4.2.19.3 Color Clock (AATCC 8). The sample shall have a minimum rating of 4 wet and 4 dry on the AATCC Color Transference Scale. For perforated leather, also perform wet crocking on the reverse side of the leather. A rating of 4 or better is also required for perforated leather.

4.2.20 Resistance to Yellowing. There shall be no shade alteration or yellowing when compared with an as-received piece of leather after exposure in an air-circulating oven @ 93 ± 2°C for 72 h.

4.2.21 Perspiration Resistance (GM9240P), Steering Wheel and Shift Knob Use only. The coating must not blister, swell, or soften when exposed to a 150 minute continuous cycle.

4.2.22 Thermal Cycle Resistance, Steering Wheel and Shift Knob Use only. There shall be no evidence of color or gloss change, blistering, or loss of coating adhesion after 2 cycles as follows:

15.5 h @ 79 ± 2°C
7.5 h @ -35 ± 2°C
15.5 h @ 79 ± 2°C and 95 ± 5% RH
7.5 h @ -35 ± 2°C

NOTE: The above constitutes 1 cycle.

4.2.23 Odor (SAE J1351). The specimen shall exhibit an odor not in excess of 3 when evaluated per the scale set forth in the test.

4.2.24 Hide Marking. Hide marking shall be no greater than the marking identified in the Leather Natural Markings Allowance Book at NAO Color and Trim Engineering, GM Technical Center, 30100 Mound Rd., Warren, MI.

4.2.25 Fogging (SAE J1756) Photometric Procedure. Bath temperature of 85°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 viewed under 200X magnification, shall be judged to have not passed this requirement.

4.2.26 Fiber Show Through. There shall be no backside fibers brought through to the surface of perforated leather after vacuuming for minute with a 28 mm diameter (max) opening.

4.2.27 Bond Strength, Trilaminate/Bilaminate only. Hunter Instrument Scale L-30M, or equivalent, 305 mm/minute pulling clamp speed, if applicable. Bond strength shall be taken between all layers of the laminate after the following conditions. The bond strength between layers of the laminate shall meet the following requirements or there shall be a cohesive failure of one of the layers:

Condition	Leather, Foam, Heater Pad, Loop Lock	All Other Scrim
	Scrim	
As received	3.0 N/25 mm	2.2 N/25 mm
Cycle aged per GM9200P	3.0 N/25 mm	2.2 N/25 mm
Hydrolysis per GM9231P	2.2 N/25 mm	1.1 N/25 mm
Xenon exposure per GM2756M	3.0 N/25 mm	2.2 N/25 mm

- Test 3 samples that are cut as described in 4.2.1
- Foam. The foam used must meet the requirements of GM6291M.
- Scrim and Adhesive must meet the appropriate material specification.
- The finished leather surface shall be free of adhesive residue.