



Decorative Interior Laminates and Films

1 Scope

This specification defines the material performance requirements for General Motors interior decorative films and laminates. These films are multilayer constructions with decorative simulated wood grains, metal, pigmented or other patterns and graphics applied on sheet stock, films, foils or rolled goods. They are used for decorating common interior surfaces such as decorative trim plates and spears, also including some decorated Electrical/Electronic (E/E) components.

This specification does not cover applied graphics, pad printing, hot stamping or direct ink, pigment or paint applications to the already formed part. This specification revision no longer covers Hydrographic Decorating.

1.1 Material Description. These materials are defined by type, grade, class (more than one class may apply) and construction code.

1.1.1 Type. Type separates the decorative film/foil into basic common constructions based on processing method to create the decorated part.

1.1.1.1 Insert Mold, Vacuum Formable Film (Type A). This film construction shall consist of a durable transparent topcoat, decorative layer(s), and a plastic backing sheet. The decorative layer is comprised of one or multiple layers and are applied by gravure, screen, or other high speed printing processes. A part is then formed by injecting a compatible plastic resin from behind.

1.1.1.2 In-Mold Foil Decoration (Type B). This thin foil construction shall consist of a durable transparent topcoat and a decorative layer(s). The topcoat may or may not be post-cured on roll or on part by ultraviolet light or other frequencies. The decoration is applied to a transparent carrier while on a continuous roll. The foil is then drawn through the mold where the decorative layer and topcoat are either transferred to or become the appearance surface during the molding process.

1.1.1.3 TOM (Three Dimensional Overlay) or Dual Vacuum Thermoformed Film (Type C) (Formerly Miscellaneous). This film construction shall consist of a durable transparent topcoat, decorative layer(s), a plastic backing sheet and an adhesive for bonding the film to an already formed part or carrier.

In these cases where an adhesive is used to attach the decorative sheet to a carrier or the part, the bonding of the decorative sheet to the carrier must meet the adhesion requirements of GMW14892.

1.1.1.4 Waterborne Decorative Film - Hydrographics (Type D). This type is no longer covered by this specification. For previously approved Type D Films see the March 2012 version of the specification for testing performance requirements until the new specification is released.

1.1.1.5 Film Insert Molding (Type E). Film Insert Molding (FIM), which is also known as In Mold Labeling (IML), describes the use of a plastic film which is pre-hardcoated on the A-surface and decorated on the B-surface with colors, patterns, and graphics, especially backlit graphics. Generally these decorations are registered to form into one production part and not continuous for application to many differing parts. The hardcoated/decorated film is thermoformed into a three dimensional (3D) formed film via high pressure forming. The 3D film may be post-cured by ultraviolet light as a shell or after it has been inserted into the injection tool and back molded with plastic resin (typically clear).

1.1.2 Grade. Grade will define the anticipated UV and application exposure temperature levels. If no Grade is specified Grade I is assumed.

- Grade I Standard, the lower UV and temperature exposure.

- Grade II High, highest UV and temperature exposure applications such as the upper, horizontal instrument panel trim and package shelves.

1.1.3 Class. Class will define the performance requirements for Sunscreen and Insect Repellent Resistance and for Resistance to Fine Scratching based on part usage for the decoration.

- Class A Standard chemical resistance per GMW14445 and standard scratch and mar performance and is the assumed Class if none is specified. All other Class approvals satisfy Class A requirements at a minimum.
- Class B Chemical resistance of ≤ 2 on GMW14445. Shift knob, steering wheel, door pull, and parts in the resting leg contact zone for console sides and door trim areas must be specified as Class B. (Class D may also be used.)
- Class C Resistance to fine Scratches $\geq 95\%$ gloss retention on GMW14125. Console horizontal trim, high gloss black colors or other highly reflective, high gloss metallic or solid dark color used in surfaces wider than 1 cm must be specified as Class C. (Class D may also be used.)
- Class D Meeting requirements of, needing performance to, both the Class B and Class C characteristics.

1.2 Symbols. Approved materials will be identified in the GM Materials Approval Databases (Appearance Data Base (Blue Sky)) by construction codes. These GM internal codes identify the decoration by the following elements Technology, Surface, Topcoat Chemistry, Backing Layer and Grade and will be defined by the appropriate GM Materials Engineer during initial construction approval. See Appendix A Table A1 for explanation of these codes.

1.3 Applicability. Typical applications include, but are not limited to, door trim spears, door pull accents, switch plates, console trim, instrument panel trim, integrated center stack trim, and gear shift knobs.

1.4 Remarks. New decorative film constructions (film type, surface type, topcoat and chemistry) must be approved before the intended program Integration Vehicle Engineering Release (IVER). Contact the GM Materials Engineer to cover the specific requirements.

2 References

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

2.1 External Standards/Specifications.

ISO 105-A02	ISO 2808	ISO 20433
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2.2 GM Standards/Specifications.

GMW3059	GMW6992	GMW14334	GMW14829
GMW3208	GMW14124	GMW14444	GMW14892
GMW3221	GMW14125	GMW14445	GMW16853
GMW3232	GMW14162	GMW14698	
GMW3417	GMW14270	GMW14729	

2.3 Additional References.

2.3.1 Cleaners.

- Sonax Window Cleaner 338241 (Europe)
- Ammoniated Window Cleaner (North America)
- Sonax Interior Cleaner 321200 (Europe)
- Fantastik or Formula 409 (North America)
- Sonax Stain Remover 653200 (Europe)
- Armor-all Cleaner (North America)
- Armor All Protectant (North America)

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221. All test specimens shall be conditioned to GMW3221 Code B, for a minimum of 24 h before and after completion of test unless the test method indicates that standard conditioning is not required. All adhesively bonded systems shall be subjected to testing after a minimum aging period of 72 h following the bonding process.

3.2 Technology/Construction and Process Documentation Management. Appendix A, Data Sheet A1 is a Decorative Trim Construction Specification Sheet which reports each layer's general composition, printing process, topcoat chemistry, texture, carrier, backing layer, and substrate with thickness and process criteria as well as a graphical representation of the layers. Curing mechanisms used for topcoats must be clearly identified; both sheet cure and post forming. Appendix A, Data Sheet A1 will be completed for each construction and all subsequent patterns to ensure the definition of the construction code is correct for each pattern. In addition to completion of Appendix A, Data Sheet A1, the supplier's process technical data sheet will be submitted for each technology. This data sheet will include the maximum recommended elongation, processing temperature ranges, any blank size or pattern spacing recommendations and cure techniques and conditions or special handling needs such as formable masks.

3.3 Testing Requirements. All film approvals must be performed on production intent samples. The samples shall consist of production process-like decorated, molded plaques, or production parts, or surrogate parts, or film samples as described in Table B1 in Appendix B. If the film is to be thermoformed and insert molded in production, the tested samples must have the same preparation technique. There may be additional, unique component testing required by GMW14444 or the Engineering Subsystem Technical Specification that the decorative trim may be required to meet for final Validation or Production Part Approval Process (PPAP) approval.

3.3.1 Technology/Construction Requirements. These requirements describe the initial testing for a new decorative film construction. Construction approval may be granted on an automotive designed new construction/technology but it need not be a GM visually approved pattern.

3.3.2 Color Requirements. For specific color/pattern approval, the reduced testing from the Color Requirements of Table B1, column for the specific Type is all that is required. For each construction and color, Data Sheet A1 (Construction Sheet) must be submitted to verify that the color/pattern is indeed the same as the construction (see Appendix A). In the event a construction disclosure is not made, all construction and color requirements must be tested on the visually approved color and pattern submitted to GM.

3.3.3 Part Requirements. All film Types have some material testing requirements for the production part; tests that are required to be performed on the production process, production part and submitted for Validation or PPAP, and are tests for which the typical plaque testing presented to this specification is not appropriate as surrogate for and predictive of the production part. Film Types B, C and D additionally have these part testing requirements for Material approval to this specification based off of a similar production part. These additional requirements, at a minimum, are defined in Table B1 and are specific to the film performance and interaction with the process. The expectation is that these tests will be completed on each geometry of part for production and from the production process at the production supplier.

3.3.4 Test Reports. Use Appendix A, Data Sheet A2 to report all test results.

4 Manufacturing Process

Not applicable.

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.

5.3 Inspection and Rejection. Samples of components or materials released to a GM material specification shall be tested for conformity with the requirements of this material specification and approved by the responsible Engineering department prior to commencement of delivery of bulk supplies.

A new approval must be received for any changes, e.g., properties, manufacturing process, location of manufacture, etc. If not otherwise agreed, all testing and documentation normally required for initial release must be completed.

It is the responsibility of the supplier to inform the customer in a timely manner, without solicitation, and to include documentation of all modifications of materials and/or processes and to apply for a new release.

5.4 Material Safety Data Sheets/Safety Data Sheets (MSDS/SDS). For new product submissions, or when a change in chemical composition of an existing product has occurred, a complete copy of the Material Safety Data Sheet/Safety Data Sheet must be submitted in compliance with the Globally Harmonized System of Classification and Labeling of Chemicals (GHS) requirements or other country-specific MSDS/SDS requirements.

5.5 All materials supplied to this standard must comply with the requirements of the International Material Data System (IMDS) and GMW3059, **Restricted and Reportable Substances**.

6 Approved Sources

Materials supplied to this specification must be approved by General Motors.

A list of approved materials can be found in the Appearance Database (Blue Sky). This GM Material File is provided to third parties to reduce redundant testing of materials. If approved material already listed is used, the part supplier can use GM Material File reference for Production Part Approval Process (PPAP) material approval. If the decision is made to use a not yet approved material, contact GM Materials Engineering, Finishes and Coatings Global Subsystem Leadership Team (GSSLT) for details on the approval process. The material approval process must be completed prior to PPAP start date of the part supplied to General Motors.

Engineering qualifications of an approved source are required for this standard. Only sources listed in the GM Materials File (i.e., GM SupplyPower) under this standard number have been qualified by engineering as meeting the requirements of this standard. To access this list, reference GMW14270 for latest location.

For other GM locations, the responsible engineering group should be contacted to obtain the approved source in that individual country.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

ΔE	Delta E = change in color
3D	3 Dimensional
ABS	Acrylonitrile Butadiene Styrene
AL	Aluminum
AR	Anti-reflective
DOI	Distinctness of Image
E/E	Electrical/Electronic
FIM	Film Insert Molding
GHS	Globally Harmonized System of Classification and Labeling of Chemicals
GSSLT	Global Subsystem Leadership Team
IMD	In Mold Decorating
IMDS	International Material Data System
IML	In Mold Labeling
IVER	Integration Vehicle Engineering Release
MSDS	Material Safety Data Sheet

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Documents
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N/A	Not applicable
PC	Polycarbonate
PET	Polyethylene Terephthalate
PFMEA	Process Failure Mode and Effects Analysis
PPAP	Production Part Approval Process
PUR	Polyurethane
PVA	Polyvinyl Acetate
PVC	Polyvinyl Chloride
PVDF	Polyvinylidene Fluoride
QC	Quality Control
RH	Relative Humidity
SDS	Safety Data Sheet
SOR	Statement of Requirements
SVOC	Semi-Volatile Organic Content
TNR	Temperature Normal Radiation
TOM	Three Dimensional Overlay
TPO	Thermoplastic Olefin
TR	Transfer Resin
UV	Ultraviolet
VOC	Volatile Organic Content

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Material per GMW16717 Type A, Grade 2, Class A. Construction per WD-123456

Where:

GMW	=	GM Worldwide
16717	=	Sequential number
Type	=	Type defined in 1.1.1
Grade	=	Grade defined in 1.1.2
Class	=	Class defined in 1.1.2
Construction	=	WD-123456 (defined in Appendix A Table A1)