



Performance Requirements for Engine Compartment Plastic Parts

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Scope. This standard covers the performance requirements of decorative plastic parts used in engine compartment automotive applications as well as applications near the exhaust system. The parts may be functional within themselves or they may be a subassembly of, or attached to, metallic, decorative or functional parts.

Note: Additional requirements for coated or painted plastic parts (e.g., emblems, painted engine covers) are given in the relevant performance specifications, not by this specification.

Note: All materials used in parts or components in contact with the air of the interior compartment must additionally conform to the interior requirements as specified in GMW14444, Code E.

1.2 Mission/Theme. This standard provides the standard material performance requirements for decorative plastic parts in the engine compartment or near the exhaust system. Typical applications of the standard are engine cover, water reservoir washer fluid, battery covers, sight shields, etc.

1.3 Classification. The operating characteristics of parts covered by this standard are operating at continuous temperature of -30 °C up to a maximum continuous temperature according to Table 1. Peak temperatures can exceed the maximum continuous temperature by 20 °C. These peaks can make up 60 h in the lifetime of the vehicle. Based on the maximum continuous temperature in installation position within the engine compartment or near the exhaust system, the parts are identified by Class 1 thru Class 4 according to Table 1.

Table 1: Operating Temperatures

Class	Maximum Continuous Temperature in Degrees Celsius (°C)	Excursion Temperature in Degrees Celsius (°C)
1	≤ +110	+130
2	+110 to +130	+130 to +150
3	+130 to +150	+150 to +170
4	> +150	> +165

2 References

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

2.1 External Standards/Specifications.

ISO 7724-1 SAE J1545

2.2 GM Standards/Specifications.

GMW3059 GMW14093 GMW14444 GMW16955
GMW3221 GMW14334

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.1.3 Facilities. Not applicable.

3.1.4 Equipment. Not applicable.

3.1.5 Test Vehicle/Test Piece. Unless otherwise specified in the relevant test method for the property concerned, either the complete component or a section thereof shall be used for test pieces. Unless otherwise specified in the appropriate test methods at least one test piece shall be tested.

3.1.5.1 Test pieces shall not be tested within 72 h of manufacture.

3.1.5.2 Conditioning. Unless otherwise stated in respective test procedures, all samples shall be conditioned prior to each requirement test to GMW3221, Code A.

3.1.6 Test Time. Conforming to the relevant test procedures.

3.1.7 Test Required Information. Conforming to the relevant test procedures.

3.1.8 Personnel/Skills. Not applicable.

3.2 Preparation. Conforming to the relevant test procedures.

3.3 Conditions.

3.3.1 Environmental Conditions. Conforming to the relevant test procedures.

3.3.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

3.4 Instructions. Not applicable.

3.5 Data. Not applicable.

3.6 Safety. This standard may involve hazardous materials, operations, and equipment. This standard does not propose to address all the safety problems associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

3.7 Documentation. Samples of components or material released to this standard shall be tested for conformity with the requirements of this standard 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 manufacture 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.

3.7.1 Test Results.

3.7.1.1 Test Report. The test report shall have the same outline and numbering as this test specification.

4 Requirements and Procedure

4.1 Raw Material Specification Conformance. The components of the assembly must be made from materials which meet the individual material specifications shown on the engineering drawing in addition to meeting the requirements of this performance specification.

Engineering qualification of an approved source is required for the material specification called out on the part drawing/math data. Only sources listed in the GM Materials File (MATSPC database) under the material specification number per drawing callout/math data have been qualified by engineering as meeting the requirements of this material specification.

4.2 Regrind. The percent regrind allowed per part shall not exceed the numeric value following the suffix RE symbol. If Home Scrap regrind (scrap that is reused back into the same part) is the only type to be specified for use, the letters HS should follow the numeric regrind value. The use of regrind must not preclude the part from meeting the other specified characteristics of part performance. Furthermore, in any case,

- The maximum regrind content shall be limited to the percent (%) that was validated and submitted for Production Part Approval Process (PPAP).
- The type of regrind must be of the same material that was validated and submitted for PPAP.
- The regrind must be clean, dry, and free of contamination.

Examples:

RE50 = 50% maximum regrind

RE20HS = 20% maximum Home Scrap regrind

Note: If regrind is to be used, all test parts must be manufactured with the maximum amount of regrind the supplier intends to use.

4.2.1 When this specification and RE suffix does not appear on the part print, no regrind is approved for use.

4.2.2 No painted, laminated or plated regrind may be used without the written approval of the GM Materials Engineering Department.

4.3 Resistance to Temperature – Humidity Cycle. Test pieces shall be assembled to jigs or formers so as to simulate as closely as possible actual service conditions. The complete test assembly shall then be subjected to the following test cycle:

4.3.1 This cycle shall be performed one time using the temperatures from Table 2.

- 24 h $\pm$ 1 h at Temperature A.
- 4 h $\pm$ 0.5 h at Temperature C.
- 72 h $\pm$ 1 h at Temperature B.
- 24 h $\pm$ 1 h at +40 °C $\pm$ 3 °C and 93% $\pm$ 5% relative humidity (RH).
- 4 h $\pm$ 0.5 h at Temperature Celsius.
- 24 h $\pm$ 1 h at +22 °C $\pm$ 3 °C.

Humidity paragraph required for moisture containing materials only (e.g., polyamide and polyester). If there are any questions concerning the material, contact the responsible GM Materials Engineer.

Table 2: Test Temperatures

	Temperature in Degrees Celsius (°C)		
	A	B	C
Class 1	+130	+110	-30
Class 2	+150	+130	-30
Class 3	+170	+150	-30
Class 4	Specially defined		-30

Note: Class 4, Temperature A and B shall be defined on the part drawing/math data.

4.3.2 Requirement. Test pieces shall show no cracking, crazing, appreciable color changes, discoloration, cloudiness, blistering, objectionable shrinkage, deformation, loss of adhesion to the substrate between layers of the composite, or other changes detrimental to serviceability. Test pieces shall comply with the dimensions specified on the drawing after completion of the test.

4.4 Resistance of Material to Heat Ageing/Oxidation Stability.

Note: Only for parts made of polypropylene.