



Applied Decorative Graphics on Powertrain Components

1 Scope

This specification describes the requirements for engine component decorative graphics.

1.1 Material Description. Materials shall be classified by Types to identify material construction and properties. Type A shall be hot stamp foils, and Type B shall be ink pad printing.

1.1.1 Type A - Hot Stamp Foils. Foils generally consist of a thin carrier strip of acetate, cellophane, or polyester film (depending on application), a release coat, a color, or metallized coat, and a sizing coat (adhesive). When applied to parts, such products are sometimes called hot stamped coatings or finishes, or just "hot stamps".

1.1.2 Type B - Ink Pad Printing. Pad printing is generally accomplished by adding a graphic design to the substrate using an epoxy ink.

1.2 Symbols. Not applicable.

1.3 Applicability. Where decorative graphics are desired on the powertrain.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW3059	GMW3286	GMW14334	GMW14829
GMW3208	GMW14124	GMW14729	GMW16955
GMW3221			

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 Sample Preparation.

3.2.1 Unless otherwise specified, test panels shall be representative of production intent substrates and coatings.

3.2.2 Pre-test Conditioning. After application of graphic to substrate, condition for at least 72 h at room temperature.

3.2.3 Post Environmental Exposure Conditioning. After environmental exposure, all samples shall be conditioned for 4 h at room temperature.

3.3 Appearance Durability. Samples prepared per 3.2 shall not show any surface deterioration, objectionable shrinkage, objectionable color or gloss change, delamination, edge lifting, cracking, visible adhesion loss, pitting, blistering, or any other degradation after exposure to any of the following tests (per Table 1).

- Heat aging
- Humidity aging
- Thermal cycling
- Salt spray
- Fluid exposure

3.4 Tape Adhesion per GMW14829. Hot stamps and pad prints bonded to a representative production substrate shall have a maximum rating of 1 after the conditions listed in Table 1. Allow 1 h room temperature dwell before testing.

Table 1: Environmental Conditions

Environments
24 h conditioning according to GMW3221 Code A (initial)
Heat aging per 3.5
Humidity exposure per 3.6
Thermally cycled per 3.7
Neutral salt spray 3.8
Fluid exposure per 3.9

3.5 Heat Aging. Samples prepared per 3.2 are oven aged for 336 h @ 150 °C.

3.6 Humidity Resistance (GMW14729 A or B). Expose samples prepared per 3.2 for 168 h.

3.7 Thermal Cycling (GMW14124). Expose samples prepared per 3.2 to two cycles of Cycle C (exterior). Replace -30 °C with -40 °C and 70 °C with 150 °C.

3.8 Neutral Salt Spray (NSS) (GMW3286). Expose samples prepared per 3.2 to 168 h of NSS.

3.9 Resistance to Fluids. All materials shall be resistant to the media they contact, such as aliphatic and aromatic hydrocarbons, fuels, lubricants, oils, greases and alcohols at their places of use. Tables 2 and 3 per GMW16955 define typical requirements for such resistance to fluids, which apply or do not apply based on installation position. The part drawing/math data shall call out the applicable items. Additional fluids, if applicable, shall be noted on the part drawing/math data.

3.9.1 Standard Engine Compartment Resistance. If (Standard) is specified for resistance to fluids, the following fluids in Table 2, as defined in GMW16955, will be tested per GMW14334 - X - Rating 4, 24 h immersion time.

Table 2: Fluid Reference Table for Standard Engine Compartment Resistance According to GMW16955

Fluid	Description
A1/A2	Brake Fluid
C	Commercial Washer Fluid according to GMW14334
E	Engine Coolant
F	Engine Oil
G	Gasoline Fuel
L	Transmission Fluid/Power Steering Fluid

Note: Other regional Original Equipment Manufacturer (OEM) initial fill equivalent liquids may be used per the discretion of the approving GM Engineer. Part shall be resistant to the liquids of the region the part is delivered to.

3.9.2 Additional Fluid Resistance that may be required. If fluids in addition to (Standard) are specified, then use fluids listed in Table 3. Test per GMW14334 - X - Rating 4, 24 h immersion time.

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