GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW3026

Carpet Materials for Floors and Floor Mats

1 Scope

This specification describes carpet materials that are suitable for floor applications and floor mats.

1.1 Material Description. The type (see 3.5.8) refers to the wear performance of the carpet and shall be indicated on the part drawing.

1.1.1 Material Identification. The material shall be constructed using synthetic fibers, dyed and finished with an approved backing to become acceptable in color, pattern and physical properties as outlined in this specification.

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

1.3 Applicability. Suitable for molded floor carpets and floor mats.

All the floors made from carpet constructions up to 400 g/m^2 (12 oz/yd^2) shall have mandatory protection such as heel pad or floor mats

1.4 Remarks. 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.

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 5084	ISO/IEC 17025
ISO 105-A02	ISO 105-B06	ISO 13937-2	SAE J1530

2.2 GM Standards/Specifications.

GMW3010	GMW3235	GMW6992	GMW14148
GMW3059	GMW3259	GMW14102	GMW14162
GMW3182	GMW3387	GMW14108	GMW14444
GMW3205	GMW3402	GMW14125	GMW15634
GMW3208	GMW3417	GMW14128	GMW15635
GMW3221	GMW4217	GMW14141	GMW16853
GMW3232			

2.3 Additional References.

TMC003 Material Safety Data Sheet guidance documents (available at www.gmsupplypower.com).

3 Requirements

3.1 General Requirements.

3.1.1 Requirements on Test Specimens. Reference GMW3221.

3.1.2 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.

3.1.3 Material Construction Specification for Floor and Floor Mats. All carpet constructions shall have a construction specification attached when submitted for approval.

© Copyright 2014 General Motors Company All Rights Reserved

Documents
Document Sharing Hub

Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW3026 2014

3.1.4 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.

3.1.5 Sampling. When multiple test specimens are required, they shall be taken diagonally across the sample so that no two test specimens overlap in the same row of yarns. Avoid taking specimens from damaged, contaminated, or defective areas caused by improper handling or manufacturing. Specimens should not be cut within 50 mm of any edge of the sample.

3.1.6 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. See Appendix A, Data Sheets A1 thru A3.

3.1.7 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.

3.1.8 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.

3.1.9 Documentation. Samples of components or materials 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. 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 of 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.

3.2 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.

3.3 Rolled Good Carpet Construction Requirements for Floor and Floor Mats. See Appendix A, Data Sheet A1.

3.3.1 Weight (GMW3182). Test three specimens. Report the results in grams per square meter (g/m^2).

3.3.2 Pile Height. Report the pile height as it is specified in each construction.

3.3.3 Thickness (ISO 5084). For non-woven carpets only. Refer to the Construction Spec Sheet. Report the average for three specimens in millimeters to the nearest 0.01 mm. 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. The specimen size shall be 100 mm x 100 mm size.

3.3.4 Breaking Load (GMW3010, Code A). Test six specimens (three specimens from the Machine Direction (MD) and another three from the Cross Machine Direction (CMD)).

3.3.4.1 Floor 310 N minimum.

3.3.4.2 Floor Mats 310 N minimum.

3.3.5 Trouser Tear Strength (ISO 13937-2). For both tufted and non-woven floor carpet constructions. Test six specimens (three specimens from the MD and another three from the CMD). Electronic method of calculation shall be used.

3.3.5.1 Floor 50 N minimum.

3.3.5.2 Floor Mats 50 N minimum.

3.3.6 Resistance to Cracking from Bending at Cold Temperature (GMW14108). Cut four specimens approximately 250 mm x 250 mm. Oven age two specimens for 336 h @ 93 °C ± 2 °C. Expose specimens face side down during the entire oven exposure. For “as-received” testing and after aging, condition specimens for a minimum of 24 h to the requirements of GMW3221, Code A, before cold temperature exposure. Condition all four specimens @ -30 °C for a minimum of 4 h. One “as-received” specimen shall be wrapped around a 75 mm diameter mandrel so that the face side is in contact with the mandrel, then the backside. Follow the same procedure for both oven aged specimens.

© Copyright 2014 General Motors Company All Rights Reserved

Documents
Document Sharing Hub
Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW3026 2014

There shall be no cracking or other deterioration of specimen on the backside.

3.3.7 Loop Pile Pullout (GMW14148). For loop pile carpet only, a 25 N minimum pull-out force is required as received.

3.3.8 Abrasion Resistance (GMW3208). The constructions higher than 950 g/m^2 (28 oz/yd^2) shall not be tested for taber.

Three specimens per type shall be tested according to GMW3208. The load shall be 1000 g with a H18 taber abrasion wheel for both tufted and non-woven carpets. The samples for testing shall be cut from the driver heel area.

3.3.8.1 Type I. Non-woven floor carpets must meet a minimum of 1000 taber wear cycles. For non-woven floor carpets only; there shall be only a slight loss of pile height and no pilling or bearding of the fibers. A rating ≥6 is required for non-woven carpets.

3.3.8.2 Type II. Tufted floor carpets must meet a minimum of 1200 taber wear cycles. A rating ≥6 is required for tufted carpets.

3.3.8.3 Type III. Carpets intended to be used in floor mat applications must meet a minimum of 2400 taber wear cycles. A rating ≥6 is required for floor mats with tufted carpets. For the loop constructions, the material shall maintain the pattern without having the loop yarn cut.

For floor mat applications, the constructions exceeding 950 g/m^2 do not required taber testing, unless it is requested by the Commodity Materials Engineer.

3.3.9 Stability of Materials Against Mechanical Load (GMW14125). Tufted carpets must meet Cycle A2X2, with a rating of 4. Non-woven carpets must meet Cycle BX2 with a rating ≥4.

3.3.10 Mildew (GMW3259). There shall be no visible growth or odor of mildew.

3.3.11 Flammability (GMW3232). Test to GMW3232. For initial approval and routine quality control.

3.3.11.1 After Conditioning (GMW3232). Immediately prior to tests, all test specimens shall be conditioned for a minimum of 24 h according to GMW3221, Code A.

3.3.11.2 After Aging. The test cycle shall commence with 48 h ± 1 h at + 40 °C ± 3 °C and 95% ± 5% relative humidity (RH), followed by 168 h ± 1 h at + 90 °C ± 3 °C and completed without interruption. Repeat 3.3.11.1 before testing flammability.

3.3.12 Sound Transparency (GMW14128). If a carpet is intended to be used as a speaker covering, it must meet this requirement.

3.4 Color Requirements. See Appendix A, Data Sheet A2.

3.4.1 Colorfastness to Artificial Light. Any of the methods listed in Tables 1, 2, and 3 may be used. **Note:** Natural Weathering is the requirement for approval (see Table 4).

Table 1: Xenon Arc Method (GMW14162, Cycle A)

Application	Requirement	For Information
Carpet (Floor)	320 kJ/m^2	640 kJ/m^2

Table 2: Xenon Arc Method (GMW14162, Cycle B)

Application	Requirement	For Information
Carpet (Floor)	14 MJ/m^2	28 MJ/m^2

© Copyright 2014 General Motors Company All Rights Reserved

Documents
Document Sharing Hub
Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW3026 2014

Table 3: Xenon Arc Method (ISO 105-B06, Condition 5)

Application	Requirement	For Information
Carpet (Floor-Low Ultraviolet (UV))	112 kJ/m^2	Not applicable
Carpet (Floor-High UV)	451 kJ/m^2	Not applicable

UV = Ultraviolet

A rating ≥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 or blue wool is to be used to certify the xenon arc apparatus.

3.4.2 Natural Weathering Exposure (GMW3417 U/G-TSTL-XX). Evaluation criteria shall be no greater than a noticeable value (lightness) and or chroma (saturation) change with minimum hue change is acceptable. 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 A4 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.

Table 4: Natural Weathering Exposure Requirement (Solar Glass)

Application	Temperature	Requirement	For Information
Carpet (Floor-Low UV)	85 °C	15 TNR kL	Not applicable
Carpet (Floor-High UV)	102 °C	105 TNR kL	Not applicable

TNR = Temperature Normalized Radiation
UV = Ultraviolet

3.4.3 Fiber Degradation (GMW3387). Perform fiber degradation before and after Xenon testing and natural weathering. A rating of ≥8 is required.

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

3.4.5 Color Crock (ISO 105-A01). A rating of ≥4 is required using the gray scale (ISO 105-A03) for staining. Use the “Round Finger” and ten strokes (to and fro).

3.4.6 Water Spotting/Colorfastness to Water (GMW14102). Specimen size shall be 400 mm x 400 mm. Amount of water used shall be 50 mL. No water penetration through the carpet is allowed during the entire water spotting test. No staining, ringing, haptic change or visual shrinkage allowed.

3.4.7 Cleanability and Soil Resistance (GMW3402). Perform soiling and cleaning of all soiling agents listed under 3.3.1 and 3.3.2 of GMW3402 with the exception of Code M. Apply each agent and allow it to remain on the specimen for an hour, then clean half of the stained area.

A rating of ≥4 is required for each soil and cleaner. For the evaluation, use the gray scale (ISO 105-A02 and/or ISO 105-A03).

3.4.8 Flammability (GMW3232). For initial approval and routine quality control.

3.4.8.1 After Conditioning. As specified in GMW3232, paragraph 4.1.1.

3.4.8.2 After Aging. As specified in GMW3232, paragraph 4.1.2. After aging, the test specimens must be conditioned for a minimum 24 h prior to testing for flammability.

3.5 Laminate, Composite and Substrate Requirements. See Appendix A, Data Sheet A3. All carpet testing is to be done on molded floor composites or floor mat carpet with backings intended for production.

3.5.1 Weight (GMW3182). Test three specimens. Report the results in grams per square meter (g/m^2).

© Copyright 2014 General Motors Company All Rights Reserved

Documents
Document Sharing Hub
Copyright General Motors Company
Provided by IHS Markit under license with General Motors Company
Reproduction, distribution or publication of these standards is expressly prohib
Licensee=/, User=,
Not for Resale,
Full document details: GMW GMW3026 2014