



Mesh Netting

1 Scope

1.1 Material Description. This specification describes material suitable for making automotive map pockets, convenience nets and storage nets. The material shall be knitted or braided, using man-made fibers, colored and finished to acceptable color, pattern and physical properties. The mesh netting may be elastic or non-elastic.

1.2 Symbols. A unique finish symbol will be given to each construction by the responsible GM representative at initial development.

1.3 Applicability. Mesh fabric map pockets or convenience nets in occupant area or trunk of the vehicle.

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, the 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-A02	ISO 105-B06	ISO 1431-1	ISO/IEC 17025
ISO 105-A03	ISO 105-X12		

2.2 GM Standards/Specifications.

GMW3010	GMW3235	GMW14141	GMW15635
GMW3059	GMW3259	GMW14162	GMW16853
GMW3205	GMW3417	GMW14270	
GMW3221	GMW6992	GMW14444	
GMW3232	GMW14124	GMW15634	

2.3 Additional References. None.

3 Requirements

3.1 Requirements on Test Specimens.

3.1.1 Standard Conditions (GMW3221, Code A). All test specimens shall be conditioned to GMW3221, Code A, for a minimum of 24 h before and after completion of test unless the test method indicates that standard conditioning is not required. If specimens are tested outside of the conditioned environment, they shall be tested within 10 minutes of removal.

3.1.2 Sampling and Test Specimen Preparation. All test specimens shall be taken from the area beyond the initial 1 m of production. Prepare test specimen as required in the respective test method.

3.1.3 Visual Evaluation of Automotive Trim (GMW6992). The color, pattern, aesthetics and other related qualities shall be evaluated and approved by the responsible engineering department as an acceptable match to the engineering approval sample when viewed under conditions set forth in GMW6992.

3.1.4 Deviation from Defined Test Methods. Deviations from the conditions of any test method shall be agreed upon between supplier and vehicle manufacturer. All deviations shall be specified on the component drawings, material specifications, and Statement of Requirements and shall be indicated as such on test certificates and reports.

3.1.5 Laboratory Accreditation. Laboratory testing is to be performed by a laboratory that conforms (meets requirements, may not be formally recognized by a third party) to ISO/IEC 17025 or is acceptable to the customer (General Motors). Test reports must conform to ISO/IEC 17025. Supplier shall submit a letter of compliance.

3.1.6 Material Construction Specification. All required information shall be reported on the Construction Specification Form provided in Appendix A, Data Sheet A1. A specification form shall be submitted along with each construction for engineering approval. Established values for a construction will be reported on and controlled within the limits established on the Construction Specification Form.

3.1.7 Laboratory Data Forms. Test reports must conform to ISO/IEC 17025. Use of the form(s) provided in Appendix B, Data Sheets B1 thru B4 meet this requirement.

3.1.8 Data Reporting. All required information shall be entered into the appropriate Construction or Laboratory Data Forms. If all individual readings of a specific test meet or exceed the specified requirements, report the average. Report all individual test results if any values do not meet the requirements, unless otherwise stated.

3.1.9 Documentation. Samples of components or material 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 manufacturer) 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.

3.2 Construction Requirements. The following requirements describe the initial testing to be completed when a new construction is being considered. For a complete construction package, 3.3 must also be completed on a representative color.

3.2.1 Geometric Shape/Size. Report the average length of five (5) repeats of pattern in the Machine Direction (MD) with net elongated by a 22 N load in the same direction. For example, the 22 N load may be established by setting up the test piece in the tensile machine (according to GMW3010) for elongation testing with a pre-load of 22 N.

3.2.2 Yarn Count. The construction (machine and across machine direction) shall conform to the engineering approval sample with the following allowable tolerances:

- Machine direction (MD) count: $\pm 1\%$
- Cross machine direction (CMD) count: $\pm 3\%$

3.2.3 Tensile Strength and Elongation (GMW3010). Established values for a construction will be reported on and controlled within the limits established on the Construction Specification Form (Appendix A, Data Sheet A1). The test specimen shall be cut so that at minimum, one (1) net hole is complete (see Figure 1). In deviation to GMW3010, a special clamping device (see Figure 2) is used, that has two (2) half pins which are inserted into the net hole. Under preload of 1 N, the half pins shall be in a distance of 10 mm of each other. The net shall be tested in Direction 1 and Direction 2 shown in Figure 1.

Figure 1: Elongation Test Piece

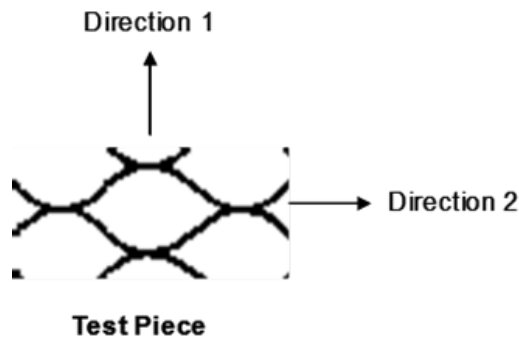
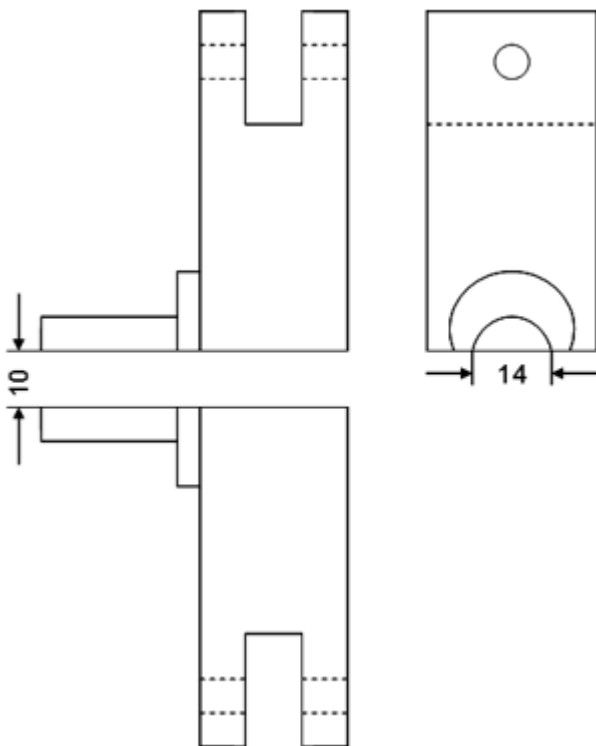


Figure 2: Elongation Clamping Device



Note: Dimensions in millimeters (mm)

3.2.3.1 Elongation. Elongation is to be measured at 44 N; refer to the Construction Specification Form (Appendix A, Data Sheet A1) for the requirement. In addition, report elongation at 25 N, 50 N, 100 N, and at break or include a force-elongation chart for information only.

3.2.3.2 Tensile Strength. The minimum breaking strength shall be 250 N.

3.2.4 Resistance to Mildew (GMW3259). This test is required whenever a new fiber, finishing agent, resin or combination thereof is introduced. Tested net shall have no visible growth of mildew and no objectionable odor.

3.2.5 Resistance to Odor (GMW3205). Test is required whenever a new fiber, finishing agent, resin or combination thereof is introduced. Tested net shall have a rating of 6 or higher. Use a test specimen of $3 \text{ g} \pm 0.1 \text{ g}$ with a desiccator of 2700 cm^3 volume (2.7 L).

3.2.6 Ozone Resistance (ISO 1431-1). For elastic materials only. The material shall be elongated 25% and held in this condition while exposed for 24 h to air at $40^\circ\text{C} \pm 2^\circ\text{C}$ containing (in parts per hundred million (pphm)) $100 \text{ pphm} \pm 10 \text{ pphm}$ ozone. At the completion of the test, the material must not show signs of breakdown, deterioration or degradation. If visual evaluation is acceptable, the elongation shall be measured. The change of elongation shall be 5% maximum compared to the values of the net as received.

3.2.7 Flammability (GMW3232).

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

3.2.7.2 After Aging (GMW3232). In addition to tests conducted in the as received condition, all materials shall additionally be tested for flammability after the following artificial condition: The test cycle shall commence with 48 h $\pm$ 1 h at 40 °C $\pm$ 3 °C and 93% $\pm$ 5% relative humidity followed by 168 h $\pm$ 1 h at 90 °C $\pm$ 3 °C and completed without interruption. Repeat conditioning before starting testing flammability.

3.2.8 Environmental Exposure Resistance (GMW14124, Cycle M Performed Twice). The material must withstand the environmental exposure with no objectionable visual changes. Visual observations shall include changes in, color or gloss, wrinkling, sagging, staining, haptic or other undesirable effects. The high temperature is to be 85 °C.

3.2.9 Overall 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.

3.2.9.1 Fogging (GMW3235, Method B Gravimetric). Test temperature is T2 (100 °C) except for Code 1 parts (see GMW14444 for reference). The condensable constituents, or the fogging value G, shall be $\leq$ 2 mg. No droplets, or crystals are acceptable upon visual examination.

3.2.9.2 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. Required limits vary according to material type. See GMW16853, Table titled **Emission Requirements for Interior Material/Parts/Assembly List** for specific requirements.

3.2.9.3 Carbonyls (GMW15635). Record the amounts of each chemical listed along with the sum of C² to C⁶ Carbonyls. See GMW16853, Table titled **Emission Requirements for Interior Material/Parts/Assembly List** for specific requirements.

3.3 Color Properties. The following requirements describe the testing to be completed with each new color being considered for an approved construction. Any new color shall meet all construction properties and conform to the original Construction Specification Form (Appendix A, Data Sheet A1).

Note: Materials using a common solution dyed fiber need only one (1) set of color data relating to the fiber. Mesh nettings made from common solution dyed fiber are assumed to have similar color properties for 3.3.1, 3.3.2, 3.3.3, 3.3.4, 3.3.5. Note that 3.3.6 must be completed for each specific construction in each color. Also piece dyed materials must have complete color testing results for each color and construction.

3.3.1 Colorfastness to Artificial Light. The procedure and requirement will be defined on the Construction Specification Form (Appendix A, Data Sheet A1) or by approving region. The requirement is rating of $\geq$ 4 per ISO 105-A02 Grey Scale for color change. A noticeable value (lightness) and/or chroma (saturation) change with minimum hue change is acceptable. Evaluate specimens as specified in GMW6992. Polystyrene reference plastic or blue wool is to be used to verify the xenon arc apparatus.