

**ADHESIVE, MOISTURE CURING URETHANE, TWO COMPONENT,
PRIMERLESS TO ELECTROCOAT, HIGH MODULUS****WSS-M2G41-A1****1. SCOPE**

The material defined by this specification is a two component moisture curing urethane adhesive which is primerless to electrocoat chemistries. This material is designed to be used in hidden areas not exposed to direct sunlight. This material is not intended to be bonded directly to glass.

2. APPLICATION

This specification was released for bonding a moon roof module electrocoated frame to an electrocoated body. The material will bond primerless to e-coated surfaces that are contaminate free and can also be used in conjunction with metal flange primers.

2.1 MANUFACTURING PROCESS RECOMMENDATION

- These adhesives are moisture sensitive and require special handling for manual and automated process.
- Mix ratio shall be as recommended by the material supplier and testing to be performed with recommended mix ratio unless otherwise stated.
- Approved suppliers are responsible for maintaining the accuracy and relevancy of these process parameters (in their Process Standard). Approved suppliers must submit any changes to these process parameters in a timely manner (within 30 days) for review and approval by Materials Engineering, Vehicle Operations, and Product Development Engineer.

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 UNCURED ADHESIVE PROPERTIES**3.2.1 Viscosity at 23 °C (Rotational Rheometer)**

Tempering Time: 300 s Pause Interval: 180 s at 131 1/s

Downward Measure: 131 1/s - 20 1/s in 120 s (30 Measure Points)

	Viscosity (Pa.s)	Yield Point (Pa)
3.2.1.1 As received		
Component A	35.0 – 45.0	1500 – 2500
Component B	15.0 – 25.0	2000 – 3000
3.2.1.2 After Aging, (336 h at 30 +/- 2 °C)	5% change after aging, max.	

Date	Action	Revisions	Rev. 0
2018 06 13	Released		

**Documents**

2. Kenopka, NA

Document Sharing Hub



3.2.2 Rheology (Component A and B)

(SAE J1524, cone and plate rheometer with 40 mm diameter parallel plates, 500 micron gap, 50 Pa/sec ramp, stress controlled rheometers use stress range 0 - 3500 Pa, strain controlled rheometers use strain range 0 - 100 sec⁻¹, evaluate material to highest stress of strain as the formulation will allow, report material batch/lot number, identify rheometer make and model, for each test condition report yield stress and submit plots for shear stress vs shear rate, submit plot for viscosity vs temperature at mid-range shear rate.

3.2.2.1 Initial (as received)
Test at 23 +/- 1 °C
Test at application temperature +/- 2 °C
Test over range 10 to 50 °C at increments of 10 °C

3.2.2.2 Aged (Age then test at 23 °C and application temperature)

7 days at 40 +/- 1 °C
90 days at 32 +/- 1 °C

The rheology variation for any one supplier shall be +/- 30%, based on the recorded rheology of the original approved production sample. The flow curves established for initial approval shall constitute the reference standard and shall be kept on file at the designated material laboratory. All samples shall produce flow curves that correspond to the reference standard when tested under the same conditions.

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

3.2.3 Solids 97% min
(ASTM D2834, except heat for 3 h at 100 +/- 3 °C
in a mechanical convection oven or FLTM BV 150-10)

3.2.4 Ash, based on solids weight A Comp: 0.9% max
(ASTM D482, or FLTM BV 150-10) B Comp: 47 % max

3.2.5 Weight per Volume
(ASTM D816)

Component A	Isocyanate:	1.19 +/- 0.02 kg/L
Component B	Resin:	1.45 +/- 0.02 kg/

3.2.6 Sag 20 mm max

Test Method:

Apply a 76 mm long right triangular shaped bead of material 6 mm wide at the base
And 15 mm high on a glass or steel panel.

Permit the panel to air dry for 30 minutes at 23 +/- 2 °C & 50 +/-5% RH. in a plane 60° angle from the horizontal. Measure the sag.



3.2.7 Sensitivity to Alcohol

CAUTION: Slight traces of alcohol will inhibit the cure of this adhesive. The use of alcohol or alcohol containing solvents is prohibited for cleanup or other uses.

3.2.8 Storage Stability

The supplier must label each container to indicate the expiration date of the material, and production usage beyond the expiration date is not permitted.

Shall be stored at ambient room temperature below 32 °C, away from all sources of heat, such as ovens, direct sunlight, etc. Shall not be stored outside. Under these storage conditions, the max shelf life of the material, from date of manufacture from the supplier, shall be 180 days stored in closed containers.

When stored at temperatures below 23 °C, it must be conditioned at R.T. for 72 h prior to use.

3.2.9 Odor Rating 3 max

(FLTM BO 131-03, variant D, cured material per 14 days at RT)

3.2.10 Fogging Test

(SAE J1756, 3 h at 100°C heating, 21°C cooling plate, post-test conditioning 16 hrs.)

Fog Number 70 min

Any fog film present shall be examined for the formation of droplets or coalescence into a clear film. Such conditions, if present, shall be cause for rejection. Cured samples shall be tested.

3.2.11 Quality

Shall be a smooth homogeneous mixture free from foreign materials and properties detrimental to normal production operation.

3.2.12 Non-Interchangeability of Materials

Only approved materials, all from the same production (supplier) source, shall be used in conjunction with one another.

3.2.13 Slippage 20 mm max

Test Method:

At 23 +/- 2 °C & 50 +/-5% RH, apply 2 parallel beads (approx. 12 g in total; triangle form, 9 mm base and 13 mm height) of material under test to a 100 x 300 x 0.8 mm ecoat panel and check for correct weight of applied bead of adhesive.

2 min after application assemble with a 100 x 300 x 0.8 mm ecoat panel to a bead thickness of 4mm and fix in that position for 10 s. Assemble test specimens with one each of both production ecoat substrates.

Remove distance spacers and turn assembly to vertical position and fix one glass plate, add a weight to lower glass specimen to a total weight force of 8 N and measure the slippage after 2 h.

Record all details of measurements and material under test.