GM	WORLDWIDE ENGINEERING STANDARDS	Material Specification	GMW14652

Interior Trim Compression Molded and Moldable Composite Materials

1 Scope

1.1 Material Description. Materials approved to this specification include compression molded and moldable composite materials.

1.1.1 Phenolic resin based materials are not allowed for interior applications.

1.1.2 Injection molded thermoplastic materials are not covered by this specification. Materials intended for this specification are normally processed by compression thermoforming.

1.1.3 Materials intended to be used in substrate applications must also meet the assembly performance requirements per GMW14444 as assembled.

1.2 Symbols. Not applicable.

1.3 Applicability. Typical applications include interior trim substrates with textile covering (i.e., rear window trim, rear compartment side trim, deck lid trim, load floors, front compartment trim, door trim, etc.)

1.4 Remarks.

1.4.1 Classification:

1.4.1.1 Type I: Materials to be used in rear window trim or load cover**.**

1.4.1.2 Type II: Materials to be used in cargo side trim, deck lid trim or rear compartment trim.

1.4.1.3 Type III: Materials to be used in load floor panels.

1.4.1.4 Type IV: Materials to be used in door trim panels.

1.4.1.5 Type V: Materials to be used in front compartment trim.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

ISO 178	ISO 527	ISO 5084	ISO 17025

2.2 GM Standards/Specifications.

GMW3059	GMW3221	GMW14270	GMW15635
GMW3116	GMW3232	GMW14444	GMW16190
GMW3182	GMW3235	GMW14777	GMW16853
GMW3205	GMW3259	GMW15634	GMW16944

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.1.1 Test Data. Lab testing is to be performed by a laboratory that conforms to ISO 17025 and is acceptable to the customer. Test reports must conform to ISO 17025 sections titled “Test Reports and Calibration Certificates” and “Test Reports”.

3.1.2 Standard Conditions (GMW3221). All test specimens shall be conditioned to GMW3221, Code A, unless the test method indicates that standard conditioning is not required. Condition the specimens for a minimum of 24 h prior to testing, or until moisture equilibrium is reached. If specimens are tested outside the conditioned environment, they shall be tested within ten (10) minutes of removal.

© Copyright 2016 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: GM GMW14652 2016

3.1.3 Sampling. For directional properties, samples shall be reported with Machine Direction (MD) and Against Machine Direction (AMD). All test specimens shall be taken from the area beyond the initial 2 m of production and at least 50 mm from either selvage edge.

3.1.4 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 (Appendix A, B and C).

The properties in Table 1 are required for full specification approval (the minimum number of lots per test required is one (1)):

Table 1: Computer Aided Engineering (CAE) Testing required per Application

Properties	Type I	Type II	Type III	Type IV	Type V
True Stress-Strain Curves at 23 °C, 85 °C and -30 °C Note 1 Note 2	X		X		
Young's Modulus	X	X	X		X
Tensile stress at Yield	X	X	X		X
Tensile stress at Break	X		X		
Poisson's Ratio	X		X		
High Speed Stress Strain at 23 °C Note 3				X	
Flexural Properties at 23 °C Note 4	X	X	X		X
Density	X	X	X	X	X

Note 1: Perform per ISO 527.
Note 2: For those materials too thick to allow testing using ISO 527 specimen type, contact Materials Engineering for guidance.
Note 3: Use GMW16944 as a reference. Material should be tested to 1/s, 10/s, and 100/s rates. Contact Materials Engineering for guidance.
Note 4: Perform per ISO 178.

3.2 Construction Requirements for Substrate. All testing shall be conducted on a formed part at ideal thickness for physical properties without facing material. Report values in Appendix A, Table A1.

3.2.1 Weight (GMW3182). Test three (3) specimens and report the average in grams/square meter for the substrate weight. Acceptable production tolerances shall be ± 10% the specified nominal substrate weight. Any deviation must be agreed to by appropriate GM engineer. Refer to the construction sheet for weight specifications (See Appendix A, Table A1).

3.2.2 Thickness (ISO 5084). Report the average for three (3) specimens without facing material, in millimeters to the nearest 0.1 mm. Use a 2.0 N load and a 50.5 mm diameter presser foot to achieve a pressure of 1.0 kPa. All readings should be taken after the presser foot has been in contact with the material for at least 5 s. Refer to the construction sheet for thickness (See Appendix A, Table A1).

3.2.3 Flexural Properties (ISO 178). Test five (5) specimens in the MD and AMD for nominal thickness without facing material. Test speed 50 mm/minute, 100 mm span, 5 mm support radius, and sample size 75 mm × 200 mm. Report flexural strength (maximum force over first 25 mm of deflection), flexural stiffness (initial slope of flexural curve), and flexural toughness (percent retention of maximum force compared to force at 25 mm) averages on construction sheet (See Appendix A, Table A1). Submit flexural stress strain curve.

3.2.4 Flammability (GMW3232). Test as received and after aging. Report Maximum Burn Rate (B_{max}) and Maximum Statistical Burn Rate (B_{stat}) requirement, must be less than 100 mm/minute.

3.2.5 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.

© Copyright 2016 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: GM GMW14652 2016

3.2.6 Mildew (GMW3259). Required only if natural fibers are present in the construction. There shall be no visible growth or odor of mildew.

3.2.7 Cantilever Sag (GMW16190). Test three (3) specimens in MD and three (3) specimens AMD. Specimen size is 75 mm × 300 mm. Secure the fixed side in flat plate and tighten with no more than 25 mm of length secured. Measure the initial height of sample at the end of sample opposite fixed end. Measure the height of sample at the end after minimum of 24 h at 85 °C. Report change in height after 24 h at 85 °C. Each sample should be individually supported.

3.2.8 Moisture Content (GMW14777). Substrates that are susceptible to moisture should be tested to 30 minutes (Code A). Moisture content must be ≤ 8% by mass. Water absorption must be ≤ 40% by mass. Thickness swell must be ≤ 40% by mass.

3.3 Color Requirements. As defined by requirements of facing material specification.

3.4 Part Requirements. On formed parts with facing material, report requirements of GMW14444 as well as the requirements listed in 3.4.1 through 3.4.4**.** Additionally, any component testing, such as knee load testing, shall be evaluated prior to approval.

3.4.1 Weight (GMW3182). Test three (3) specimens and report the average. Report the average in grams/square meter for the substrate weight. Acceptable production tolerances shall be ± 10%, the specified nominal substrate weight. Any deviation must be agreed to by appropriate GM Engineer. Refer to the construction sheet for weight specifications (See Appendix A, Table A1).

3.4.2 Thickness (ISO 5084). Report the average for three (3) specimens with facing material, in millimeters to the nearest 0.1 mm. Use a 2.0 N load and a 50.5 mm diameter presser foot to achieve a pressure of 1.0 kPa. All readings should be taken after the presser foot has been in contact with the material for at least 5 s. Refer to the construction sheet for thickness. (See Appendix A, Table A1).

3.4.3 Flexural Properties (ISO 178). Test five (5) specimens in the MD and AMD for nominal thickness with facing material. Test speed 50 mm/minute, 100 mm span, 5 mm support radius, and sample size 75 mm × 200 mm. Report flexural strength (maximum force over first 25 mm of deflection), flexural stiffness (initial slope of flexural curve), and flexural toughness (percent retention of maximum force compared to force at 25 mm) averages on construction sheet (See Appendix A, Table A1). Submit flexural stress strain curve.

3.4.4 Cantilever Sag (GMW16190). Test three (3) specimens in MD and three (3) specimens AMD. Specimen size is 75 mm × 300 mm. Secure fixed side in flat plate and tighten with no more than 25 mm of length secured. Measure the initial height of sample at the end of sample opposite fixed end. Measure the height of sample at the end after minimum of 24 h at 85 °C. Report change in height after 24 h at 85 °C. Each sample should be individually supported.

4 Manufacturing Process

4.1 Manufacturer's Identification. Not applicable.

4.2 Alignment. Not applicable.

4.3 Quality Control Monitoring. All quality control processing guidelines provided by material source must be followed by molder. The molder must also show process control in all areas associated with Appendix B, Table B1. All deviations to material source guidelines must be documented in drawing/math notes by engineering work order.

4.4 Part Performance/Processability. All materials covered by this specification are subject to part performance testing through part validation. All submissions for approval require Appendix B, Table B1 to be filled out completely and a process curve showing best heat history with thermocouple data.

5 Rules and Regulations

5.1 Legal Regulations. All materials must satisfy applicable laws, rules, regulations and recommendations valid in the country of usage.

5.2 Language. In the event of conflict between the English and domestic language, the English language shall take precedence.

© Copyright 2016 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: GM GMW14652 2016