



## **Decorative Exterior Decals GM6074M**

### **1 Scope**

This specification covers the performance requirements of exterior decorative striping and graphics with pressure sensitive adhesive and suitable liner. GM6073M film is intended for exterior decal applications, such as striping, ornamentation, etc., and may include premasks for ease of application, protection during application, or paintable premasks. Typical examples are shown in Figure 1. GM6074M is intended for exterior wood grain film. In addition, this specification covers the performance requirements of exterior paint film with pressure sensitive adhesive and suitable liner. The paint film is intended for exterior applications as a substitute for two-tone paint.

#### **1.1 Material Description.**

**1.1.1** Types IA and IB films are used for accent stripes (pin stripes), blackout films and inserts. These types are supplied with a 0.025 mm thick pressure sensitive adhesive (PSA).

**1.1.2** Type II films include usage in various graphic packages, legends, accent/two-tone stripe end caps, inserts, and door handle tapes. These types are supplied with a 0.025 mm thick pressure sensitive adhesive (PSA).

**1.1.3** Types IIIA and IIIB films include usage in various graphics packages, legends, and woodgrains. These types are supplied with a 0.025 mm thick pressure sensitive adhesive (PSA).

**1.1.4** Types IVA and IVB films include two-tone stripes. These types are supplied with a 0.025 mm thick pressure sensitive adhesive (PSA).

**1.1.5** Types VA and VB films include low profile individual letters and emblems, approximately 1 mm thick. They are available in various colors, and bright (chrome, gold, satin chrome, etc.).

**1.1.5.1** Type VA uses a 0.30 mm thick gray acrylic foam tape coated on both sides with an acrylic PSA.

**1.1.5.2** Type VB uses a 0.125 mm thick acrylic PSA.

**1.1.6** Types VI and VII films are used as two-tone replacements and as blackout films. These high performance films (PVDF/acrylic based) are supplied with a 0.025 mm thick pressure sensitive adhesive (PSA).

**1.2 Remarks.** These films have limited gravel and abrasion resistance. (Use GM6254M for gravel and abrasion resistant films). Applications to body panels requiring specific damage resistance must be tested to establish acceptable design application of the decal. Types IB and IVB have limited weathering resistance. Their usage is limited to semi-protected areas, unless weathering performance can be demonstrated with long term Florida and Arizona weathering.

### **2 References**

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

#### **2.1 External Standards/Specifications.**

|            |           |
|------------|-----------|
| ASTM D523  | ASTM G53  |
| ASTM D882  | SAE J400  |
| ASTM D1000 | SAE J1960 |

#### **2.2 GM Standards/Specifications.**

|         |         |
|---------|---------|
| 9981062 | GM9220P |
| 9981285 | GM9226P |
| 9981293 | GM9507P |
| 9981729 | GM9508P |
| 9984064 | GM9515P |
| 9984065 | GM9531P |
| 9985422 | GM9533P |
| GM4465P | GM9625P |
| GM6254M | GMW3001 |
| GM9071P | GMW3059 |
| GM9125P | GMW3221 |

### **3 Requirements**

#### **3.1 General Requirements.**

**3.1.1 Appearance.** Color, pattern, and gloss of material shall be equivalent to approved master standards when viewed under simulated north

sky daylight in a Maspeth Viewing Box per GM9220P. Master standards are available from the releasing division. Specific samples must receive engineering approval.

**3.1.1.1** If gloss is specified on the engineering drawing, the gloss level shall be determined per ASTM D523.

**3.1.2 Premask.** Paintable premask shall be a clear plastic film,  $0.035 \pm 0.005$  mm thick. Other types of premasks specified for ease of application are optional with the supplier. Specific samples must receive engineering approval.

**3.1.3 Sample Conditioning.** All samples are to be conditioned prior to each requirement test to GMW3221, Code A.

## 3.2 Physical Requirements.

### 3.2.1 Sample Preparation.

**3.2.1.1** Unless otherwise specified, test panels shall be representative of production intent substrates and coatings. Contact Materials Engineering for a list of paint systems to test on.

**3.2.1.2** All samples prior to application, unless otherwise specified, shall be conditioned for 4 h at  $23 \pm 2^\circ\text{C}$  and  $50 \pm 5\%$  RH prior to testing.

**3.2.1.3** Unless otherwise specified, the decals shall be tested at  $23 \pm 2^\circ\text{C}$  and  $50 \pm 5\%$  RH. Squeegees shall be used to apply decals to painted test panels.

### 3.2.2 Tests.

**3.2.2.1 Tensile Strength.** Per ASTM D882 Method A, 25 x 150 mm die cut or precision cut sample, 125 mm/minute crosshead speed and a jaw separation of 75 mm.

- Types I, II, III & IV.....13 MPa minimum
- Type V .....10 MPa minimum
- Types VI & VII .....15 MPa minimum

**3.2.2.1.1 Tensile strength after heat aging.** Age the samples for 7 days at  $70^\circ\text{C}$ , cool to room temperature, and test as in 3.2.2.1.

**3.2.2.2 Elongation.** ASTM D882 Method A, 25 x 150 mm die cut or precision cut sample, 125 mm/minute crosshead speed and a jaw separation of 75 mm the elongation shall be 15%. A minimum rating of 8, on the flex test per GM9226P may be substituted for this requirement.

**3.2.2.2.1 Elongation after Heat aging.** Age the samples for 7 days at  $70^\circ\text{C}$ , cool to room temperature, and test as in 3.2.2.1. The elongation after heat aging shall be 15% min. A

minimum rating of 6, on the flex test per GM9226P may be substituted for this requirement.

**3.2.2.3 Adhesion.** Samples prepared per section 3.2.1 and ASTM D1000 Method A, shall meet the minimum adhesion test requirements shown in Table 1.

**Table 1: Minimum Adhesion Requirements**

| Environments                          | Types I, II, III and IV | Types V  | Types VI and VII |
|---------------------------------------|-------------------------|----------|------------------|
| 30 minutes RT aging                   | 350 N/m                 | 500 N/m  | 350 N/m          |
| 72 hours RT aging                     | 600 N/m                 | 1050 N/m | 600 N/m          |
| Aged 168 hrs @ $70^\circ\text{C}$     | 600 N/m                 | 1050 N/m | 600 N/m          |
| Thermally cycled per sec. 3.3.1.2     | 600 N/m                 | 1050 N/m | 600 N/m          |
| After humidity test per sec. 3.3.1.3  | 600 N/m                 | 1050 N/m | 600 N/m          |
| After xenon per sec. 3.3.1.5          | 600 N/m                 | 1050 N/m | 600 N/m          |
| After UV condensation per sec 3.3.1.7 | N/A                     | N/A      | 600 N/m          |

**3.2.2.4 Appearance Durability.** Samples prepared per Section 3.2.1 shall not show any surface deterioration, objectionable shrinkage (visible line of adhesive in the edge of film is unacceptable or no film edge separation from the surrounding paint film for decals with paintable premasks), 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.

- Heat aging.....section 3.3.1.1
- Thermal Cycling .....section 3.3.1.2
- Humidity .....section 3.3.1.3
- Arizona/Florida exposure.....section 3.3.1.4
- Xenon Arc exposure .....section 3.3.1.5
- High Temperature .....section 3.3.1.6
- Ultraviolet Condensation.....section 3.3.1.7

**Note:** When accelerated test results and Florida/Arizona exposure results are in disagreement, the exposure results shall overrule.

Florida and Arizona exposure samples may be washed with a mild detergent and water (ratio 5:95 by volume).

**3.2.2.5 Abrasion Resistance.** Test samples prepared per section 3.2.1 shall show no loss of pattern when tested per GM9515P with a 500 g load using CS-17 abrading wheels.

**3.2.2.5.1 GM6073M Type Decals:**

- Type IA.....500 cycles (min)
- Type IB .....500 cycles (min)
- Type II .....300 cycles (min)
- Type IIIA .....300 cycles (min)
- Type IIIB.....500 cycles (min)
- Type IVA .....500 cycles (min)
- Type IVB .....500 cycles (min)
- Type VA .....300 cycles (min)
- Type VB .....300 cycles (min)

**3.2.2.5.2 GM6074M Type Decals:**

- Type VI .....1000 cycles (min)
- Type VII .....1000 cycles (min)

**3.2.2.6 Gravelometer Resistance** Samples prepared per section 3.2.1 shall exhibit a minimum rating of 4 as received and a minimum rating of 5 after the environmental cycle when compared to GM charts (GM9508P) after testing per SAE J400 at -30°C.

**3.2.2.7 Solvent Wipe Resistance.** Samples prepared per section 3.2.1 shall show no loss of gloss or color change when exposed separately to isopropyl alcohol (99881293), VMP naphtha (9981062), and aliphatic hydrocarbon paint cleaning solvent (9981194) and rubbed briskly with a clean white soft cotton cloth after 60 s penetration time. In addition, Type VI and VII shall exhibit equivalent resistance to current paint systems when subjected to plant materials shown in specification GM9533P.

**3.2.2.8 Fuel Resistance.** Samples prepared per section 3.2.1 shall show no loss of gloss, color change, lifting, surface degradation, or tackiness after being immersed for 10 seconds, 10 times in a fuel consisting of 55% VM&P naphtha, (9981062), and 45% toluene, (9981729) with a 20 s evaporative period between each dip. Repeat this test with synthetic gasohol (40% toluene, 50% naphtha, 5% methanol, 5% ethanol), climatized diesel fuel (9985422), and a 60/40 mixture of reagent grade toluene and evaluate per the above. Type VI and VII shall show no marring per thumbnail test GM9507P.

**3.2.2.9 Acid Resistance.** Apply 3 drops of 0.1 N HCl to a test panel prepared per section 3.2.1. Cover this area with a watch glass and expose at 38°C in an oven for 30 minutes. Cool and rinse with tap water and compare to the control panel. The sample shall show no color change and only a minimal gloss change. Types VI & VII shall exhibit equivalent resistance to current approved paints when subjected to acid rain solution per GM9625P, at pH 3 & 4 and tested per GM9533P.

**3.2.2.10 Detergent and Water Spot Resistance.** Apply 3 drops of tap water and 3 drops of a 1% solution of 9981285 placed separately on a test panel per Section 3.2.1. Expose at 70°C for 4 h. Cool and rinse the panel with tap water and compare to the control panel. The sample shall show no color change and only a minimal gloss change.

**3.2.2.11 Tape Test.** Types I through V. The purpose of this test is to measure the interlayer adhesion between the clear coating, or film, and underlying ink, or film layers. After any of the exposure conditions (72 h room temperature, heat aging section 3.3.1.1, thermal cycling section 3.3.1.2, humidity section 3.3.1.3, and Xenon Arc section 3.3.1.5), the topcoat must not be removed (minimum 99% adhesion) when subjected to GM9071P, Method A. Types VI & VII to be tested to cross cut tape test per GM9071P, Method B, after any of the exposure conditions (see above) with minimum 99% adhesion.

**3.2.2.12 Wrap Test.** Striping material, generally less than 50 mm width, conforming to GM6073M functionally applied to a two-tone paint panel with a simulated hem flange per Figure 2 and exposed to heat aging per section 3.3.1.1 shall not show any surface deterioration, objectionable shrinkage (visible line or adhesive on edge of film is unacceptable), objectionable color or gloss change, delamination, edge lifting, cracking, blistering or other degradation.

**3.2.2.13 Release Liner and Premask.** Removal of the release liner from the premask and transfer shall not cause the transfer to be dislodged from the premask. Upon installation of the transfer, the premask shall be easily removed from the body surface and shall not cause lifting of the decal or tearing of the premask.

**3.2.2.14 Paintable Premask (only).** Install the decal with the premask intact on one panel coated with solvent borne enamel 9984064 and one panel coated with 9984065 per section 4.