GM	WORLDWIDE ENGINEERING STANDARDS	General Specification	GMW16251

Structural Adhesive Performance Guideline for the Bonding of Composite 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. This guideline covers the performance requirements for an adhesive or adhesive system suitable for the structural bonding of composite substrates for aftermarket service applications.

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.

1.2 Applicability. 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.

1.3 Remarks. The acceptability of performance of any adhesive system, 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.

2 References

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

2.1 External Standards/Specifications.

ASTM D5041	ASTM D5573	ASTM D5858	SAE J1523

2.2 GM Standards/Specifications.

GM9751P	GMW3221	GMW15288	GMW15635
GMW3059	GMW14124	GMW15634	
GMW3205	GMW14729		

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 × 2.5 mm and 100 mm × 150 mm × 2.5 mm.

3.1.2.2 Suitable bonding fixture.

3.1.2.3 Water soak chamber capable of maintaining 54 °C ± 2 °C.

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

3.1.2.5 Side Impact machine as described in GM9751P.

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3.1.2.6 Sixty (60) degree wedge as described in ASTM D5041.

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

3.1.2.8 Oven capable of maintaining 70 °C ± 2 °C.

3.1.2.9 Oven capable of maintaining 80 °C ± 2 °C.

3.1.2.10 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 average lap-shear and side impact strength along with standard deviation of each sample set.

3.7.1.2 The average wedge failure initiation energy and failure propagation energy along with standard deviation of each sample set.

3.7.1.3 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.

4.2 Physical Properties/Requirements (Cured Adhesive System).

4.2.1 Paint Compatibility. The adhesive system must be compatible with the proposed service paint systems and processes.

4.2.2 Process Compatibility. The performance of the cured adhesive must meet all requirements of this standard when process according to the repair process for the intended application.

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