



SEALER, 150 - 250% EXPANDING, PUMPABLE, WELDABLE

WSB-M4G60-B4

1. SCOPE

The material defined by this specification is a pumpable 150 - 250% expanding, weldable sealer for sealing metal joints. It is recommended that the material be warm applied up to 49 °C for enhanced material dispensing properties.

2. APPLICATION

This specification was released originally for materials to seal weld joints (cowl area, back panel, wheel house assemblies to quarter panels, body side to underbody assembly). The materials are applied to oily metal surfaces, steel and aluminum, and expand when processed through the electrocoat bake oven. Optimal material dispensing properties are achieved when these materials are temperature conditioned between 38 - 49 °C.

The Manufacturing Properties and Engineering Performance requirements defined in these specifications are based upon laboratory coupon testing and define the minimum acceptance criteria for sealer performance. The assembly process and design for the sub-assembly will determine the specific sealer processing parameters for each application. The sub-assembly engineering performance requirements are defined by the component SDS (Sub-system Design Specification).

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

3. REQUIREMENTS

Material specification requirements are to be used for initial qualification of materials.

3.0 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.

3.1 SYSTEM COMPATIBILITY

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

Date	Action	Revisions	Rev. 04
2016 10 17	Revised	See Summary of Revisions	S. Short, NA
2014 01 03	Revised	See Summary of Revisions	J. Herl, EU
1993 07 22	Released	NB00E10263630004	W. Curtis, E. Rezendes

**3.2 MATERIAL PROPERTIES**

- 3.2.1 Weight per Volume +/- 0.05 kg/L
(ASTM D816)

The weight tolerance for any one supplier shall be within the specified variance, based on the recorded weight of their original approved production sample. Reference paragraph 4.1.

- 3.2.2 Hardness, Durometer A +/- 5
(ISO 868/ASTM D2240, instantaneous
reading, cure material for 30 minutes
oven time at 182 °C, cool to 23 +/- 2 °C)

The hardness tolerance for any one supplier shall be within the specified variance, based on the recorded hardness of their original approved production sample. Reference paragraph 4.2.

3.3 MANUFACTURING PROPERTIES

- 3.3.1 Rheology
(SAE J1524, rotational 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 or 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 verses shear rate, submit plot for viscosity verses temperature at mid-range shear rate. If applicable, plots for each components and the final mixture must be submitted)

Initial (as received)

- Test at 23 +/- 2 °C
- Test at application temperature +/- 2 °C
- Test over range 10 to 50 °C at increments of 10 °C

Aged (age then test at 23 +/- 2 °C and application temperature)

- 7 days at 40 +/- 2 °C
- 90 days at 32 +/- 2 °C

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.





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

3.3.2.1	As received Based on original submission	+/- 10s
3.3.2.2	Aged (Material aged in closed container for 72 h at 40 +/- 1 °C, Conditioning Method B)	60% max increase from as received

3.3.3 Sag Resistance/Flow Rate

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

Test Method:

- Apply a 200 mm bead, 4 mm in diameter, of material along the center line of six CRLC steel panels and six galvanized panels per para 4.4.
- Scribe panels to mark the initial material location.
- Condition six panels, two panels for each position per substrate 40 +/- 2 °C for 24 hours if warm application of material is recommended.
- Immediately after conditioning, place panels in an oven to cure the material at the minimum bake per para 4.5. Maintain panels in the specified attitude during backing and cooling.
- Allow the panel to cool to 23 +/- 2 °C.
- Determine the sag by measuring the material movement below the scribe mark.
- Repeat the above procedure for the maximum bake per para 4.5.

3.3.4 Slump Resistance 3 mm max

- Assembly aged 24 h at 40 +/- 2 °C

Test Assembly: Two 25 x 100 mm coupons, prepared per para 4.4, with two 38 x 12 x 5 mm spacers. The spacers are placed at each end of one of the coupons, and sufficient sealer is applied between the spacers to fill the gap. The second coupon is placed on top of the sealer and spacers (Figure 1). Clamp the assembly with spring clips at each end. Remove excess sealer from all exterior edges with a spatula.

3.3.5 Wash Resistance No wash off
(FLTM BV 116-01, Method B,
1.5 mm material thickness)

3.3.6 Electrocoat Compatibility Shall not contaminate
(FLTM BV 119-01) electrocoat primer bath
or cause electrocoat
film irregularities

3.3.7 Welding Acceptance Test
(FLTM BV 109-01, except 72 hours at 55 +/- 2 °C heat exposure not required)

The sealer shall be weldable immediately upon application and after 30 days storage at temperature 40 +/- 2 °C.