

ENGINEERING MATERIAL SPECIFICATION

Material Name

Specification Number

**ADHESIVE, EPOXY, ONE COMPONENT, INDUCTION HEAT
RESPONSIVE, STRUCTURAL, BONDLINE SPACERS**

WSS-M2G300-A2

1. SCOPE

The material defined by this specification is a pumpable one-component, induction heat responsive, epoxy resin base, structural adhesive with bondline spacers. Full adhesive strengths are attained after oven cure.

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 decklids, doors and hoods, etc. This adhesive can be used to bond oily, unclean metal substrates, such as hot dip and electro-galvanized steel. Bondline spacers have been added to the adhesive to maintain a 0.25 mm bondline thickness during the hemming process. Adhesive must be able to be applied using the application processes described in para 5.7.

The recommended induction heating process for body components is a minimum 4 second cycle time at metal temperatures of 191 °C. Full adhesive strengths are attained after oven cure. Recommended material cure schedules are 171 °C metal temperature for 10 minutes minimum and 205 °C metal temperature for 30 minutes maximum.

Prior to use, the adhesive must be evaluated under the component production parameters. The choice of substrates, stamping lubricants, stamping plant process conditions, assembly plant process conditions and specific design application may affect adhesive performance. Compliance with this specification does not guarantee the adhesive will function for all potential applications on a vehicle.

Note: Material defined by this specification is intended to replace ESB-M2G300-A. The material approved to WSS-M2G300-A2 reflects a minor formulation change to compensate for the addition of bondline spacers over material approved to ESB-M2G300-A.

3. REQUIREMENTS

3.0 STANDARD REQUIREMENTS FOR PRODUCTION MATERIALS

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

Date	Action	Revisions
2003 01 31	Revised	Para 3.0 inserted ; Para 3.1, 3.2, 3.3, 3.10, 3.11,4 deleted
1996 02 09	Activated	N.E. Lindsay G.A. Molar

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3.4 SYSTEM COMPATIBILITY

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

3.5 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 reference standard and shall be kept on file at the designated material laboratory.

3.6 MATERIAL CHARACTERISTICS

3.6.1 VISCOSITY

(SAE J1524, VIS-2, 2.64 mm orifice, 550 kPa)

As Received
(Conditioning Method B)

+/- 10 s

The viscosity tolerance for any one supplier shall be +/- 10 s, based on the recorded viscosity of the original approved production sample. Reference para 5.1.

. Aged, 7 days at 40 +/- 2 °C 20 % max increase from initial

. 90 day Storage Stability at 23 +/- 2 °C
and 32 +/- 2 °C

The supplier shall provide a viscosity profile versus time from initial through 90 days storage at 23 +/- 2 °C and 32 +/- 2 °C. Measurements shall be taken at weekly intervals. Curves shall be made available to Materials Engineering prior to addition to the Approved Source List.

Final approval of a specified material viscosity for production shipments shall be made by the affected manufacturing activity. In all cases, the viscosity shall be within specification limits as identified on the material control plan.

3.6.2 Solids, min

99 %

(ASTM D 2834, except heat for 3 h at 102 +/- 3 °C in a mechanical convection oven, test each component and mixed product, save sample for next test)

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3.6.3 ASH, max 40 %
(ISO 3491, Method A, 760 +/- 30 °C.
Based on the solids weight)

3.6.4 Weight Per Volume
(ASTM D 816)

The weight tolerance for any one supplier shall be +/- 0.02 kg/L, based on the recorded weight of their original approved production sample. Reference para 5.2.

3.6.5 Sag Resistance
(FLTM BV 118-01, 6 mm material thickness, substrates per para 5.4, oven cure per para 5.5.2, one panel each bake)

.	Horizontal	3 mm
.	Vertical	3 mm
.	Inverted	No loss of material

3.6.6 Wash Resistance
(FLTM BV 116-01, Method A, 1.5 mm material thickness, substrates per para 5.4)

No measurable movement, displacement or wash off.

3.6.7 Electrocoat Compatibility
(FLTM BV 119-01, use current production paints as identified by Material Engineering)

Shall not contaminate electrocoat primer bath or cause electrocoat film irregularities.

3.6.8 Expansion No porosity or expansion
(Substrates per para 4.4, one panel each substrate)

Extrude a 13 x 200 mm adhesive bead onto a 100 x 300 mm panel.

Place the test panel in an air circulating oven and bake at 205 +/- 2 °C for 30 min.

After bake, condition test panel at 23 +/- 2 °C for 1 h minimum.

Cut the panel lengthwise through the center of the adhesive.

Examine the adhesive for any voids, porosity or expansion caused by entrapped air or internal gassing.