GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW15757

Low Wear Non-woven Carpet for Protected Applications

1 Scope

This specification describes low weight, non-woven carpet materials that are suitable for floor applications.

1.1 Material Description. The material is low wear and is generally used on entry level vehicles with special provisions for testing and usage, including mandatory floor mats and complete protection of the ingress/egress areas and protection of the transmission tunnel areas. (See 3.2.7.)

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

1.3 Typical Applications. Suitable for molded floor carpets.

Note: 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/IEC 17025	ISO 105-A02	ISO 105-B06	ISO 13937-2
ISO 105-A01	ISO 105-A03	ISO 5084	

2.2 GM Standards/Specifications.

GMW3010	GMW3232	GMW4217	GMW14128
GMW3059	GMW3235	GMW6992	GMW14141
GMW3182	GMW3259	GMW8081	GMW14162
GMW3205	GMW3387	GMW14102	GMW15634
GMW3208	GMW3402	GMW14108	GMW15635
GMW3221	GMW3417	GMW14125	GMW16853

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 Test Data. Lab testing is to 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.

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

3.1.3 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.

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3.1.4 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 specimen.

3.1.5 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 reporting data sheets (see Appendix A and/or Appendix B).

3.1.6 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.

3.1.7 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.

3.1.8 Documentation. Specimens 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 Construction Requirements (Appendix A).

3.2.1 Weight (GMW3182). Test three specimens. Report the results in grams/square meter (g/m²). Refer to Carpet Construction Certification Data Sheet in Appendix A for weight specification requirements.

3.2.2 Pile Height. Refer to the Carpet Construction Certification Data Sheet in Appendix A for pile height specifications.

3.2.3 Thickness (ISO 5084). Non-woven carpets only. Refer to Carpet Construction Certification Data Sheet in Appendix A. 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 specimens shall be 100 mm x 100 mm size.

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

- Floor 310 N minimum

3.2.5 Trouser Tear Strength (ISO 13937-2). Test six specimens; three specimens from the MD and another three from the CMD. Electronic method of calculation shall be used.

- Floor 50 N minimum

3.2.6 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 at 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 at -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.

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

3.2.7 Abrasion Resistance (GMW3208). Non-woven, low-weight floor carpets must be tested to GMW3208 Taber abrasion test using H18 wheel, 500 g load for 600 cycles. Three specimens per type shall be tested according to GMW3208.

Rating of minimum 6 is required.

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They also must have floor mats, heel pads, complete protection of the ingress/egress areas and protection of the transmission tunnel areas.

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

3.2.9 Odor (GMW3205). Report both wet and dry results. Rating ≥6 is required. Use code A2, and B2

3.2.10 Mildew (GMW3259). Required only if natural fibers are present in the construction. There shall be no visible growth or odor of mildew. See Appendix A, Data Sheet A1 to determine if this is a requirement.

3.2.11 Fogging (GMW3235, Method B, Y1, T2). The condensable constituents' value should be <2 mg.

3.2.12 Flammability (GMW3232).

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

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

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

3.3 Color Requirements (Appendix B).

3.3.1 Colorfastness to Artificial Light Xenon Arc Method. Xenon shall be performed and reported for information only. Any of the methods listed in Tables 1, 2 and 3 may be used. **Note:** Natural weathering is the requirement for approval.

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

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

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

UV = Ultraviolet

3.3.1.1 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 or blue wool is to be used to certify the Xenon arc apparatus.

3.3.2 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 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

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