



## **Structural Bonding Composites Acceptance Criteria**

### **1 Scope**

**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 provides the manufacturing acceptance criteria for structural bonding in automotive products for which GM is responsible for establishing or approving product design. This standard does not apply to weld through, metal bonding, hem flange or anti-flutter (semi-structural) adhesives.

**1.2 Applicability.** This standard applies to any applications where a structural adhesive (9982247, 9982265, 9986130, 9986133, 9986223, 9986274 or 9985693) is used to bond automotive fiber reinforced plastic substrates.

The criteria established in this standard become mandatory when referenced in product release information. Deviations from any adhesive criteria provided in this standard must be identified in product release information or an approved Product Quality Standard (PQS) document.

**1.3 Usage.** Structural bonds are considered satisfactory when they carry the intended service loads for a required period. Service loads on structures containing adhesive bonds are varied in both type and magnitude and cannot be addressed by this standard. Therefore, while the adhesive acceptance criteria of this standard are consistent with service loading requirements, they have been established specifically for use in process and product monitoring. Any attempted application of this document to other uses, such as post-crash quality assessment, may lead to an erroneous result or conclusion. Discrepant adhesive applications may still contribute to the integrity of the assembly by retaining a portion of their engineering properties.

**1.4 Clarification.** For clarification of this standard or editorial comments, email the GM Global Weld Council at: weld.council@gm.com.

Proposed changes to this standard must be presented to the Global Weld Council. To suggest a change to this standard, reference the "Procedure for Weld Standard Changes" on the Global Weld Council's web page.

### **2 References**

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

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

None

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

|         |         |         |          |
|---------|---------|---------|----------|
| 9982247 | 9985693 | 9986133 | 9986274  |
| 9982265 | 9986130 | 9986223 | GMW15563 |

#### **2.3 Additional References.**

- GM Global Quality Requirements
- Global Launch Manual, Section B4
- Global Manufacturing System (GMS) Operating Guidelines

### 3 Requirements

#### 3.1 General Acceptance Criteria.

**3.1.1 Correct Material.** The structural adhesive applied shall be the material specified in the design release documentation and/or the Process Data Sheet (see Figures A1 and A2). The product is non-conforming if incorrect material is being applied.

**3.1.2 Shelf-Life.** The “shelf-life” of the material is stated in the associated material specifications. Production material that exceeds the specified shelf life is considered non-conforming and shall not be used. Incoming adhesive materials is to be stored in a manner that is consistent with the conditions specified in the material specification.

**3.1.3 Material Open Time.** The material open time of the mixed adhesive material is specified in the (mixed material) Materials Specification. Bonding operations exceeding the specified “open time” shall be judged to be non-conforming. Controls should be in place to avoid production bonding operations that are in excess of the specified open time.

**3.1.4 Substrate Condition.** Bonding surfaces are required to be free from contaminants such as dirt, dust, corrosion, or other foreign matter. Visibly contaminated parts shall be wiped with a clean, paint shop quality cloth moistened with a 50/50 mixture of Isopropyl Alcohol and water. The part shall be allowed to dry prior to application of adhesive.

#### 3.2 Visual Acceptance Criteria.

**3.2.1 Bead Location.** The bead position on the flange shall be in agreement with the design release documentation including Process Data Sheet and/or the Adhesive Visual Aid (see Figures A1 and A2). Beads not properly located require the process to be adjusted and/or returned to the qualified set-up. Bead position across the faying surface may be adjusted to achieve wet out and to minimize or eliminate excess material squeezed out of the joint. Missing beads are not permissible.

**3.2.2 Voids, Skips or Interruptions.** Adhesive voids, skips or interruptions observed in the as applied bead require the process to be adjusted/returned to the qualified set-up. Portions of bead where voids, skips or interruptions are permissible are to be documented on the Sealer Visual Aids or an approved Product Quality Standards (PQS).

#### 3.3 Measurable Acceptance Criteria.

**3.3.1 Post-cure Bond Line Adhesion.** During destruct tests the separated panels must demonstrate either cohesive failure within the bond, evidence of resin release and/or fiber tear of the substrate over 75% of the specified bead length with less than 50 mm of discontinuity within any 250 mm bond segment. Adhesive bond lines that do not have an effective bond line length greater than 75% of the specified length are non-conforming.

**3.3.2 Post-cure Bond Line Width.** Bond line width refers to the width of the cured “ribbon” of adhesive measured at the narrowest point of bond line on each contact surface. Segments with post-cure bond line widths less than the specified minimum are discontinuities and require the process to be adjusted and/or returned to the qualified set-up.

#### 3.4 Disposition/Repair Procedure.

**3.4.1 Disposition.** Suspect product with non-conforming adhesive bonds shall be handled in accord with GM Global Quality Requirements for Corrective Action and Nonconforming Material.

**3.4.2 Repair Procedures.** When required, repair of parts, assemblies or vehicles with nonconforming adhesive bonds shall be performed according to the procedures specifically authorized by the appropriate Product Engineer.

### 4 Manufacturing Process

**4.1 Process Control.** The source is responsible for establishing practices and test methods to assure that the criteria of this standard are met and are consistent with the GM Joining and Dispense Process Control Procedure, GMW15563.

**4.2 Two Part Adhesive Mix Control.** The source is responsible for establishing practices and test methods to assure that the cure and/or post-cure cycle criteria are met and are consistent with the applicable material specifications.