



## **Painted Brake Calipers – Paint Performance Requirements**

### **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 Purpose.** This standard defines the tests and requirements (primarily) on painted areas of brake calipers. Possible variants are:

- Cast aluminum, painted
- Cast iron, zinc nickel plated and painted
- Cast iron, painted with subsequently reprocessed (machined surface) and zinc coated areas

**1.2 Applicability.** Any/all vehicles with painted areas on brake calipers.

**1.3 Remarks.** None.

### **2 References**

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

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

|            |            |           |           |
|------------|------------|-----------|-----------|
| ISO 4892-1 | ISO 4892-2 | SAE J2527 | SAE J2635 |
|------------|------------|-----------|-----------|

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

|          |          |          |          |
|----------|----------|----------|----------|
| GMW3059  | GMW14698 | GMW14872 | GMW15357 |
| GMW14333 | GMW14729 | GMW15282 | GMW16745 |
| GMW14334 | GMW14829 | GMW15287 |          |

**2.3 Additional References.** None.

### **3 Test Preparation and Evaluation**

#### **3.1 Resources.**

**3.1.1 Facilities.** As specified by the relevant test methods.

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

**3.1.1.2 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.

**3.1.2 Equipment.** As specified by the relevant test methods.

**3.1.3 Test Vehicle/Test Piece.** Painted brake calipers in the as received condition. If the part design does not provide enough test surface, adequate test panels are allowed.

**3.1.4 Test Time.** Not applicable.

**3.1.5 Test Required Information.** Not applicable.

**3.1.6 Personnel/Skills.** Not applicable.

**3.2 Preparation.** Not applicable.

**3.3 Conditions.**

**3.3.1 Environmental Conditions.** As specified by the relevant test methods.

**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 Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

**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.** The test results shall be represented in a test report with reference to this standard.

## 4 Requirements and Procedure

**4.1 General.** The brake caliper shall be appropriately pretreated before painting. Coatings shall be free of Chromium VI. Chromium VI is not permitted as an adhesion promoter.

**4.2 Organic Coat Requirements.**

**4.2.1** The paint finish shall be free of blisters, drip marks or other surface irregularities.

**4.2.2 Coating Thickness.** The coating thickness is measured with a suitable coating thickness measuring device (e.g., the eddy current principle or ferromagnetic) to an accuracy of  $\pm 2 \mu\text{m}$ .

The coating thickness shall be 70  $\mu\text{m}$  minimum in the decorative area and 40  $\mu\text{m}$  minimum in all other areas with the exception of machined surfaces.

**4.3 Performance Requirements.**

**4.3.1 Scratch Resistance.** Per GMW14698; Tip 2, 4 N minimum.

Requirement: No visible penetration in the as received condition and after brake fluid test.

**4.3.2 Cross Hatch Test.** Per GMW14829, Method A; Rating 0 or 1, in delivery conditions, after temperature resistance test and humidity testing.

**4.3.3 Humidity Environmental Test.** Expose painted parts per GMW14729. There shall be no evidence of blistering or other appearance changes at end of humidity exposure after 240 h.

**4.3.4 Temperature Resistance.** The test parts are stored for  $1 \text{ h} \pm 5 \text{ minutes}$  at  $200 \text{ }^{\circ}\text{C} \pm 5 \text{ }^{\circ}\text{C}$ .

Requirement: No fundamental change in color and loss of adhesion in Cross Hatch Test.

**4.3.5 Corrosion.**

**4.3.5.1 For Cast Iron: Cyclic Corrosion Test.** After exposure to cyclic corrosion testing per GMW14872, EXT, All, 4s, Method 1/2, the parts shall have a corrosion Rating of 10 per GMW15357 after six test cycles (only zinc coated areas are excluded from the assessment after 6 cycles). Minimum Rating of 7 per GMW15357 after Exposure C. Scribe creepback on painted surfaces per GMW15282 after test end for information only.

**4.3.5.2 For Cast Aluminum: Filiform Resistance.** Painted part must meet a filiform resistance requirement of 4 mm maximum length of any filament from the scribe line, when tested per GMW15287, for a period of 672 h