



Fiber Graphic, Heat Transfer

1 Scope

1.1 Material Description. This specification describes a flocked material that can be heat transfer bonded, bonded via pressure sensitive adhesives (PSA), or mechanically attached by sewing to a variety of automotive interior trim substrates including fabric, carpet and plastic roll good materials.

1.2 Symbols. Not applicable.

1.3 Applicability.

1.3.1 Types. There are several uses for this type of material. Therefore, there are separate sets of requirements for the different uses.

1.3.1.1 Type A. Small applications, logos or labels, to be located in low wear areas on the vehicle.

1.3.1.2 Type B. Larger applications located in higher wear areas of the vehicle such as doors or seat bolsters.

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-A01	ISO 105-A03	ISO 105-B06	ISO/IEC 17025
ISO 105-A02			

2.2 GM Standards/Specifications.

GMW3059	GMW3347	GMW14124	GMW15634
GMW3205	GMW3387	GMW14125	GMW15635
GMW3208	GMW3402	GMW14141	GMW16853
GMW3221	GMW3414	GMW14162	
GMW3232	GMW3417	GMW14270	
GMW3235	GMW6992	GMW14444	

2.3 Additional References. None.

3 Requirements

3.1. Test Data. Lab testing shall be performed by a laboratory that conforms (meets requirements but may not be formally recognized by a third party) to ISO/IEC 17025 and is acceptable to the responsible GM Department. Test reports must conform to ISO/IEC 17025. Supplier shall submit a letter of compliance.

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

3.3 Standard Conditions (GMW3221, Code 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.

3.4 Sampling. When multiple test specimens are required, they shall be taken diagonally across the sample so that no two (2) test specimens overlap in the same row of yarns. Avoid taking specimens from damaged, contaminated, or defective areas caused by improper handling or manufacturing.

3.5 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. All required information shall be reported on the appropriate test data reporting forms (for Construction, see Appendix A, Data Sheet A1 and for Color, see Appendix A, Data Sheet A2).

3.6 Visual Evaluation of Automotive Trim (GMW6992). The color, pattern, aesthetics and other related qualities shall be approved by the appropriate engineering department as an acceptable match to the standard when viewed under conditions set forth in GMW6992. See the appropriate construction specification for pattern and finish information.

3.7 Deviations from Defined Test Methods. Deviations from the conditions of any test method shall have been agreed upon between supplier and vehicle manufacturer. All deviations shall be specified on the component drawings, material specifications, etc., and shall be indicated on test certificates, reports, etc.

3.8 Documentation. Samples of components or materials released to this specification shall be tested for conformity within 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 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. 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.

3.9 Construction Requirements.

3.9.1 Lint Pickup and Retention (GMW3347, Type B only (see 1.3.1.2)). There shall be a minimum rating of a six (6) (of lint retention) when compared to the rating scale.

3.10 Color Requirements. These requirements describe the testing to be completed for each color once the initial construction has been approved. The testing may be done on a carpet material or on a carpet composite following the initial construction approval. All construction requirements are expected to match the initial construction approval even though these properties are not all retested for each color.

3.10.1 Colorfastness to Artificial Light, Xenon Arc Method. Any of the methods listed in Table 1 may be used. The method needs to be agreed upon by the responsible Materials Engineer.

Note: Natural weathering is the requirement for approval.

Table 1: Xenon Arc Method

Method	Requirement
GMW14162, Cycle B	28 MJ/m ²
GMW3414, Cycle A	903 kJ/m ²
ISO 105-B06, Condition 5	225.6 kJ/m ²

A rating of ≥ 4 is required using the gray scale (ISO 105-A02) for color change. A noticeable value (lightness) and/or chroma (saturation) change with minimum hue change is acceptable. Evaluate specimens as specified in GMW6992. Reference polystyrene is to be used to certify the xenon arc apparatus.

3.10.2 Natural Weathering Exposure (GMW3417). Acceptable evaluation criteria shall be no greater than a noticeable value (lightness) and or chroma (saturation) change with minimum hue change. Evaluate specimens as specified in GMW6992. Natural weathering is the requirement for colorfastness to light approval. GM is responsible for conducting the natural weathering testing. Suppliers shall submit one (1) A4 (8.5 in $\times$ 11 in) specimen of the color approved material to the responsible engineer at the developing region. This specimen

must be from the same lot of material that is visually approved by GM and shall be submitted along with the color properties test specimen submission package. The specimen shall be labeled For Natural Weathering Test and include the supplier's name, piece number, date and GM finish symbol and color number. GM will advise the supplier of compliance or lack of compliance to the requirement.

All the materials shall be tested for 37 500 langleys at 85 °C.

3.10.3 Color Crock (ISO 105-A01). A rating ≥ 4 is required using the gray scale (ISO 105-A03) for staining, when subjected to ten (10) strokes, using round finger on the crockmeter.

3.10.4 Cleanability and Soil Resistance (GMW3402). Perform soiling and cleaning of all soiling agents with the exception of Codes E, L and M. For high wear areas (Type B, see 1.3.1.2) the soiling agent M shall be tested. A rating ≥ 4 is required. For the evaluation, use the gray scale (ISO 105-A02 and/or ISO 105-A03).

3.10.5 Dye Migration (GMW14141). A rating ≥ 4 is required using the gray scale (ISO 105-A03) for staining.

3.10.6 Fiber Degradation (GMW3387). For Type B only (see 1.3.1.2). Perform fiber degradation as received, and after Xenon testing (see Table 1). A rating ≥ 8 is required.

3.10.7 Environmental Cycle (GMW14124, Cycle M). There shall be no change in color or appearance.

3.11 Laminate, Substrate or Composite Requirements. The following properties shall be tested for each individual application. Test composite materials shall be as representative as possible to the production design and size.

3.11.1 Linear Abrasion Resistance (GMW14125, Code A2X2). No apparent marking is acceptable. Record the results, see Appendix A, Data Sheet A1.

3.11.2 Abrasion Resistance (GMW3208). For Type B only (see 1.3.1.2). The specimens shall be tested according to GMW3208. The setting is CS10 wheels, 500 g load, and 500 cycles. Rating of six (6) minimum is required.

3.11.3 Adhesion (GMW14124, Cycle M). The edges shall not be lifted using fingernail. The materials shall be tested as received, and after each step of environmental cycling per GMW14124, Cycle M.

3.11.4 Flammability (GMW3232). The results shall be reported in the GMW3232 format.

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

3.11.4.2 After Aging. The test cycle shall commence with 48 h $\pm$ 1 h at 40 °C $\pm$ 3 °C and 95% $\pm$ 5% relative humidity, followed by 168 h $\pm$ 1 h at 90 °C $\pm$ 3 °C and completed without interruption.

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

3.11.5.1 Resistance to Odor (GMW3205, Coding A2 and B2). Report results for both wet and dry conditions. A rating of ≥ 6 is required. Use a ratio of specimen size to container volume of 1:50. A ratio of 1:100 is sufficient for small parts.

3.11.5.2 Fogging (GMW3235, Method B). The bath temperature shall be Coding T2 (specified in GMW3235, (T2 = 100 °C)). The condensable constituent's value should be less the 2 mg. Also, if the specimens form crystals, oily film or visible droplets greater than 0.05 mm in diameter at 40X magnification, the sample does not meet the requirement.

3.11.5.3 Volatile Organic Compound/Semi-volatile Organic Compound (VOC/SVOC) (GMW15634). Record total amounts of VOCs and SVOCs in milligram/kilogram and attach a report listing all chemicals detected. Values of total amounts shall be ≤ 150 $\mu\text{g/g}$ for VOCs, and ≤ 300 $\mu\text{g/g}$ for SVOCs.

- Volatile Organic Compounds (VOC) ≤ 150 $\mu\text{g/g}$
- Semi-volatile Organic Compounds (SVOC) ≤ 300 $\mu\text{g/g}$

3.11.5.4 Carbonyls (GMW15635). Not applicable.

3.11.6 Environmental Cycling (GMW14124, Cycle M). There shall be no apparent shrinkage, color or appearance change.