



ADHESIVE, EPOXY, WELDABLE, THERMAL CURE, STRUCTURAL, HEM FLANGE

WSS-M2G575-A

1. SCOPE

The material defined by this specification is a pumpable, one component, thermal curing, weldable epoxy resin base, structural adhesive for steel with bondline spacers for bonding metal in hem applications.

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.

3. REQUIREMENTS**3.1 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS**

Material suppliers and part producers must conform to the Company's Standard Requirements For Production Materials (WSS-M99P1111-A).

3.2 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.

3.3 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.

3.4 MATERIAL PROPERTIES

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

Date	Action	Revisions	Rev. 3
2016 10 18	Editorial	See Summary of Revisions	S. Short, NA
2014 05 08	Revised	See Summary of Revisions	B. Witkowski, NA
2010 07 20	Activated		B. Witkowski, NA



- 3.4.2 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.

- 3.4.3 Weight Per Volume
(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.

3.5 MANUFACTURING PROPERTIES

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

- 3.5.1.1 As Received +/- 4 s
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

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

- 3.5.1.3 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.

- 3.5.2 Differential Scanning Calorimetry, Onset of reaction, min 80 °C
(20 +/- 1 mg sample size, 5 °C / min heating rate,
25 - 250 °C temperature range,
submit Heat Flow vs. Temperature curve)

- 3.5.3 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 | No measurable movement |
| Vertical | No measurable movement |
| Inverted | No loss of material |

- 3.5.4 Slump Resistance, max

- * Assembly aged 24 h at 23 +/- 2 °C
- * Assembly aged 30 days at 23 +/- 2 °C
- * Assembly aged 30 days at 50 +/- 1 °C

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



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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.

- 3.5.5 Bridging max 3 mm
(SAE J243 ADS-9, Section 3.4,
Method D, nonflow fixture, substrates per para 4.4,
bake conditions per para 5.5)
Assembly aged for 24 h at 23 +/- 2 °C
Assembly aged 30 days at 23 +/- 2 °C
Assembly aged 30 days at 50 +/- 1 °C
- 3.5.6 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.
- 3.5.7 Electrocoat Compatibility
Shall not contaminate electrocoat primer bath or cause electrocoat film irregularities.
(FLTM BV 119-01, use current production paint as identified by Material Engineering,
substrates per para 4.4)
- 3.5.8 Welding Acceptance Test Must pass
(FLTM BV 109-01, gun application, 25 coupon assemblies per condition)
steel substrates only
As prepared (fresh material)
Assembly aged 30 days at 23 +/- 2 °C
Assembly aged 30 days at 40 +/- 2 °C
- 3.5.9 Flammability with Continuous Spot Welding
(FLTM BV 114-01, substrates per para 4.4)
During welding tests, less than 5% of the welds shall exhibit a flame and all shall be self-extinguishing within 30 s.
- 3.5.10 Odor
Shall be free from objectionable odors as determined by the manufacturing facility, both as received and after storage. Cured samples should be tested per FLTM BO 131-03 and have a maximum rating of 3. Materials with a rating higher than 3 must be reviewed with materials engineering, and additional testing including testing of odor samples in all regions of potential use must be performed. Region of use is defined as where completed vehicle will be shipped to customer.
- 3.5.11 Material Consistency
Shall be a smooth homogenous mixture, free from entrapped air, foreign materials and any properties detrimental to normal production operation.
- 3.5.12 Storage Stability
Heat greatly accelerates aging. The material shall be stored in closed containers away from all sources of heat. The shelf life of the material shall be 3 months from date of