



Adhesive Performance Requirements of Bonded FRP and Non-FRP Assemblies

1 Scope

1.1 Material Description. This specification defines the performance requirements of production parts made by bonding Fiber Reinforced Plastics (FRP) substrates, such as Sheet Molding Compound (SMC), and non-FRP substrates, such as Xenoy, Bexloy or Structural Reaction Injection Molded (SRIM). Requirements for parts for interior applications (Type I), exterior applications (Type II), and Cathodic Electrodeposition Primer (ELPO) exposure (Type III) vary and are noted by type designations where necessary. If no type is listed, the default shall be Type II.

1.2 Symbols. Not applicable.

1.3 Applicability. Interior, exterior, and ELPO exposure applications. See Table 1 for tear-down requirements by type.

1.4 Remarks. The supplier is responsible for evaluating both in-house approved adhesives (production intent) as well as any GM assembly plant adhesives that will bond the substrates.

1.4.1 The Approved Adhesive Applications (AAA) process per GMW15625 is required as part of this specification. Omission of this requirement must be approved by materials engineering.

2 References

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

2.1 External Standards/Specifications.

ISO 10365

2.2 GM Standards/Specifications.

GMW3059	GMW14270	GMW15921	GMW16966
GMW3221	GMW15625	GMW16184	GMW17205
GMW14124			

2.3 Additional References.

- Bonded FRF/non-FRF Part Component Drawing(s)

3 Requirements

3.1 Requirements on Test Specimens. Reference GMW3221.

3.2 Sample Conditioning. All samples are to be conditioned per GMW3221, Code A, prior to each requirement test per 3.11, 110 °C test temperature is required for non-FRP samples only.

3.3 Surface Contaminants. All bond surfaces must be free of in-mold coatings, paint primer, mold release, or other contaminants.

3.4 Adhesion Requirements. Adhesive must satisfy the requirements of GMW15921 on production intent substrates.

3.5 Plastic Surface Preparation - Primerless Adhesive Systems. Prior to bonding, bond surfaces must be wiped with a clean, dry, paint shop quality rag to remove all surface dirt, dust, and gross contaminants.

3.6 Plastic Surface Preparation - Primer Adhesive Systems. Prior to bonding, bond surfaces must be **wash primed** with the adhesion promoter (primer). This not only cleans the surface to remove gross contaminants, but also deposits a chemical layer necessary for a good, durable bond. Dyes or pigments are

required so the area primed can be seen. The adhesive is applied after the flash off time of the primer is met, according to the technical data sheet for the adhesive.

3.7 Metal Surface Preparation. Metal surfaces must be primed, such as ELPO, dip prime, or two-part air dry epoxy primers. Surfaces must be cleaned using a clean, dry, paint shop quality rag to remove all surface dirt, dust, water, and gross contaminants.

3.8 Adhesive Thickness (bond gap). The recommended thickness is 0.8 mm ± 0.15 mm. See the bonded FRF/non-FRF part component drawing(s) for the actual thickness requirement.

3.9 Adhesive Width. Recommended width is 18.0 mm ± 2.0 mm. See the bonded FRF/non-FRF part component drawing(s) for the actual width requirement.

3.10 Adhesive Squeeze-out. Squeeze-out must be removed to flush or below on secondary visible edges. This requirement may be waived if squeeze-out does not adversely affect appearance, fit, or function requirements. See GMW17205.

3.11 Bond Line Read Through (BLRT). No visible BLRT is acceptable in order to meet the appearance requirements of part.

3.12 Bonding and Curing. Assemblies are to be bonded and cured according to production intent process. This includes initial cure and oven exposures at the sub assembler as well as the GM assembly plant.

3.12.1 The adhesive bonding process shall be documented on the Adhesive Bonding Process Sheet per Table A2 in GMW15625.

3.13 Destructive Test Crowbar per GMW16966. Adhesive testing of assembled part must yield the following, when tested per Environments in Table 1:

- No more than 50 mm in 250 mm (linear) shall yield an unacceptable failure mode.
- Voids in the footprint area are unacceptable.
- The failure mode is evaluated per ISO 10365. Calculate percentage as follows:

$$\text{Percent} = \frac{\text{Bonded Area}}{\text{Design Footprint}} \times 100$$

A minimum of three (3) samples shall be tested per environment. The sample can be a full part or sections cut from a full part. If sections are used, they should be distributed between the various environments. The water soak samples should be full parts so that cut edges are not exposed.

3.14 Thermal Stress/Accelerated Humidity. Three (3) bonded assemblies shall be exposed to 85 °C, 99% Relative Humidity (RH) environment for 35 days. Assemblies shall have not bond separation after exposure. Checks to be made with a feeler gauge to confirm no separation.

Note: This test is only required for assemblies where the Coefficient of Linear Thermal Expansion (CLTE) of the individual substrates differs by more than 1.5×10^{-5} mm/mm K.

3.15 All materials supplied to this standard must comply with GMW3059, **Restricted and Reportable Substances**, including the requirement to submit a full material composition disclosure to GM via the International Material Data System (IMDS) or via a completed GMW3059 report form.