



Structural Adhesive Performance Guideline for the Bonding of Metallic Substrate for After Market Use

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. The test procedures and performance requirements contained in this standard are to serve as a template for the adhesive manufacturers, to aid in the accumulation of test data, and to provide insight as to the possible performance of the adhesive system under the conditions tested. This document is a guide and is not to be construed as an approval for this type of repair by GM, its agents, or dealers.

The acceptability of performance of any adhesive systems, evaluated by means of this standard, shall be the responsibility of the Service Technology Engineer, in conjunction with the Design Release Engineer, for the application intended.

1.2 Applicability. This guideline covers the performance requirements for an adhesive or adhesive system suitable for the structural bonding of metallic substrates for aftermarket service applications.

These adhesives may be used in service to bond replacement body panels (door, deck lid, hood, or roof skins) as an option to, or in conjunction with, welding, rivets, or other mechanical attachment means.

These adhesive systems may also be used in service to bond other automotive parts such as structural components, reinforcements, and body rails.

It is the intention and purpose of this guideline to provide a test protocol for evaluation of adhesive systems that could be utilized in service repair of vehicles.

2 References

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

2.1 External Standards/Specifications.

ASTM D1876	ASTM D5573	ISO 4587	ISO 11343
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2.2 GM Standards/Specifications.

GMW3059	GMW3221	GMW14872	GMW15635
GMW3205	GMW14729	GMW15634	

3 Test Preparation and Evaluation

3.1 Resources.

3.1.1 Facilities. Not applicable.

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.

3.1.2.1 Substrate coupons, 25 mm × 100 mm × 0.8 mm for lap shear testing, 25 mm × 250 mm × 0.8 mm for T-Peel testing and 20 mm × 90 mm × 0.8 mm for High Speed Impact testing.

Note: Substrates evaluated shall be representative of the application intended. It is recommended that the actual substrate used, be recommended by the GM Service Engineer requesting the evaluation.

Metallic substrates evaluated shall be abraded with a 60 grit wheel, so as to simulate a service operation of removal of E-coat on a representative service part used for the repair.

3.1.2.2 Suitable bonding fixtures.

3.1.2.3 Universal tensile test machine capable of measuring loads at an accuracy of 1%.

3.1.2.4 Pendulum or Drop Tower test apparatus capable of performing the ISO 11343 High Speed Impact testing.

3.1.2.5 Heated chamber capable of maintaining 80 °C ± 2 °C.

3.1.2.6 Freezer capable of maintaining -40 °C ± 2 °C.

3.1.3 Test Vehicle/Test Piece. Not applicable.

3.1.4 Test Time. Not applicable.

3.1.5 Test Required Information. Not applicable.

3.1.6 Personnel/Skills. Per laboratory accreditation requirements.

3.2 Preparation. Not applicable.

3.3 Conditions.

3.3.1 Environmental Conditions.

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

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. Report the following:

3.7.1.1 The individual and average lap-shear and T-Peel, and impact strength, along with standard deviation of each sample set.

3.7.1.2 The failure mode and strength (or energy) of each specimen according to ASTM D5573.

4 Requirements and Procedure

4.1 Physical Properties (Uncured Adhesive System). The adhesive and bonding method must be compatible with service repair systems.