



ADHESIVE, EPOXY, WELDABLE, THERMAL CURE, HEM FLANGE

WSS-M2G393-A1

1. SCOPE

The material defined by this specification is a pumpable, one component, thermal curing, weldable epoxy resin base, structural adhesive for aluminum and steel with bondline spacers for bonding metal in hem applications. This material has a lower modulus which may allow for better part processing during curing conditions.

2. APPLICATION

This specification was released originally for materials to structurally bond metal-to-metal body components such as the inner and outer panels (hem flange) of deck lids, doors, and hoods, etc. This adhesive can be used to bond oily, unclean metal substrates. Bondline spacers are added to the component to maintain a 0.25 mm bondline thickness during the hemming process.

2.1 LIMITATIONS

This material has not been evaluated for applications in vehicle body structure and proper DV/PV testing should be developed if these applications are considered.

3. REQUIREMENTS

3.1 APPROVED SOURCES

This specification requires the use of approved sources. Only the sources identified on the Ford Approved Source List (ASL) can be used when this specification is listed on the drawing, CAD file, or other documents. The list of approved sources is located within Ford at www.mats.ford.com or available externally through a Ford Materials Engineer.

3.2 CONDITIONING AND TEST CONDITIONS

All test values are based on material conditioned for not less than 24 h prior to testing in a controlled environment of 23 +/- 2 °C and 50 +/- 5% relative humidity. Testing of the material should occur in the conditioning environment or soon after removal, some portions of this specification indicate alternative conditioning.

3.3 INFRARED SPECTROPHOTOMETRY AND/OR THERMAL ANALYSIS

IR spectra and thermograms from initial material approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. The material supplier shall ensure that all future material supplied to the specification shall produce IR spectra and thermograms that correspond to the reference standard when tested under the same conditions.

3.4 RHEOLOGY

Suppliers must submit flow characterization data to Ford Motor Company for flow modeling and process window determination. For a specified temperature range, the requested properties include, but are not limited to, viscosity, yield stress, apparent activation energy for viscosity and apparent activation energy for yield stress. This data constitutes the referenced standard and shall be kept on file at the designated material laboratory.

Date	Action	Revisions	Rev. 0
2015 06 03			



3.5 SYSTEM COMPATIBILITY

Initial adhesive approval was based on a specific material system which included the substrate, stamping lubricants and adhesive. The material system was oven cured using specific production process parameters. Substrate choice, stamping lubricants, stamping plant processing conditions and assembly plant processing conditions may affect adhesive performance. If any of these parameters are changed, the adhesive performance must be validated using the new parameters.

3.6 MATERIAL PROPERTIES

3.6.1 Solids 99% min
(ASTM D 2834, except heat for 3 h at
102 +/- 3 °C in a mechanical convection
Oven, save sample for next test)

3.6.2 Ash +/- 3%
(ISO 3491, Method A, 760 +/- 30 °C)

The ash tolerance for any one supplier shall be +/- 3%, based on the recorded ash of their original approved production sample. Reference para 4.3.

3.6.3 Weight Per Volume Report
(ASTM D 816)

Weight tolerance for any one supplier shall be +/- 0.02 kg/L, based on the recorded weight to their original approved production sample. Reference para 4.2.

3.6.4 Bondline Spacers

Material shall contain spacers to allow a bondline gap of 0.25mm

3.7 MANUFACTURING PROPERTIES

3.7.1 Viscosity
(FLTM BV 103-01 2.64 mm orifice,
550 kPa pressure, Method A, test at 25 +/- 2 °C)

3.7.1.1 As Received +/- 4 s, Report

The viscosity tolerance for any one supplier shall be +/- 4 s, based on the recorded viscosity of the original approved production sample. Reference para 4.1

3.7.1.2 Aged, 7 days at 40 +/- 2 °C 10% max increase from as received viscosity

3.7.1.3 Aged, 90 days at 27 +/- 2 °C 30% max increase from as received viscosity

Final approval of a specified material viscosity for production shipments shall be made by during material trial, preferably at equipment suppliers lab testing. In all cases, the viscosity shall be within specification limits as identified on the material control plan.

3.7.2 Differential Scanning Calorimetry,
(20 +/- 1 mg sample size, 5 °C / min heating rate,
25 - 250 °C temperature range,

Onset of reaction, min 80 °C





Submit Heat Flow vs. Temperature curve)

3.7.3 Sag Resistance

(FLTM BV 118-01, 6 mm material thickness, substrates per para 4.4, oven schedule per para 4.5, one panel each bake)

Horizontal
Vertical
Inverted

No measurable movement
No measurable movement
No loss of material

3.7.4 Slump Resistance

Test Assembly:

Two 25 x 100 mm coupons, substrates per para 4.4, with two 38 x 12 x 3 mm spacers. The spacers are placed at each end of one of the coupons, and sufficient adhesive is applied between the spacers to fill the gap. The second coupon is placed on top of the adhesive and spacers (Figure 1). Clamp the assembly with spring clips at each end. Remove excess adhesive from all exterior edges with a spatula.

Test Method:

Prepare 3 assemblies per substrate.

Subject one assembly per substrate to exposures.

After exposure, condition assemblies at 23 +/- 2 °C for 24 hours, then bake at minimum bake per para 4.5.

Determine the slump by measuring adhesive loss from the bottom of the assembly.

Record observations of any adhesive loss after exposure or after bake.

Repeat the above procedures for maximum bake per para 4.5.

3.7.4.1 Aged at 24 h at 23 +/- 2 °C
(Method and Assembly per 3.7.4) 3 mm max

3.7.4.2 Aged at 30 days at 23 +/- 2 °C
(Method and Assembly per 3.7.4) 3 mm max

3.7.4.3 Aged at 30 days at 50 +/- 1 °C
(Method and Assembly per 3.7.4) 3 mm max

3.7.5 Bridging 3 mm max
(SAE J243 ADS-9, Section 3.4,
Method D, nonflow fixture, substrates per para 4.4,
bake conditions per para 5.5)

3.7.5.1 Aged at 24 h at 23 +/- 2 °C
(Method and Assembly per 3.7.4) 3 mm max

3.7.5.2 Aged at 30 days at 23 +/- 2 °C
(Method and Assembly per 3.7.4) 3 mm max

3.7.5.3 Aged at 30 days at 50 +/- 1 °C
(Method and Assembly per 3.7.4) 3 mm max

3.7.6 Wash Resistance
(FLTM BV 116-01, Method A,
1.5 mm material thickness, substrates per para 4.4)

No measurable movement,
displacement or wash-off.